

# AFRICA ENERGY YEARBOOK

2021/2022



## Hard choices

Africa's 'Just  
Transition' evolves

## Funds in focus

How can Africa  
attract institutions into  
its energy projects?

## Ahead of the curve

Tshifhiwa Bernard Magoro  
discusses the latest  
developments in  
African renewables

Official publication of the 24th Africa Energy Forum

In association with



In partnership with



African  
BUSINESS

ZAYED  
SUSTAINABILITY  
PRIZE



جائزة  
زايـد  
للاستدامة

# US\$ 3 MILLION GLOBAL AWARD CALLING ALL SUSTAINABILITY CHANGEMAKERS



HEALTH



FOOD



ENERGY



WATER



GLOBAL HIGH  
SCHOOLS

## SUBMISSIONS ARE OPEN UNTIL 6 JULY 2022

The Zayed Sustainability Prize is a US\$ 3 million global award for recognising small and medium-sized enterprises, non-profit organisations and high schools with impactful, innovative and inspirational sustainability solutions across the categories of Health, Food, Energy Water and Global High Schools.

**Apply now for a chance to scale your organisation or school's sustainable and humanitarian solution!**



@ZSP\_ORG | @ZayedSustainabilityPrize

[www.ZayedSustainabilityPrize.com](http://www.ZayedSustainabilityPrize.com)

# CONTENTS

- 7 **Welcome from the Editor**  
EnergyNet's Harpreet Sohanpal

- 8 **Photo Gallery**  
aef photo of the year  
competition



- 14 **Data section**  
**AFRICAN ENERGY IN FIGURES**  
Africa's electricity supply  
industry is gaining momentum  
despite crises and delays.

- 18 **Interview**  
**TSHIFHIWA BERNARD  
MAGORO**  
Head of South Africa's IPP  
Office.

- 20 **Interview**  
**HUSSAIN AL NOWAIS**  
Chairman, AMEA Power



- 24 **Utilities**  
**BIG CHALLENGES FOR  
AFRICAN UTILITIES**  
National utilities are being  
forced to modernise as IPPs  
enter the market.

- 28 **Interview**  
**ZIRIA TIBALWA WAAKO**  
CEO of the Uganda Electricity  
Regulatory Authority.

- 30 **Energy landscape**  
**THE BACK-UP PLAN**  
Africa's gas is more important  
than ever, post Ukraine.

- 34 **Climate policy**  
**AFRICA SEEKS MORE FAR-  
REACHING CLIMATE POLICY  
AND FINANCE**  
The COP26 climate change  
summit fell short of delivering

on its climate and finance  
promises for Africa. Can COP27  
in Egypt make up for it?

- 38 **Interview**  
**YEHIA ZAKI**  
Chairman, Suez Canal  
Economic Zone.

- 40 **Energy transition**  
**NOT BY RENEWABLES ALONE**  
How do renewables stack up  
against traditional forms of  
energy in Africa?

- 46 **Finance and investment**  
**GOING PRIVATE**  
IPPs across Africa are  
growing in size and scale,  
thanks to their ability to  
attract a more diverse array  
of financing.





#### 48 *Finance and investment* **ATTRACTING INSTITUTIONAL INVESTORS**

Attracting institutional investors and pension funds to Africa's energy transition remains a challenge in a world in flux.

#### 54 *Interview* **JAMES DOREE**

Managing Director, Lion's Head Global Partners.

#### 56 *Interview* **MANDY RAMBHAROS**

General Manager, Eskom Holdings Just Energy Transition.

#### 58 *Case study* **KENYA SEEKS TO MAXIMISE BENEFITS FROM 'BASELOAD' RENEWABLES**

Kenya's geothermal and hydropower resources have been major contributors to the country's success in boosting electricity access rates, but can they play a leading role in meeting surging energy demand in the future?



#### 62 *China-Africa* **CHINA'S COAL PLEDGE BITTERSWEET FOR AFRICA**

China's decision to ditch financial support for coal projects abroad has already hit projects in Zimbabwe and Kenya.

#### 64 *Green hydrogen* **AFRICA AND GREEN HYDROGEN: A PERFECT MATCH?**

Green hydrogen projects could prove vital in the fight to stem global warming, and African countries could be poised to play a pivotal role as hydrogen production and export hubs.

#### 66 *Future energy* **OFFGRID SOLAR SECTOR SEEKS TO REBUILD INVESTOR CONFIDENCE**

There are signs of post-pandemic recovery for Africa's offgrid solar industry. Now it needs to lure back the investors.



**70 Offgrid investment**  
**KEEPING THE FUNDS FLOWING**  
**INTO AFRICA'S OFFGRID**  
**PROJECTS**

Innovative financing solutions are helping investment to keep flowing into African offgrid renewables projects despite the difficult operating environment.

**74 Geothermal energy**  
**KENGEN TARGETS EAST**  
**AFRICAN GEOTHERMAL**  
**OPPORTUNITIES**

Once considered prohibitively expensive, geothermal energy is gaining in prominence as part of the global energy transition.

**78 Sustainable development**  
**GABON PLOTS FOREST**  
**PATH TO SUSTAINABLE**  
**DEVELOPMENT**

With 88% of its surface occupied by rainforest, Gabon is in a strong position to develop its green economy.



**106 Last Word**

**ONE RULE FOR THEM?**

Hydrocarbons-related projects across the globe are finding it difficult to get a hearing, but is Africa still being held to tougher standards than the rest of the world?



**AFRICA ENERGY YEARBOOK –**  
**VOLUME 14, JUNE 2022**

PUBLISHED BY:

**EnergyNet Limited**

Fulham Green  
Bedford House  
67-79 Fulham High Street  
London  
SW6 3JW

**EnergyNet Limited**

**CLARION**  
EVENTS



**EDITOR**

Harpreet Sohanpal  
harpreet@energynet.co.uk  
+44 (0) 20 7384 7955

**SUB-EDITOR**

Charles Dietz

**ART DIRECTOR**

Steve Bell

**PRODUCTION MANAGER**

Stuart West  
Copyright © 2022

EnergyNet Limited

ISBN 978-1-9996197-0-1

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of EnergyNet Limited.

[www.energynet.co.uk](http://www.energynet.co.uk)

EnergyNet Limited

CLARION  
EVENTS

# EnergyNet 2022-2023 Calendar of Forums



MARCH 2023, WASHINGTON DC, USA



12-16 DECEMBER 2022  
PANAMA CITY, PANAMA



20 – 23 JUNE 2023  
KENYA



20 – 23 JUNE 2023  
KENYA



1-3 FEBRUARY 2023  
DAR ES SALAAM, TANZANIA



30 NOVEMBER – 2 DECEMBER 2022  
CAPE TOWN, SOUTH AFRICA

NEW

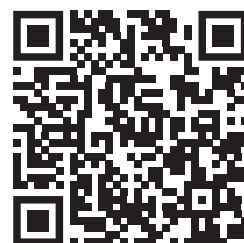


*\*Dates & locations are subject to change*

Contact us, for more information about participating as a speaker,  
sponsor or attendee at [events@energynet.co.uk](mailto:events@energynet.co.uk).

[www.energynet.co.uk/events](http://www.energynet.co.uk/events)

REGISTER YOUR  
INTEREST HERE!





*Harpreet Sohanpal*  
Director - Marketing Operations  
EnergyNet Ltd

# WELCOME

*Welcome to the 2022 edition of the Africa Energy Yearbook, produced in partnership with African Business magazine, and the 24th annual Africa Energy Forum in Brussels.*



**W**elcome to the 2022 edition of the *Africa Energy Yearbook*, produced in partnership with *African Business* magazine, and the 24th annual Africa Energy Forum in Brussels.

We would like to thank all our authors, interviewees and contributors for giving us a detailed insight into the challenges and successes as well as the opportunities that are present in sustainable development. This edition of the *Africa Energy Yearbook* provides an overview of the continent's energy transition plans and projects.

## SOME HIGHLIGHTS FROM THE YEARBOOK INCLUDE

Big challenges lying ahead for African utilities, as they are expected to maintain supplies for rapidly growing populations while extending limited power grids. Many face growing competition from independent power producers (IPPs) while being tasked with hitting government targets in a way that other generators are not (see pg.24).

Uganda is providing a robust example to the rest of the continent when it comes to renewable power initiatives. "The regulatory climate in Uganda has been assessed as the best on the African continent for the last four consecutive years." Read the full interview with Eng. Ziria Tibalwa Waako, CEO of the Uganda Electricity Regulatory Authority (ERA) on page 28.

The offgrid solar sector is seeking to rebuild investor confidence post-pandemic as the African offgrid solar industry recovers. The sector is growing but is in urgent need for further support. Bringing solar power to communities both remote and in more populous areas that suffer from inadequate grid provision is regarded as vital if the UN sustainable

development goal of bringing universal electricity access to all by 2030 is to be realised (see pg. 66).

Kenya Electricity Generating Company (KenGen) is targeting East African geothermal opportunities. Geothermal energy is a fundamental resource which is at the centre of Kenya's energy policy and East Africa's energy transition. At the end of November, KenGen started drilling geothermal wells in Djibouti in a bid to reduce the country's dependence on imported electricity and fuels and meet the increasing demand for energy from large-scale developments including urban, port and industrial infrastructure (see pg.74).

We are pleased to announce that KenGen will be country hosts at the 25th annual Africa Energy Forum taking place on 20-23 June 2023, in Nairobi, Kenya!

Additionally, we are hosting Africa's first Offshore Technology Africa Forum (OTA) (30 November to 2 December) in Cape Town, South Africa, where we will be unlocking Africa's Blue Economy and offshore wind and gas.

We're particularly excited to be back in Tanzania for the 7th year following a brief hiatus as the country further showcases its open-for-business-strategy for private sector development. The Tanzania Energy Cooperation Summit (TECS) takes place on 1-3 February 2023 in Dar es Salaam, Tanzania.

These business development meetings are designed to further your objectives in key markets and we look forward to working with you to make them as valuable as possible to your corporate goals.

Meanwhile, we look forward to seeing you all at the Africa Energy Forum. ■

Photo of the year

# AEF PHOTO OF THE YEAR COMPETITION RETURNS FOR 2022

*We are excited to bring the Photo of the Year competition back at aef, as we return to the full scale conference and exhibition on 21-24 June at Tour & Taxis in Brussels.*

Our Photo of the Year competition celebrates excellence in the transformative impact of Africa's energy projects.

This year we have introduced three new categories:

## ENERGY IN ACTION

Using energy for work; energy in motion; energy in the community.

## ENERGY IN LANDSCAPE

Energy as a visible part of the landscape, including hills, rivers, buildings, trees, and plants.

## ENERGY AND YOUTH

Energy connecting and empowering youth, entrepreneurs, early career professionals.

The shortlist has now been drawn up. EnergyNet and the aef team would like to say thank you to everyone that entered the aef Photo of the Year competition. We were inundated with so many inspirational photos sent in for all three categories, a testament to how many transformative energy projects have impacted Africa and its community.



**THE WINNERS WILL BE ANNOUNCED LIVE AT THE AFRICA ENERGY FORUM ON 21ST JUNE AT TOUR & TAXIS, BRUSSELS.**

All shortlisted photos and winners will be showcased during the 24th annual Africa Energy Forum on 21-24 June 2022 at Tour & Taxis in Brussels. The winning company[s] or individual[s] will receive an enlarged copy of the winning photo, and it will be displayed and credited in the Africa Energy Yearbook, EnergyNet Magazine, aef website and on the EnergyNet homepage for 3 months.

**GOOD LUCK TO ALL THE FINALISTS!**

The aef Team



## ENERGY IN ACTION



**Left: BTE  
Renewables – Site  
construction  
100 MW.**

**Below: African  
Infrastructure  
Investment  
Managers [AIIM]  
– Off-grid solar  
energy solutions  
to communities  
without access to  
a formal electricity  
supply.**



**Above: Power Africa  
– Electricity access  
is crucial for Avelino  
Martin's carpentry  
business in Luanda,  
Angola.**

**Right: InfraCo  
Africa – Water flows  
using solar powered  
irrigation, Senegal.**





## ENERGY IN LANDSCAPE



**Left: Vestas – V52-850kW Kenya, Lake Turkana.**

**Below: Juwi – Garob storm.**



**Above: Distributed Power Africa – Tanganda Tea Estate.**

**Right: African Infrastructure Investment Managers [AIIM] – Cookhouse Wind Farm.**





## ENERGY AND YOUTH



**Left: Globeleq** – Raphael is one of the hundreds of young energy professionals who has progressed through the industrial practical training at the Songas power plant, Tanzania.

**Below: Kipeto Energy** – To support the youth in Esilanke where our wind farm is located Kipeto Energy has employed resident youth.




**Above: Solar Giraffe** – Young girl charging her phone on the Solar Giraffe in Mangunze Gaza Mozambique.

**Right: Power Africa** – Electricity powers small businesses and creates brighter future for children.

# GREEN HYDROGEN – IMPLICATIONS AND PROSPECTS FOR AFRICA

*Energy security is back in the spotlight as a result of the war in Ukraine and sanctions against Russian oil and gas. At the same time, the global transition to renewable energy is accelerating.*



**E**nergy experts presented green hydrogen as a viable solution on both fronts at a recent webinar and publication of a new whitepaper, ‘Unlocking European Energy Security with clean, affordable and domestically produced renewable energy and green hydrogen’. The paper, published by Siemens Gamesa Renewable Energy presents a convincing case for green hydrogen in helping secure Europe’s long-term energy supply and meeting net-zero targets.

With increasing energy interdependence globally, will a transition from fossil fuels to renewables and green hydrogen in Europe impact Africa? As the continent with one of the least developed renewable energy sectors, what are the prospects for green hydrogen in Africa?

## A GREEN ROUTE TO CARBON NEUTRALITY

Hydrogen has been used as a fuel for decades. It is produced by using electrolysis to split water molecules. When renewable energy is used for its production, the result is green hydrogen, a carbon-neutral gas that

can be transported via pipeline and storage containers to where it is required.

According to the ‘Unlocking European Energy Security’ whitepaper, green hydrogen is the only viable option to reduce the greenhouse gas emissions from heavy industries such as fertilisers, cement, iron, and steel and as a fuel for long-haul aviation, trucking, and ships.

## GREEN HYDROGEN AND AFRICA

With abundant renewable resources – nonarable land, sun, wind and hydropower - Africa is rich in many of the ‘raw materials’ required to produce renewable energy at scale, which can, in turn, be used to manufacture green hydrogen. According to the World Economic Forum 9% of all energy generated in Africa came from renewable sources in 2020, of which 6.8% came from hydropower.

Several African countries are actively pursuing UN SDGs and implementing renewable energy plans. Egypt has committed to source 42% of its total electricity from renewable energy by 2035 and Morocco has a renewable energy target of 52% by 2030. South Africa





## Unlocking European energy security

[Click here to read the Renewable Energy White Paper](#)

intends to install an additional 3.3 GW of wind energy capacity over the next five years, to cover around 20% of the country's energy consumption.

Several green hydrogen initiatives are already underway on the continent: The Africa Green Hydrogen Alliance was formally launched at the first-ever Green Hydrogen Global Assembly in Spain last month (May 2022). Founding partners Egypt, Kenya, Mauritania, Morocco, Namibia, and South Africa are encouraging other countries to join in developing a robust green hydrogen ecosystem.

Egypt and Zimbabwe have already installed over 100 megawatts of electrolyzers and there are plans in place to build further green hydrogen projects in Egypt, Mauritania, Morocco, Namibia and South Africa.

### CHALLENGES AND OPPORTUNITIES

The International Renewable Energy Agency (IRENA) advocates renewable energy as an answer to many of Africa's economic, environmental and social challenges; a way to overcome energy poverty and support development without damaging human health or the environment.

Africa is heavily reliant on fossil fuels for power and they account for around 50% of export revenue in the sub-Saharan region, according to the World Bank. Although a shift to renewables is likely to reduce fossil fuel exports from Africa, it also brings export opportunities.

Several countries are already benefitting from the increased global

demand for mineral resources used in the production of batteries and wind turbines - nickel, copper, and cobalt. And there is also enormous potential to increase exports of renewable energy.

In March, the EU announced an additional 10 million tonnes of green hydrogen imports per year, as part of the RepowerEU plan to offset Russian gas supplies. This is in addition to the EU's existing target of consuming 20 million tonnes of green hydrogen by 2030, with 10 million tonnes locally produced in Europe and the other half imported.

At the same time, there is enormous potential to increase renewable energy exports. The European Union is working to shift to green hydrogen by 2050, with imports from Africa and other regions part of the equation. In March, an additional 10 million tonnes of green hydrogen imports per year was announced, as part of the RepowerEU plan to offset Russian gas supplies.

The International Renewable Energy Agency (IRENA) advocates renewable energy as an answer to many of Africa's economic, environmental and social challenges; a way to overcome energy poverty and support development without damaging human health or the environment.

It can create jobs. For example, the green hydrogen facility planned for the Northern Cape region of South Africa is forecasted to create 20,000 jobs by 2030. The IRENA African Development Bank (AfDB) report anticipates Africa's energy transition can create 26 million jobs by 2050.

### REQUIREMENTS

Unlike some areas of the world where existing infrastructure e.g., natural gas pipelines can potentially be repurposed, a green hydrogen economy in Africa will require major investment which is currently lacking. A recent IRENA report, in collaboration with the AfDB, showed that in the past two decades only 2% of global renewable energy investment went to Africa.

This appears to be changing. There is some international recognition and commitment to growing a green hydrogen economy in Africa. The H2Atlas-Africa project – a joint initiative of the German government and sub-Saharan African partners aims to produce 165,000TWh annually in West Africa across several projects. Germany has also signed partnerships with Namibia and the Democratic Republic of the Congo, as well as collaborative projects with South Africa and Morocco.

A supportive legislative framework is crucial. According to IRENA and the AfDB, an integrated energy transition framework could attract sustainable energy investment to grow the regional economy by 6.4% by 2050.

With access to finance, technology and a more supportive legislative framework, Africa can become a significant contributor to a fairer global energy transition. To this end, Europe and Africa together can exercise much greater influence within the green hydrogen sector, thus forming a strong, inclusive, and green hydrogen transformation. ■



# AFRICAN ENERGY DATA

*Africa's electricity supply industry gaining momentum despite crises and delays*

Uncommon with other industries, Africa's power sector has suffered major challenges during the Covid-19 pandemic, resulting in delays, cancelled projects, and new ways of working. Problems remain, but there are indications that some momentum is returning.

2021 marked a low point for new capacity being brought online in Africa, preliminary figures from African Energy Live Data show, in a blow for ambitions to industrialise. A net 5,733 MW was added to the continent's grid during the year, the lowest figure since 2012. While 2020 saw some recovery towards the end of the year as projects at advanced stages of construction were able to make the final push following the initial lockdowns, projects at an earlier stage of construction or late stage of development were more severely impacted by pandemic restrictions resulting in delays across the board in 2021.

Travel restrictions proved particularly problematic early in the pandemic, with some companies withdrawing

from projects as staff could not travel while others struggled to bring in specialists. As the pandemic has gone on, the increasing cost of key components and logistics has undermined business cases, with an exaggerated impact in Africa where development timelines are often drawn out, increasing the inflationary effect on financial models. Cost inflation for developers is proving a significant problem for often too

an impact and many projects which had been scheduled to begin operating in 2021 will not produce their first electrons until late in 2022 and in some cases 2023.

Constrained national budgets and growing debt even before the pandemic, coupled with weak growth, has reduced African governments' ability to underwrite the power sector. Most African governments provide subsidies

*There are signs that the industry is slowly turning a corner. Reforms in major markets such as South Africa and Nigeria are still at a very early stage and will require skilful implementation by policymakers.*

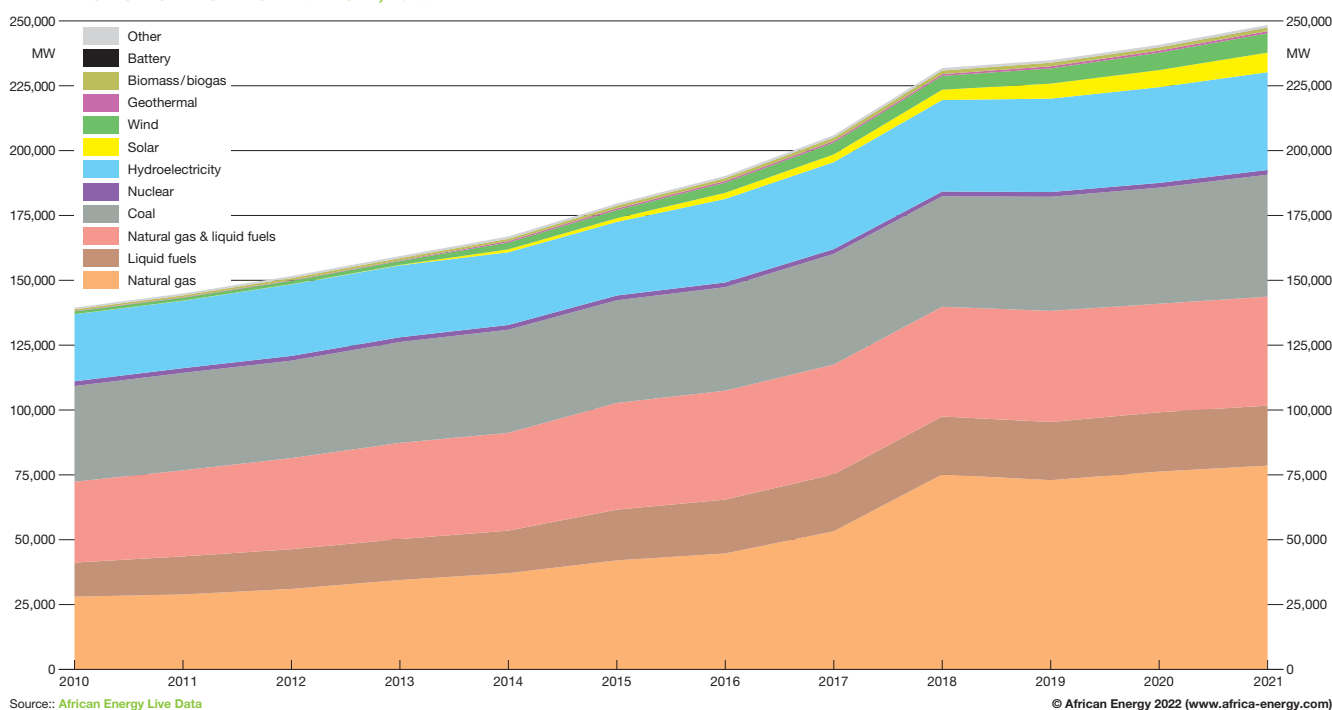
slow procurement programmes, with bidders struggling to anticipate price rises sometimes years in the future when setting out their bids.

Russia's invasion of Ukraine and continued lockdowns in China mean that these pressures continue to have

to loss-making utilities and are often asked to provide guarantees to private developers. The result has been a dramatic reduction in power purchase agreements (PPAs) signed with independent power producers. Live Data recorded PPAs signed for 1,479 MW



ALL AFRICA ON-GRID CAPACITY BY FUEL, 2010-21



new capacity in 2021 compared with 5,417 MW in 2020 when national authorities were more optimistic that the impact of the pandemic would be short-lived. The five-year annual average 2016-2020 was 4,410 MW.

### Has the industry turned a corner?

There are signs that the industry is slowly turning a corner. Reforms in major markets such as South Africa and Nigeria are still at a very early stage and will require skilful implementation by policymakers. Slowdowns in new capacity additions in North Africa as well as major Sub-Saharan markets such as Ghana, Kenya, Nigeria, and South Africa had impacting new capacity even before the pandemic. Net new capacity added in 2019 was 9,115 MW, down from a five-year average of 12,400 MW in the years 2014-18 as the attention of policymakers and development finance institutions turned towards bottlenecks in transmission and distribution as well as sector liquidity.

However, developers, financiers, and construction companies are reporting healthy deal flow, driven in particular by renewable energy projects. Growth in solar and wind capacity remained relatively robust during the pandemic, with a combined 1,451 MW new on-grid solar and wind capacity added in 2021 and 1,556 MW in 2020, compared with a five-year average of 1,466 MW 2015-19.

Rising oil and gas prices may add further impetus to renewable energy development. Diesel prices have increased dramatically in the wake of Russia's invasion of Ukraine, hitting African businesses and utilities that remain heavily reliant on generators and impacting governments' balance of payments.

The 2021 slowdown was driven by fewer projects coming online in North Africa, where massive investment programmes implemented in the second half of the 2010s culminated in 2018 with a massive 14.8GW being brought online in the region alone. But new capacity has been added in

Sub-Saharan Africa at a relatively steady rate, with 3,394 MW added in 2021, 3,140 MW in 2020, and 3,579 MW in 2019. While a slowdown on the middle of the decade, a glut of projects during the earlier period exposed bottlenecks elsewhere in the supply chain which has delayed the addition of more capacity.

Private sector investment also remained relatively consistent during the pandemic. A net 2,283 MW of privately owned capacity was added to the grid in 2021 and 2,026 in 2020, compared with a five-year average of 2,530 MW/yr 2015-19. State-owned projects continue to be more significant for the grid, accounting for 76% of net new capacity added each year on average.

Public investment has focused on baseload and dispatchable technologies. Of the net 3,705 MW new state-owned capacity added in 2021, 2,047 MW was gas, 1,200 MW coal, and 325 MW hydropower. In contrast, the private sector is heavily invested in renewable energy, with

## Data section

717 MW of the 2,283 MW net new privately-owned capacity solar and 672 MW wind.

This is typical of the division of investment in recent years. Between 2017 and 2021, 75% of new state-owned capacity was gas, 11% coal, and 11% hydropower. If North Africa is excluded, 40% of new state-owned capacity was hydroelectric and 39% coal, followed by 9% liquid fuels (mostly diesel and heavy fuel oil) and 8% natural gas. Private investment across the continent as a whole has been only slightly more diversified, with solar capacity accounting for 38% of new privately-owned capacity added over the period. 25% was wind, 12% coal, 9% gas and 7% hydropower.

The resilience of private sector investment is encouraging but ensuring that public and private interests align remains critical to creating a sustainable investment climate. Utilities have on some occasions struggled to accommodate variable renewable power onto intermittent networks or into markets without the right contractual and market structures to make the most of the technologies. Public and private investments need to be made with a clear view of the best allocation of risk, competence, and financial capability.

## THE RISE OF C&I SOLAR

As investors have become frustrated with a lack of on-grid opportunities, forcing them to fight aggressively for the most promising projects, they have taken advantage of technological and business innovation – as well as the availability of climate-linked finance – to move into commercial and industrial (C&I) solar. Africa has a number of increasingly well-established solar PV developers specialising in C&I solar and is starting to see larger utility-scale developers move into the space. The sector has also at-

tracted significant institutional investment over the last few years.

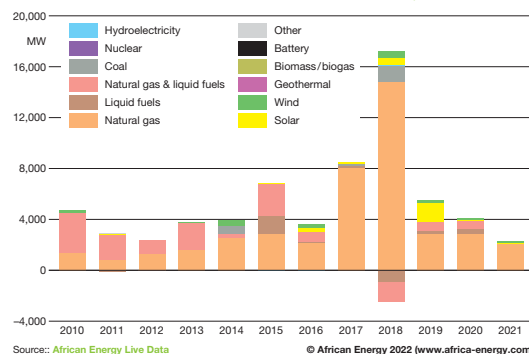
Live Data does not have comprehensive figures for off-grid and embedded generation but several trends are clear. While Live Data has not recorded significant changes in the overall amount of new off-grid and embedded – power plants supplying grid-connected customers and so ‘embedded’ within the grid but not supplying it – capacity, the breakdown of technologies has begun to change.

Between 2010 and 2015, the traditional technologies of liquid fuels, natural gas, and biomass (largely from bagasse, a by-product of sugar cane production) accounted for an average of 88% of all off-grid and embedded capacity added. But 2016–2021 showed a rapid shift towards solar, wind, and battery technologies. These accounted for 35% of net new capacity over the period, but more than 50% in 2019 and 2021. In 2021, more solar capacity was added than any other technology, accounting for 40% of the total. The technology averaged 30% of new off-grid and embedded capacity added each year between 2018 and 2021.

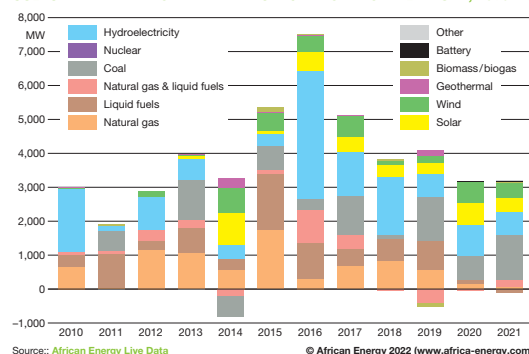
## NOT OUT OF THE WOODS

Tough times will continue for some time as the shockwaves from multiple crises work their way across the continent over the next few years. However, there is optimism in the industry that deal flow is improving and that reforms in major markets will begin to bear fruit. At the same time, the appetite amongst investors for exposure to renewable energy projects on the continent remains strong and growing. But it is also clear that the scale of investment and rate of increase of installed capacity must grow by an order of magnitude for Africa to come close to achieving its urgent electrification and industrialisation goals. ■

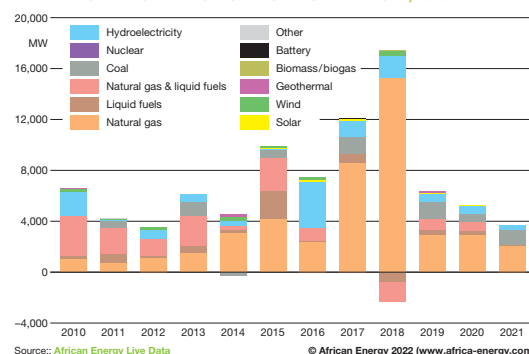
NORTH AFRICA: NET NEW ON-GRID CAPACITY BY FUEL, 2010–21



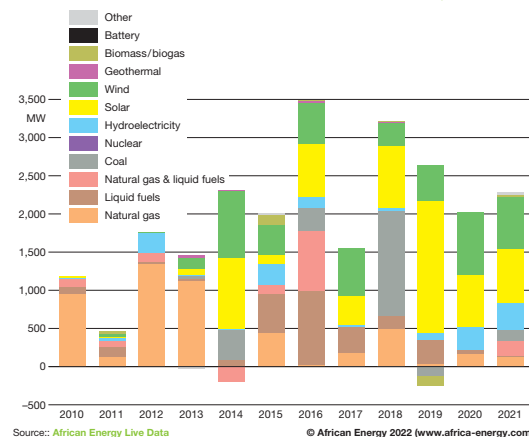
SUB-SAHARAN AFRICA: NET NEW ON-GRID CAPACITY BY FUEL, 2010–21



NET NEW STATE-OWNED ON-GRID CAPACITY BY FUEL, 2010–21



NET NEW PRIVATELY-OWNED ON-GRID CAPACITY BY FUEL, 2010–21





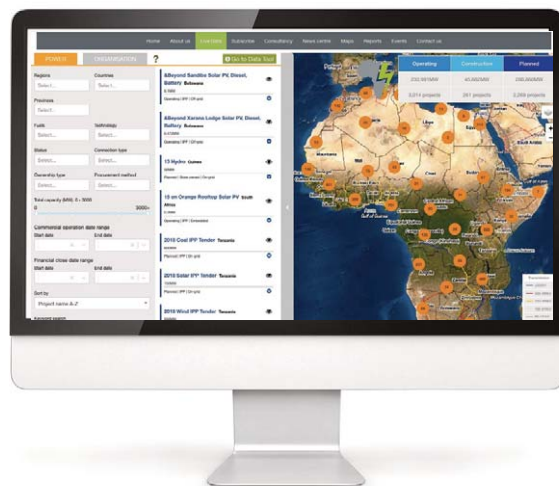
# Power market intelligence for a challenging environment

Identify opportunities for investment and sales with detailed project information and data on more than 7,000 power plants and projects and the organisations behind them

African Energy Live Data is an innovative online database dedicated to the African electricity supply industry. Analyse the competitive environment and assess power plants and the project pipeline based on independently researched and verified information.

## Features and benefits

- Find projects matching your market profile and build informed country-by-country market development plans
- Search for the organisations behind each power plant and project. Identify owners, developers, offtakers, financiers and their portfolio of projects.
- Support strategic planning by analysing country data from 2010 and projections five years into the future, alongside key economic & demographic statistics.



## Live Data can help your business

In addition to subscriptions to the full platform, we can provide a tailored package, providing data for energy modelling, mapping, sales, analysis, or case studies.

Contact us to arrange a demonstration of the platform.



*Tshifhiwa Bernard Magoro*  
*South Africa's IPP Office*

# STAYING AHEAD OF THE CURVE

*South Africa is making huge strides in renewables. Tshifhiwa Bernard Magoro heads up South Africa's IPP Office. Here he talks Bill Lumley through some of the latest developments*



### **South Africa has some of the lowest renewable energy tariffs in the world. What has made this possible?**

Through the competitive, independent and transparent bidding process under the Independent Power Producer Procurement Programme (IPPPP), South Africa has been able to effectively leverage rapid, global technology developments and price trends, which has resulted in lower rates with every bid cycle. Strict adherence to these procurement principles has contributed to the high level of participation by developers from all over the world, and in most cases oversubscribed bid rounds have resulted in extremely competitive pricing.

This also demonstrates market confidence in our procurement process gained from years of consistently doing the right thing and doing things right.

Another important factor that has impacted on pricing in South Africa is the government support provided in relation to the obligations of the Buyer, which has been the national utility Eskom to date. Such support remains critical until we establish alternative mechanisms to reduce government liability.

It is notable that these competitive prices also reflect significant obligations on IPPs in respect of economic development commitments over the life-time of the project, which is a

unique feature of South Africa's IPP procurement model. These include commitments around broader ownership and local participation, local content and broad-based procurement, job creation, skills development and socio-economic initiatives in the communities within which the projects are located.

### **Could you highlight standout energy sector PPPs?**

As an independent procurement office, it would not be appropriate for us to comment on individual projects. However, the programme collectively has achieved many firsts, including, most recently concluding agreements on 2 June 2022, for the first dispatchable renewable plant to be built in Africa.

The first bid window under the IPPPP was announced in December 2011. By February 2022, 5,826 MW of electricity capacity from 87 IPP projects have already been connected to the national grid and supplying energy to Eskom. Through the IPP projects we have attracted investment into our economy to the value of R209.6 billion. These projects have specifically prioritised jobs for youth, women and citizens from local communities. Through the IPP Programme, 63,291 job years (the equivalent of a full time employment opportunity for one person for one year) have so far been created for South African citizens in the construction and operation of IPPs.



Total socio-economic development and skills development expenditure by operational IPPs to date is around R2.5 billion, which has contributed to skills and enterprise development, as well as health, education and social welfare initiatives in the broader communities where IPPs are located.

### **The cap on private power generation without a licence in SA was lifted from 1 MW to 100 MW. What is the significance of that move?**

Firstly this policy signifies Government's commitment to speedy resolution of the current energy deficit. The lifting of the cap is also a significant step towards the establishment of the electricity market reform in the country, as intended in the ERA Amendment Bill released earlier this year by the Department for public comment. The end state envisioned by the Bill caters for three kinds of transactions, including willing buyers and willing sellers, physical bilateral transactions, and the regulated transactions.

### **What else is being done to increase the speed of the solar and wind roll-out?**

The Minister of Mineral Resources and Energy has committed to more regular procurement bidding windows in line with the country's Integrated Resource Plan (IRP) 2019.

Other recent legislative changes include the enabling of municipalities and large industrial consumers to purchase electricity directly from IPPs, which will further stimulate investments in renewable energy. Roof top PV in commercial and residential sector is also gaining momentum

The Minister has committed to re-

visit the IRP to bring it in line with the current realities of the energy shortages.

### **The government's Integrated Resource Plan suggests the country needs 20.6 GW of new solar and wind capacity by 2030 to meet demand. Is that manageable?**

In fact if one considers some of the assumptions made then, we need much more capacity to come online by 2030 than initially anticipated.

The energy procurement plan under the IRP is the most ambitious that the country has seen in over a decade. The 13,813 MW new generation capacity that has been determined to date represents only 44% of the total 31,488 MW target for 2030 under the IRP. Further determinations will be made in order to reach the 14,400 MW total target for wind generation and 6,000 MW target for Solar PV generation by 2030.

The procurement target is manageable, however, there are also other critical factors that need to be addressed to enable this roll-out, which include grid development investment and revitalising local manufacturing, which has been eroded as a result of the long delays in procurement and global factors such as the COVID-19 restrictions. Other government regulatory approvals such as environmental authorisations will also have to be streamlined for a faster turnaround times.

### **What is the role of gas IPPs in SA's energy transition?**

South Africa's National Development Plan (NDP), the IRP and several national gas policies, including the more

recent Gas Master Plan base case, all recognise the important role of gas in the energy mix, particularly as a transition fuel towards net zero. The gas economy will also foster the creation of new job opportunities and skills required to develop, construct and manage new import, transport and consumption infrastructures as well as the tertiary sectors. South Africa's power, industrial and transportation sectors also show great potential to contribute to a gas market development.

The IPP Office has been tasked with the design of a Gas IPP procurement programme in line with the Ministerial Determination of 3,000 MW, which is the total gas generation allocation under the IRP up to 2027. This is a complex programme involving a multitude of stakeholders and as the procurement is still at conceptual phase, we cannot yet share more details on this. The green hydrogen gas economy is also going to be a game changer in this country.

### **Coal still accounts for most of SA's energy supply. What else can be done to drive down that share faster?**

This is a policy matter that is not in the domain or mandate of the IPP Office. Suffice to say that South Africa's energy planning process takes full cognisance of the country's commitments to reduce emissions, whilst at the same time being sensitive of the massive economic and socio-economic transition implications on local economies, workers and communities. What is also evident is that in recent past coal plant performance has been deteriorating at a much faster rate than initially planned in the in-IRP. ■

## Interview

**Hussain Al Nowais**  
Chairman, AMEA Power

*Multinational Independent Power Producer AMEA Power is focused on delivering renewable energy solutions to emerging markets in Africa, the Middle East and Asia. AMEA Power's Chairman **Hussain Al Nowais** explains to Bill Lumley his passion for investment in wind and solar energy across the African continent*

**One of the most outstanding stories in the region is the speed with which AMEA Power has grown in a short period of time. Between the inception of the organisation and today, you have already built a significant pipeline. Can you outline a timeline of this and other key projects AMEA Power has going forward, under development or in construction, to get a vision of the direction you are looking to take?**

We began in 2015 when Egypt and Jordan were our first entry into this business. Our largest exposure in the company is 1,000 MW in Egypt, which comprises 500 MW of wind and 500 MW of solar.

These two projects are on target to achieve financial close in November this year. Once financial close is achieved, the construction of both the

wind project and the solar project will be launched. We are working in this regard with a major development financial institution. The EPC contractor and the permits are ready. So basically, it's a ready-to-go project.

In Jordan we have 100 MW in operation, comprising 50 MW of wind and 50 MW of solar. We have also successfully connected our first developed project in Sub-Saharan Africa to the grid, a solar power plant in Togo, West Africa. These three renewable energy projects reached commercial operation in the year 2021.

The Togo project is one I'm particularly proud of. We took the whole project from inception to completion in just 18 months, building a 50 MW solar plant in Blitta in the north of the country. I'm not just proud of that project, but I'm also most grateful to the President of Togo, who awarded me with the Commander of the Order of Mono medal in recognition and ap-



preciation for the speed with which we carried out the entire project, despite the fact that it was undertaken during the COVID-19 pandemic. There were all kinds of challenges that we had to overcome, yet we were able to deliver the project successfully. The solar power plant is currently in operation, the client is happy and so are we. And in fact, they are now extending our concession to an additional 20 MW with battery storage.

### **What challenges did you face and how did you manage to overcome them?**

We advanced our equity and did not wait for financial close to fulfil the commitment I made to the government for the construction to start immediately.

The debt financing came in after the project had begun construction, by which time we had already extended large sums of cash from our equity funds. So, we funded it, and then received financing from the West African Development Bank, together with the Abu Dhabi Fund for Development. It was confidence and a passion for success that drove us to complete the project, which is in operation today.

Now we have started construction on a project in Burkina Faso, a 26.6 MW solar plant. This is a challenging geography and also a challenging time. Despite these hurdles, we have already embarked on the construction of the solar power plant. The debt financing for the project came from the International Finance Corporation (IFC), the IFC-Canada Climate Change Program and the Emerging Africa Infrastructure Fund (EAIF).

In addition to Burkina Faso, we have also launched the construction of a 34 MW solar plant in the north

of Morocco, with a local partner. The construction is being financed by local banks in Morocco.

Morocco is a significant market for us, as it has established itself as a regional leader in clean energy, pushing forward a number of large-scale renewable energy projects. Morocco's target is to increase its renewables share to 52% by 2030, and we look forward to supporting the country in achieving its objective and diversifying its energy mix.

We are also on course to start construction by the end of this year on a 100 MW solar power plant in Tunisia, funded by two major development finance institutions.

Two and a half years ago, AMEA Power was formally awarded the

100 MW solar power plant project in Kairouan after an international competitive tender aligned with the Tunisian government's 2030 New Energy Vision, as part of a large 500 MW solar programme.

We were very excited about being awarded a large renewable energy project in one of our key target markets, and we are happy to support the country in achieving its objective to diversify its energy mix.

AMEA Power is also undertaking a 30 MW solar project in Djibouti; a 50 MW solar project in Côte d'Ivoire, a 20 MW solar project in Uganda; and a 50 MW wind plant in Kenya. We are also pursuing solar and wind opportunities in Ethiopia, Zambia, South Africa and others. In our portfolio today



## Interview

### *Hussain Al Nowais* Chairman, AMEA Power

we have secured about 2000 MW, and we have another 1000 MW of prospective pipeline that we are pursuing across the continent of Africa. AMEA Power will then become a 3 GW power company.

#### **Can I ask you what your vision is in the medium to long term in Africa?**

We passionately believe in Africa. We saw the potential of Africa and in the subcontinent, Sub-Saharan Africa, six years ago, when we saw the shortage of power combined with the demand for power. We went ahead and took the risk. A lot of people did not believe that things can move in Africa. It's true, it takes time, you have to be patient there. You also have to work closely with the clients and share knowledge on the concept of IPP, as some are not familiar with this scheme. But I am delighted to say that we are now making great progress and creating impact. We credit this to our teams and our various partners.

Our approach is to work hand in hand with our partners and clients. We believe in the spirit of partnership, and we are committed to the communities we work in. And again, I come back to Togo. We succeeded there because we worked hand in hand with the government as a partner. We trained the local community on the construction and the operation. We spent a great deal of time and effort in sharing knowledge and training them. We contributed to their social needs, by building (and providing equipment) to a clinic, and building and renovating schools for the community.

Partnership with the community is a theme and a philosophy we have adopted in Africa. We are in their communities and in their villages.



You need partnership; you need to have that common trust and common belief in the project and the need of the society.

We understood the continent, we understood the ways the different countries and communities operate, and we work with them as partners. With an open book, transparent and supportive approach, we follow the rules, we follow the ethics, we follow the code of conduct, and we work hand in hand with the communities and the government.

#### **Looking ahead in terms of the whole area of decarbonisation, can you outline your strategy, what you've achieved in this regard so far, and what your plans have regard for the future?**

We are now focusing on providing wind power, solar power and battery storage, when needed, delivering this all in a diverse and challenging geographic environment.

There are now two new angles we

are pursuing in Africa, two areas we are working on. The first is the green hydrogen concept, which is becoming extremely attractive in Africa, given the wealth of solar and wind resources available in a number of African countries.

The second new aspect we are pursuing is that of water. There is a distinct scarcity of water in Africa, and several countries have a great need for it. For this reason, we are pursuing projects such as desalination – treating sea water and converting it to drinking water and usable water. This process will again happen through green power – using reverse osmosis technology and powering the process through green power.

We are also pursuing green hydrogen, because, again, hydrogen is central to decarbonisation, the process of reduction of carbon emissions which everyone in the energy business is keen to pursue through the green hydrogen business and the green ammonia business.

In this regard I'm proud to say that we have signed an MoU for our first



green hydrogen project, which we have now started to develop in Egypt. In parallel, we're pursuing green hydrogen opportunities in three other countries in Africa, but it's still at an early stage. We are keen on pursuing carbon emission mitigation through decarbonisation by strongly applying the clean climate philosophy.

**What are the biggest challenges you've faced, how have you overcome them to get where AMEA Power is today and what future challenges you expect to face the coming months and years?**

Time. It takes longer to deliver in Africa than we are normally used to for several reasons, the system and the processes and sometimes the knowledge building with the team there, the understanding of the processes, the understanding of the PPP model, the understanding of the IPP model, the understanding of the BOOT model. These are new terms for many in the business. Some of them have advanced, some of them are very advanced and others are getting there.

I have confidence having met a lot of young African officials. They are very capable, very competent and they are learning fast, all ambitious to grow their continent and their country's position as equal with the rest of the world.

**Can you give me any examples of how you managed to turn opportunities into projects that you've subsequently delivered in a very short period of time?**

To return to the example of Togo, I met the president of Togo, HE Faure

Gnassingbé. A great visionary leader, who talked about his vision to go green and wanting to develop a solar project. We signed an MoU and we embarked on the journey to work with the team, and to share knowledge about the process. We promised to deliver on time, and we delivered on time, working with the partners, the community, the government, the banks, and using our equity. I think this is a model of how things can happen. We managed to deliver the first large-scale IPP renewable energy project in record time.

**Can I ask why you're so committed to such an investment with a high proportion of your projects in Africa?**

We saw the huge potential in Sub-Saharan Africa, given that around 167 MW is consumed per 1 million people there. By contrast Germany, for example, has 3,851 MW per one million people. Egypt by contrast has 1,099 MW per 1 million.

We opted to focus on the area and the geography where there is a shortage of power. In terms of ratios of power versus people, it's very low on the African continent compared with the Middle East, Europe or the US. A country of about 9.5 million people, United Arab Emirates, consumes more than 30,000 MW of power. In retrospect, countries with significantly higher populations in Africa consumed or had lesser access to reliable power.

Speaking of renewables, in which we believe very strongly, we did not pursue investment in any thermal HFO or thermal power because the availability of resources in Africa in terms of sun and wind is outstanding: it's a free fuel. You don't have to pay for this fuel. Your investment is just

the equipment and manpower to convert it to power.

If you take a country like Burkina Faso, it is 1,500km away from any port where they may be able to collect HFO as a fuel. This means they're paying for a huge cost for fuel not least because they're paying a huge cost for transporting that fuel. Yet they have a fantastic natural resource from which to get power: the sun. Okay, they don't get it 24 hours a day, but they do have sunshine for at least 10 hours a day. You add a couple of hours of battery storage, you can take it up to 14 or 15 hours.

**Do you see AMEA Power being ahead of the game and setting gold standards in Africa?**

We are committed to our belief in the subcontinent. We work hard, we have a large team of people at AMEA Power comprising a mix of 30 different nationalities from all over the world, including Africa, Asia and Europe. They are all dedicated and believe in one theme, which is to succeed and to grow.

Africa has always been a geography we liked, we have succeeded there, and we want to continue.

We have more to do in Africa as the sky is the limit.

Our mid-term vision is to focus on Africa and the Middle East as far as geographies are concerned. Regarding the business areas, in addition to hydrogen and water, we're also pursuing another direction, which is delivering power to mines. Many of the countries in Africa such as Zimbabwe, Zambia and DRC have strong mining operations that need power. The world is now seeing a high demand for copper, zinc, and cobalt for example, so this is an important growth area as well for AMEA Power. ■

# BIG CHALLENGES FOR AFRICAN UTILITIES

*National utilities are being forced to modernise as independent power producers enter the African market, but there is no one-size-fits-all solution to the energy conundrum, writes **Neil Ford***

**A**frican power utilities have long been in a difficult position. They are expected to maintain supplies to rapidly growing populations while extending limited power grids. Many face growing competition from independent power producers (IPPs) while being tasked with hitting government targets in a way that other generators are not. Yet they have to undertake these tasks while tariff increases are strictly limited, so it is therefore no wonder that most appear to be failing.

Over the past three decades, some African governments have sought to weaken the monopolies of state power companies to improve the power supply situation, particularly by unbundling utilities into their constituent generation, transmission and distribution parts. Such policies are usually designed to attract private sector investment and engender competition

but in some cases they can result in the dissolution of utilities.

Unbundling is necessary if genuine competition is to be achieved as it removes conflicts of interest where IPPs have to compete in generation with the state utility but then rely on that utility for transmission and distribution, plus sometimes even adjudication if it also acts as industry regulator. Most unbundling strategies result in a single transmission operator, often still state owned, with competition in both generation and distribution, but particularly in the former.

A competitive market in generation can drive down costs, both in construction and operations & maintenance (O&M), while it also has the potential to promote technology and skills transfer. At the same time, an independent regulator is usually set up to oversee competition and tariff regimes, which can often otherwise be influenced by government.

## THE DIFFERENT MODELS

About a third of all African power sectors remain dominated by vertically integrated utilities, including those in Chad, Democratic Republic of Congo, Equatorial Guinea and Liberia. However, governments with many other calls on their limited financial resources are generally unable to finance infrastructural improvements without private sector participation. About another third have retained vertical integration – where the utility dominates generation, transmission and distribution – but with competition in generation, such as Botswana, Mauritius, Rwanda and Tanzania.

A third group has vertically unbundled without private sector participation, including in Ethiopia, Lesotho and Sudan. Finally, some have vertically unbundled with private sector participation, such as Angola, Ghana,





*Few countries have embraced unbundling quite as enthusiastically as Nigeria.*

Nigeria and Zimbabwe. Some of this final group, such as Nigeria, seem to have highly competitive and deregulated markets but the benefits are not easily apparent.

Unbundling can indeed create more competition in the sector but it rarely helps to address one of the main problems that affected the performance of state power companies in the first place – a lack of investment. Aside from IPPs, the majority of power utilities operating in Africa are still state owned even where deregulation and unbundling policies have been pursued. Except where IPPs are guaranteed attractive terms, the power sector is generally not regarded as a promising investment option across the continent as a whole.

There have also been concerns in some African markets that IPPs have been offered overgenerous terms. In Kenya, for instance, it has been claimed that private producers have been paid twice as much for electricity as state utility KenGen, with government officials fired as a result. Utilities in Kenya, South Africa and Ghana have tried to bypass contractual agreements by reducing their offtake from IPPs during downturns in demand, particularly during the early months of the Covid crisis. Demand fell in South Africa by as much as 11 GW, as many mines and industrial firms halted operations.

Where it is difficult for state owned utilities to boost revenue within their domestic markets, growing cross-border power sector integration does offer them opportunities to target more potential customers, although progress in developing regional power pools has been slow. The South African Power Pool is the most successful to date, but planned upgrades to the East African and West African power pools have been repeatedly delayed.

## NIGERIA AND KENYA

Few countries have embraced unbundling quite as enthusiastically as Nigeria. The country had long been famed for the poor performance of its power sector, with customers routinely renaming the National Electric Power Authority (NEPA) 'Never Expect Power Again'. The lack of generating capacity, limited progress on grid expansion and frequent power cuts prompted the government to rename it the Power Holding Company of Nigeria (PHCN) in 2005 in preparation for unbundling into 18 successor companies: six generation companies that now compete with IPPs, one transmission company and eleven distribution firms. The transmission company remained state owned but all of the others had been at least partly privatised by the end of 2014.

This competitive structure could prove a success in the long-term but ongoing problems in supplying gas to thermal plants and a lack of finance for downstream upgrades means that Africa's most populous nation still has insufficient generating capacity and unreliable supplies. Security issues surrounding gas supply make it difficult to assess the impact of the reforms on generation levels, as a large but fluctuating proportion of thermal capacity is constantly shut-in.

Kenya has also already unbundled its power sector, although to a far more limited extent. In 1997, the Kenya Power Company was broken up into Kenya Electricity Generating Company (KenGen) and Kenya Power and Lighting Company (Kenya Power), with the latter taking responsibility for transmission and distribution. Both have been partly privatised to bring in much-needed investment. Kenya Power has struggled to maintain power supplies in recent years because of rising demand and more recently the collapse of a hydro dam.

There have been three nationwide blackouts since 2018, the most recent in January 2022. Sabotage has been blamed by some, following the dismissal of a number of power sector officials after the government found irregularities in the drafting of PPAs deemed to be overgenerous. The case highlights the fact that deregulation only works if the terms of private sector contracts are correctly calibrated. In the case of Kenya, PPAs seem to disadvantage both of the main utilities, with KenGen not receiving the same level of payment as its competitors and Kenya Power overpaying for electricity.

While the renewables revolution has weakened the position of some utilities, KenGen has been able to play a full role. The firm was due to face competition from a planned 1 GW coal-fired plant at Lamu but environmental opposition eventually saw the government cancel that project in 2020. Nairobi has now instituted a target of achieving 100% renewable energy production by 2030, including hydro, utilising the country's solar, wind and geothermal resources as well as its existing hydro schemes.

KenGen competes with private sector operators in developing geothermal projects and has turned Kenya into the biggest geothermal power producer in Africa and one of the biggest in the world in the process. The company completed the 83 MW Olkaria 6 in May taking Kenya's total geothermal capacity up to 944 MW and has announced plans to add 400 MW more geothermal capacity over the next five years.

The country's biggest IPP is the 310 MW Lake Turkana wind farm, which came on stream in 2019 and which is owned by a consortium of private investors. Providing the country's current contractual difficulties can be worked out, KenGen looks

set to continue competing with private sector renewable energy generators. The main threat to both utilities could come from self generators. As in South Africa, many industrial and business customers are developing their own power plants, often solar, to avoid relying on the grid.

### SOUTH AFRICA

Given the problems that have affected unbundled power sectors, it is perhaps not surprising that many governments have opted not to follow the lead of Kenya and Nigeria. Apart from some limited participation by IPPs, the government of South Africa continued to rely on power utility Eskom, even in the face of serious power supply problems, with the support of the country's powerful trades union movement, which opposes privatisation and deregulation.

The government itself was partly to blame for the shortfall in generating capacity as it underestimated how much new generation capacity would be required. The development of two

big new coal-fired projects was sanctioned, the 4.8 GW Kusile and Medupi plants, but both took years longer to build than expected with big cost overruns.

The parastatal's debts, which now stand at R392bn (\$25.8bn), began to affect the entire country's credit rating, given the government's role as guarantor. It had begun to mount despite average annual increases in electricity tariffs of 14.73% from 2008 until just before the Covid crisis. The company failed to balance its books despite injections of finance by the government, most recently for R21.9bn (\$1.5bn) in the 2022 national budget allocation. In February 2019, the Department of Public

*In 2019, one year after coming to power, President Cyril Ramaphosa announced that Eskom would be unbundled into three wholly owned entities.*





Enterprises described the utility as “technically insolvent”. Finally, Eskom became caught up in the corruption, or state capture, cases that have dominated South African politics over the past few years.

Pretoria previously tried to attract private sector investment in power generation, while still leaving Eskom in a dominant position. Renewable energy investors were allowed to develop solar and wind power projects under the government’s Renewable Energy Independent Power Producer Procurement Programme (REIPPP). Power was to be supplied to the national grid under long-term power purchase agreements (PPAs) with Eskom but Eskom refused to sign PPAs with some of the selected bidders in 2017-18, leading to delays in launching more tender rounds. This stance may have steered the government in its determination to act.

Eskom’s inability to solve its power supply problems and its growing debts finally pushed Pretoria into action. In 2019, one year after coming

to power, President Cyril Ramaphosa announced that Eskom would be unbundled into three wholly owned entities covering generation, transmission and distribution. Functional separation was completed in 2020 with the establishment of divisional boards and managing directors, with all three now functioning relatively independently. Legal separation is scheduled for completion by the end of 2022.

The government is considering taking over Eskom’s massive debts or at least part of them as the successor companies will be unable to operate effectively with this drag on their finances. Moreover, it would be difficult to decide how to apportion the debt among the three new companies.

Eskom’s dominant position has also been weakened by the South African government’s decision in 2020 to relax restrictions on self-generation, which will result in more mines developing their own power projects to satisfy their needs and supplying

excess production to the national grid. Solar capacity is likely to dominate as miners seek to reduce their greenhouse gas emissions where possible. The growing trend of self generation could also threaten the position of utilities elsewhere on the continent.

The state-owned utility’s position could also be threatened in the longer term by a move away from coal, given that coal-fired plants comprise most of its 44 GW installed capacity. South Africa has been reluctant to move away from coal because of the jobs and revenue it generates from mining, consumption and exports but Eskom will gradually have to embrace renewables more fully if it is not to lose out entirely to new competitors. However, the firm’s new generation offshoot will be able to compete on an equal basis with IPPs and will be able to bid in future renewable energy tenders.

South Africa introduced a carbon tax in June 2019, with a rate of R144 (\$9)/ton for 2022, and the rate is to increase by at least \$1/ton every year until it reaches \$20/ton, with a target of \$30/ton by 2030 and \$120/ton from 2050. These rates are low by international standards, which were generally in the range of \$40-80/ton in 2020.

The government is banking on renewables to drive private sector participation in the industry, with 1,600 MW of new wind power capacity, 1,000 MW of solar and 513 MW of storage officially due for completion by December 2022 but realistically expected by 2024 at the earliest. Another 2,600 MW of private sector wind and solar and 750 MW of new coal capacity is due to come on stream by 2023 but this too will be delayed as site selection and tenders are still ongoing. ■



## Interview

Eng. Ziria Tibalwa Waako,  
CEO of the Uganda Electricity Regulatory Authority (ERA)

# UGANDA SETS STANDARD

*Uganda is providing a robust example to the rest of the continent when it comes to renewable power initiatives. Bill Lumley talks to **Eng. Ziria Tibalwa Waako**, CEO of the Uganda Electricity Regulatory Authority (ERA)*

**There are a number of key initiatives concerning off-grid initiatives in the country, among them the enactment of off-grid regulations and the adoption of new business models. As a regulatory authority, what do you see as the biggest challenges you think Uganda faces in some of these initiatives, such as the enactment of off-grid regulations?**

Firstly there is the enactment of the off-grid regulations, The Electricity (Isolated Grid Systems) Regulations, 2020, which provide for clear and robust regulatory framework covering the technical, legal, economic, environmental, tariff and grid arrival considerations.

Then there is the adoption of attractive new business models. For example, the ERA licensed bundled villages under one licence under the Pro Mini Grids project. The economies of scale with such a packaging help in the provision of access to even smaller communities that without a model would be non-viable both financially and economically.

The ERA has been discouraging non-renewables in the design of pro-



***“The regulatory climate in Uganda has been assessed as the best on the African continent for the last four consecutive years.”***

jects, especially under the competitive tenders, with higher marks awarded to solutions with renewable power.

The provision of government subsidies to off-grid developers through the Rural Electrification Program. The subsidies are mainly towards the construction of the distribution grid and the last mile connections and this has been a great success.

Additionally, the design of simplified internal wiring solutions, with ready boards for those households that lack internal wiring, or for semi-permanent housing structures where the conventional internal house wiring is not possible.

**What have you learned so far from partnerships with institutions such as the Mulago Neonatal Unit and Uganda Prisons Services, to switch from using biomass to electricity in kitchens?**

Our observation is that the initial capital for efficient cooking facilities is high. Therefore there is a need for a framework that manages the front end cost of the acquisition of the equipment. In time as the cost falls we are able to then roll out on a massive scale, unrestricted by the tariffs.



But now we see reduced tariffs for cooking.

The cooking tariff is to encourage domestic users to cook using electricity as opposed to using charcoal, which contributes to the depletion of forest cover but also creates respiratory health challenges.

As mandated under the Electricity Act, the ERA approves investments in the electricity has approved investments towards the provision of electrical infrastructure used by citizens for value addition, improve access.

### **Are there any specific initiatives being driven or championed by the ERA that are helping to improve both the livelihood of the citizens of Uganda and the environment?**

Basic access to electricity – lifeline (social tariff) for all domestic consumers across the country, small distribution companies – driving access in the mostly rural parts of the country where the main national grid distribution company would ordinarily not operate due to the limited revenue per customer. Also the adoption of enabling policies (REFIT, Rebate, Quality of Service etc) geared towards enhancing the efficiency, access, and customer experience of the stakeholders in the electricity supply industry.

### **Access to electricity in sub-Saharan Africa has doubled in the past two decades. To what extent will off-grid renewable power help make this a reality across the country?**

Access to electricity stands at 51% with the majority (32%) connected to off-grid systems. The Energy Policy has recognised that off-grid supply

as a contributor to Uganda attaining universal access to electricity.

The ERA has enacted enabling regulations to offer robust regulatory framework including the attraction of private sector capital into the off-grid renewable power segment.

### **What are the biggest challenges in delivering off-grid renewable power? Investment and funding must be high on that list.**

Affordability of the electricity – with consideration given to full recovery of capital expenditure, operations and maintenance costs, and a reasonable return on investment, the end user tariffs for the off-grid systems are in most cases bound to be higher than the national grid tariffs making it unaffordable for the end users. Need to have in place a suitable framework and source for subsidy (especially towards the construction of the distribution network and last mile connections) to support the buying-down of the tariff.

### **How successful has Uganda been so far in meeting its energy targets?**

Following the electricity reforms in the early 2000's, the country has registered tremendous growth in the sector including the successful unbundling of the electricity supply industry; the attraction of substantial amount of private capital into the generation and distribution segments; an increase in the generation capacity; increased transmission capacity; revamped distribution network system; reduced energy losses; improved revenue collection realisation; and a reputable and competent regulator, ranked as number one on the African continent for four-straight years.

### **Is it fair to say Uganda is setting a standard for the rest of the continent or even the rest of the world to follow when it comes to renewables?**

Correct. The regulatory climate in Uganda has been assessed as the best on the African continent for the last four consecutive years. Also participating in the registered user index has enabled us to identify gaps and continuously work to improve on them.

In addition to our regulatory climate we also have a lot of support from governance. There is minimal interference with the independence of decision making. It is very important that our body determines the price of electricity. And we are supported by government to implement it, which is not found in many countries, because in some countries, the tariffs are determined by politicians, who can make it difficult for the sector to implement them. And in the end, do you find a lack of investment in the network, or a lack of compensation. And, therefore, climate suffers, as well as the quality of supply and the quality of service suffers.

But we have enjoyed a lot of support from the government.

It is true we've had some of the most expensive projects. For example, we hosted the first-ever big hydro on the continent. And when you host the first project, it's breaking new ground, and therefore the risk perception is different is high. But all this has worked in the interest of the country. And we have seen a lot of a lot of progress. And we believe that he it can only get better. We are in for very exciting times in Uganda. ■



# THE BACK-UP PLAN

*Africa's gas is more important  
than ever, post Ukraine, writes  
**Jackson Foley***





*“Timing to market will be key. Africa needs to move fast if it wants to be a key supplier to Europe as it tries to diversify away from Russia.”*

**T**he EU could import 50 bcm more of LNG on a yearly basis” declared the European Commission in March. In May, the bloc expanded that ambition to include 10 bcm of pipeline gas on top. Its political decision to reduce its dependency on Russia in protest at Moscow’s invasion of Ukraine means the EU is now scrambling for alternative supplies. In its REPowerEU plan, released on March 8, the Commission specifically mentioned Egypt and West Africa as potential sources. But does this mean it is boom time for Africa’s gas?

At present, Algeria is by far the largest African supplier of natural gas to the EU, providing 12.6% of its imports in 2021 (45 bcm), according to the Commission’s statistics. Nigeria is a distant second with 3.5% (12.6 bcm, according to S&P Global Platts Analytics) with Egypt just behind with 2.5% (9 bcm, according to the country’s Minister of Petroleum) in 2021. Egypt’s figure was, notably, a quadrupling over the year before.

Massimo Di Odoardo, Vice-President, Global Gas and LNG Research at Wood Mackenzie says African producers will face stiff competition, “Africa is well positioned given its proximity”, he says. “But European demand might not be there forever, and others are trying to seize the op-

portunity, including in the US and the Middle East. Timing to market will be key. Africa needs to move fast if it wants to be a key supplier to Europe as it tries to diversify away from Russia”

Some of those other suppliers are already expanding their output. In late March, the United States committed to “work with international partners and strive to ensure additional LNG volumes for the EU market of at least 15 bcm in 2022”. This would replace around 4% of the EU’s total gas imports this year, with higher volumes in prospect over the coming decade. This still leaves a signifi-

cant gap to fill. What is the potential for African countries to ramp up supplies to the EU in the short term?

The producers with the greatest ability to meet the EU’s increased needs are those with existing connections to European buyers. Sonatrach of Algeria and Egypt’s EGAS have been early beneficiaries, courtesy of their long-standing relationships with ENI of Italy. Just a month after the EU unveiled its REPowerEU plan, ENI announced a deal with Sonatrach to increase exports of gas through their shared TransMed pipeline by 9 bcm per year. Two days later, ENI announced a deal with EGAS of Egypt





*There is no shortage of resources in accessible offshore locations around the coasts of southern and western Africa. The obstacles to exploiting them are political.*

for 3 bcm of LNG to be shipped during 2022.

Extra flows from Algeria will take time to ramp up, according to Alice Gower, Director, Geopolitics and Security at Azure Strategy, “While it is possible that Algeria could increase its gas exports to Europe following the deal with ENI, it is likely to fall short of the 9bcm goal, not least because of pipeline capacity issues (there is only 8bcm of spare capacity). But also, Algeria does not have spare capacity available. Add growing domestic demand and there may not be enough gas to go around.”

It is possible, instead, that competition between European companies could be a case of “robbing Peter to pay Paul”. According to Gower, “What this deal does show, however, is Algiers’ move away from Spain (politically speaking) and we may see gas previously destined for Spanish mar-

kets sent to Italy instead.”

Supplies from Egypt may arrive at European terminals more quickly than those from Algeria, facilitated by the reopening of the Damietta liquefaction plant on the Mediterranean coast. That followed an agreement between ENI and EGAS last year. This has eased the long-standing capacity difficulties in Egypt.

But, as Gower points out, “Egypt itself relies on imported Israeli gas to meet its rising domestic demand and its export contracts, as its own reserves are in decline. Boosting exports to Italy does not look so easy, unless the volumes are made up of diverted cargoes of imported Israel gas processed in Egypt.”

This may explain why, in its May communication, the EU declared that it, “aims to conclude a trilateral agreement with Egypt and Israel” before this summer.

There are doubts too about whether the third big supplier, Nigeria, can increase gas supplies to Europe. This is not necessarily because of capacity. In April, the Ministry of State Petroleum Resources admitted that the country’s (indeed Africa’s) largest LNG exporter, Nigeria LNG Limited, was operating at 70% capacity because of disputes over the price of third-party gas supplies. Resolving these disputes is likely to take some time.

Ground was broken for a new Nigeria LNG train, the country’s seventh, last June after a decade-long delay. Despite this, observers warn against raising expectations. Construction has been further delayed by COVID and other troubles. The company’s CEO recently announced a revised expected completion date of 2025.

There is little chance that other Sub-Saharan Africa producers will be able to do much to relieve the EU’s gas supply problems in the short term. Forecasts from researchers at Rystad Energy issued in February suggest only modest increases in production in 2023 with major rises in LNG output not expected to begin until new deepwater fields come on stream after 2027.

### DEVELOPING NEW PRODUCTION

In the medium term, the European Commission wants to diversify its gas supply chains more widely. In its strategy for ‘External Energy Engagement in a Changing World’, released on 18 May, it declared “Senegal, and Angola also offer untapped LNG potential.” With western majors such as BP, ExxonMobil and Shell having announced pull-outs from Russia following the invasion of Ukraine, analysts expect the companies to place renewed emphasis on their holdings in Sub-Saharan Africa.

BP has been developing LNG off Senegal and neighbouring Maurita-

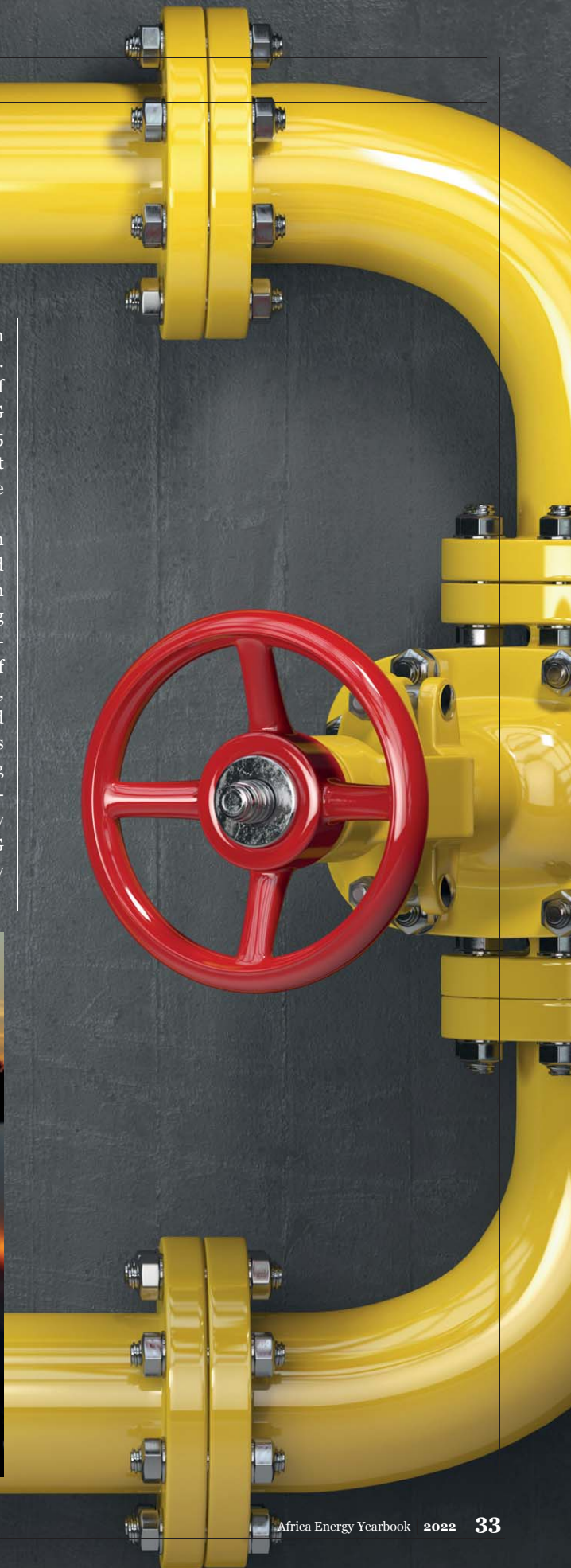


nia for some it. It has already sold cargoes from Phase 1 of its Greater Tortue/Ahmeyim (GTA) project, which is expected to deliver about 3.4 bcm annually. Gas from Phase 2, along with more from two nearby projects, will at least double this figure and remains uncontracted, according to Rystad Energy.

The next country with the potential to make a significant impact on European LNG markets is Mozambique. The ENI-led Coral South project is expected to begin production this year, with all its output, expected to be around 4.5 bcm/year, purchased by BP. Other operators with interests in Mozambique include TotalEnergies and ExxonMobil. TotalEnergies declared force majeure, following an attack by Islamist rebels, but there are hopes that it will be able to begin production by 2028.

ENI is also working to bring on production in the Republic of Congo. In April it announced the signing of a letter of intent to develop an LNG project with a capacity of over 4.5 bcm/year once fully operational. It expects production to begin by the end of 2023.

There is no shortage of resources in accessible offshore locations around the coasts of southern and western Africa. The obstacles to exploiting them are political. While the European Union's search for new supplies of gas has provided a new opportunity, its climate policies have introduced new uncertainties. The key elements of its RePower plan are diversifying supplies, reducing demand and ramping up the production of green energy in the EU. The fate of African LNG producers will depend upon how they balance those three imperatives. ■



# AFRICA SEEKS MORE FAR-REACHING CLIMATE POLICY AND FINANCE

*The COP26 climate change summit fell short of delivering fully on its promise in terms of support for sustainable energy and other climate change measures in Africa. Can COP27 in Egypt make up for the shortcomings of Glasgow?*

**M**any regions of Africa felt the health impacts of the Covid pandemic less strongly than other parts of the world, but the economic and social effects have still been keenly felt – and none more so than in efforts to tackle climate change impacts.

Construction of vital projects vital to the greening of the power system dropped behind schedule, while companies charged with supplying solar panels and clean cooking equipment struggled to keep going in the face of disrupted supply chains, movement restrictions and a fall in financial support from the international donor community. At the same time, Africans on low incomes seeking to buy clean energy products, such as household solar panels, deferred their purchases in the face of an uncertain future.

As we report in this yearbook, there are signs of revival in the clean

energy sector as Covid restrictions ease and business and daily life return to something approximating normal. But it remains to be seen whether the mechanism likely to bring the greatest improvement in climate outcomes on the continent, the UN climate change process – can be cranked up to full speed.

Africa continues to feel the brunt of negative global warming impacts in terms of harsh weather conditions, despite accounting for only around 4% of global carbon emissions. Droughts are becoming longer and hotter, flooding more widespread and intense, shifting some fragile environments from being barely habitable to being uninhabitable. And there are wider impacts, of course, such as the effects on the energy sector of rising demand for cooling products, putting strain on electricity supply.

Accounting for current pledges to combat climate change, children born

in Africa in 2020 are likely to be exposed to 5-10 times more heatwaves compared to those born in 1960, according to the UN Intergovernmental Panel on Climate Change (IPCC).

The continent still relies to a large extent on funding from rich nations to finance the measures needed to reverse this process or deal with the consequences, through aid, technology and dealing with the impact of migration.

The UN process is central to dealing with all these consequences of climate change, so it was a blow when the COP26 conference in Glasgow was first delayed by a year due to the pandemic. Then, when it did take place, in November 2021, it failed to deliver as much as had been hoped for, in part because of the disjointed preparations when politicians were focused on the pandemic.

The conference was supposed to be a benchmark climate change meeting where a new raft of meaningful cli-



mate change measures would be implemented in a similar fashion to the Paris COP21 meeting in 2015, building on years of hard work to reach broader agreements in the interim. Instead, the outcome was closer to those of the intervening meetings, setting the stage for greater things to come.

James Reeler, WWF South Africa's senior climate specialist, told *African Business* magazine in December that COP26 had been "something of a mixed bag" for Africa, even if its outcomes had been more positive than recent conferences.

"It's not sufficiently ambitious to deal with the current climate crisis, and largely leaves developing nations out in the cold when dealing with climate change, which does not gel with the founding principles of the UN Framework Convention on Climate Change – that those countries responsible and capable of dealing with the crisis must take more action and support others," he said.

Instead, some of the big decisions were deferred – though perhaps only until this year's COP27 meeting due to be held in Sharm El-Sheikh, Egypt in November. Reeler said a "saving grace" of COP26 was that the door was left open for increased ambition at the next meeting, rather than locking in the COP26 goals for another five years.

## METHANE PACT COULD BE CRUCIAL FOR AFRICA

The Glasgow meeting did produce some tangible benefits for Africa, including a potentially highly impactful scheme agreed by 100 countries to cut 30% of methane emissions by 2030.

Methane accounts for around a third of man-made global warming. It is also around 25 times more potent than carbon dioxide at trapping heat in the atmosphere and remains in the atmosphere for a much short-

er period – around nine years rather than thousands of years for some CO<sub>2</sub>, according to the US National Oceanic and Atmospheric Administration (NOAA).

A rapid cut in methane levels is seen as one of the most effective ways to put a brake on global warming, and ameliorate its future impact on Africa. But rapid action is needed. NOAA said the annual increase in atmospheric methane during 2021 was the largest annual increase recorded since systematic measurements began in 1983.

This is an issue of direct relevance to the energy sector. The International Energy Agency estimates that nearly one-third of all methane emissions from human activity are generated from fossil fuel operations. Energy companies have said they are working to reduce methane emissions, but the overall trend in methane emissions remains on an upward trajectory, after a small fall during the Covid pandemic when oil and gas production declined temporarily.

CO<sub>2</sub> levels are also continuing to rise. NOAA reported that the global surface average for carbon dioxide during 2021 was 414.7 parts per million (ppm), an increase of 2.66 ppm over 2020. That marks the 10th consecutive year that carbon dioxide increased by more than 2 parts per million – the fastest sustained rate of increase in 63 years since monitoring began.

## SOUTH AFRICA BENEFITS FROM COAL REDUCTION DRIVE

African leaders acknowledge that agreement over reducing the use of coal as a feedstock in power stations – responsible for about 40% of annual global CO<sub>2</sub> emissions – is also a positive for the climate-vulnerable counties on the continent. But there was disappointment that China and India had weakened the wording of

the commitment to 'phasing down' coal use, rather than pledging to phase it out in the near term.

However, South Africa, the continent's largest coal producer, did secure investments and loans of \$8.5bn from international partners to transition from coal to green energy – said to be the largest single tranche of climate finance made to date.

South Africa has said the funding would help state energy company Eskom to reduce carbon emissions. However, the government has yet to commit to a date for phasing out coal – a Herculean task given that, despite a steady reduction in the share of coal in the overall energy mix, coal-fired power still accounts for 70% of South Africa's electricity generating capacity. Urgent action is needed as South Africa accounts for almost a third of African carbon emissions, mainly due to its coal habit.

At the same time as pushing coal usage down, South Africa also intends to invest in the growing green hydrogen economy, seeking to become a global hub by harnessing its copious solar and wind resources to produce hydrogen using electrolysis, a power intensive but clean method of production compared to commonly used methods using fossil fuels with carbon emissions as a by-product. South Africa has an added incentive to develop green hydrogen because it is a major source of platinum, which is used as a catalyst in the electrolysis process.

## OVERALL FINANCING COMES UP SHORT

But overall, international support for climate change measures in Africa has fallen short of expectations. Developed countries still haven't met a target set in 2009 to invest \$100bn a year to help meet developing countries' climate adaptation and mitigation needs – and many believe that even that amount is not enough.

Tariye Gbadegesin, managing director of ARM Harith Infrastructure Fund told *African Business* at the end of COP26 that \$100bn a year “should be a floor and not a ceiling”, given the cost of the global climate transition was estimated to be between \$100 trillion and \$130 trillion.

“For Africa alone, just the cost of energy access is \$100bn, so \$100bn across developing economies – it’s not enough. Nigeria estimated the cost of its energy transition to net zero over 30 years to be \$400bn, so it’s just not enough, and the developed economies really need to do better,” she said.

The AfDB estimates that between \$1.3trn-\$1.6 trn will be needed over 2020-30 to implement Africa’s climate action commitments and Nationally Determined Contributions (NDCs), which are individual country climate action targets. That’s an annual \$118bn-145bn.

But if current trends continue, a climate financing gap of \$99.9bn-127.2bn a year will remain by 2030, undermining Africa’s efforts to support climate resilience and a just energy transition.

Gbadegesin said there were concerns over the accessibility and relevance of that capital, even where it was forthcoming, “Many developing economies were just complaining through the hallways of COP about how virtually impossible it is to access even the little amount of capital that is committed,” she added.

Her remarks echo a sentiment often heard around the continent that climate finance has often been easier to mobilised for more resilient countries with more stable economies than for those most vulnerable to climate shocks.

Climate finance is also hard to keep track of and measure adequately. “The global climate finance landscape is highly fragmented, leaving

accountability for climate finance flows opaque and hard to measure objectively,” the African Development Bank (AfDB) said in its *African Economic Outlook 2022*.

The Bank noted that climate-related projects had increasingly been funded by debt instruments on non-concessional terms rather than concessional loans or grants.

“The 33% of debt-financed climate projects in Africa on non-concessional terms could have increased Africa’s debt burden and exacerbated debt sustainability challenges, further undermining the continent’s climate resilience capacity,” the AfDB said.

There are philanthropic, blended finance and private initiatives bolstering funding for green energy, climate resilience measures and other climate finance measures on less onerous terms. Amazon founder Jeff Bezos’ Earth Fund pledged \$2bn to the cause, and the Bezos Earth Fund also joined the Rockefeller Foundation, IKEA Foundation and other philanthropic institutions in supporting the

Global Energy Alliance for People and Planet (GEAPP), which aims to mobilise \$100bn in public and private capital to go towards adapting to climate change over the next decade. Investment partners in the project include the AfDB, the European Investment Bank and the World Bank.

### COP27: IMPLEMENTATION IS THE WORD

Hopes are now pinned on the outcome of COP27, a conference taking place on African soil, to make faster headway in turning aspirations for tackling the continent’s climate change needs into well-targeted action on the ground.

The host government is making all the right noises. UN Officials have said the meeting should be treated as a climate summit for Africa, while Egypt has said it intends to launch a plan for the energy transition in the continent during the climate summit, with an emphasis on mobilising climate finance.





## *The huge scale of the response to the Covid pandemic shows that, given the right impetus, vast sums can be directed at a global problem.*

Egyptian Foreign Minister Sameh Shoukry, the president-designate of COP27, told AP in May that the overall goal was implementation. “The commitments and the pledges now have to be implemented in all sectors of the climate change agenda, whether it’s in adaptation, mitigation or finance, loss and damage,” he said.

Egypt relies on natural gas -- which it also produces -- for most of its electricity production. But Shoukry said he did not regard fossil fuels as part of the solution to climate change.

“We might see in gas a transitional source of energy with certainly less emissions. But I think we have to really move quickly to the net zero goal and we have to apply ourselves more effectively in new technologies, in renewable energy,” he told AP.

Egypt has been one of the most proactive countries in Africa in terms

of investment in renewable energy. In addition to pouring investment into large wind and solar farms, the government signed a number of agreements in early 2002 to develop green infrastructure projects. These included a memorandum of understanding with green energy firm Scatec for a \$5 billion development to produce green ammonia from green hydrogen by the Suez Canal.

### **COVID SPENDING SHOWS WHAT’S POSSIBLE**

The huge scale of the response to the Covid pandemic shows that, given the right impetus, vast sums can be directed at a global problem.

“The scale of fiscal measures mobilised by the world in response to COVID-19 (\$17 trillion) within two years indicates that the tools and re-

sources to meet the climate finance commitments exist – if political will is mobilised,” the AfDB said in its *Economic Outlook*.

The Bank also offered up a series of policy recommendations which are likely to be central to debate in Sharm-El-Sheikh in November. Firstly, it said developed countries should honour their commitment to provide \$100 billion annually to developing countries to support climate action and that this should be new and additional resources, distinct from official development assistance (ODA) commitments and financing from multilateral development banks (MDBs).

“Innovative financing instruments, such as green bonds and loans, sustainability or sustainability-linked bonds and loans, debt-for-climate swaps, and more efficient and better-priced carbon markets, could provide much-needed domestic resources to support Africa’s ambition to achieve a net-zero transition by 2050,” according to the Bank.

It said institutional capacity development, along with regulatory and other policy reforms, are urgently needed to support and accelerate climate finance from domestic and external sources – public and private – for climate resilience and a just energy transition in Africa. It also said MDBs, development finance institutions, and bilateral development agencies should make available a greater volume of concessional finance instruments and grants to support climate adaptation and a just energy transition in Africa.

“Climate change is a global commons problem, demanding global cooperation for sustainable resolution. Accelerating climate finance for climate resilience and a just energy transition in Africa is in the interest of the whole of humanity’s future,” the AfDB said. ■



**Eng. Yehia Zaki**  
Chairman, Suez Canal Economic Zone



# MAKING EGYPT A GREEN HUB

*Yehia Zaki talks to Bill Lumley about the way the SCZONE is embracing renewables and its ambitions for becoming a hub for renewable energy products in Africa and the region*

## Can you outline some of the key clean energy projects taking place or in the planning stage in Egypt?

Egypt enjoys comparative advantage stemming from its abundant renewable energy sources generated from wind and solar resources. Its flagship project is “Benban Solar Park”, a major venture for renewables in Southern Egypt, which is being completed in partnership with the private sector. The project is touted as the biggest solar photovoltaic park in the world, in alignment with Egypt’s commitment to 42% of its power to come from renewable sources by 2035.

South of the SCZONE is an area very well-equipped for wind resources that is set to have one of the largest wind farms in the world, in addition to solar and other projects. In the SCZONE in particular we have already started to develop a power station for renewables, and for that we

have currently received 17 proposals for the establishment of a 700 GW solar production plant, and this is a model to be replicated in the future.

Having said that, Egypt has embarked on a number of key projects related to global decarbonisation commitments, leveraging on its robust transmission network and the unique geographical location with ease of access to the world specifically to Europe and Asia. With emphasis on the integration between SCZONE’s industrial parks and seaports, which qualifies it to produce green hydrogen and green ammonia, Egypt is positioned to be a global powerhouse in the green energy value chain.

In light of all that, the SCZONE will house the industrial segment, or what I call the “downstream”, for the production of green hydrogen for the purpose of producing green ammonia and e-methanol for the exportation and green bunkering activities.

**E**ng. Yehia Zaki is the Chairman of the Suez Canal Economic Zone (SCZONE), an Egyptian Authority responsible for the management and the operation of 461 sq km of industrial and logistic parks alongside the banks of the Suez Canal, as well as six sea ports distributed on the Mediterranean and the Red Seas, aiming to transform the diversified area into a world-class global logistics hub and industrial processing center that serves the European, African and Asian markets, including the GGC market, to facilitate economic growth and create sustainable and high quality jobs for the Egyptian people.



While the geographical location of the SCZONE around the Suez Canal is not necessarily the best location for wind and solar power generation, we work hand in hand with the relevant Egyptian stakeholders to have this “upstream” segment happen at a different location outside the geographic boundaries of the SCZONE, and transmitted to the industrial park at SCZONE, where it can be utilised for the green fuel projects.

### **What challenges have occurred in attracting investment for these developments and how have they been overcome?**

With the complexity and integration of similar projects, and the level of coordination between various stakeholders, I prefer to refer to this as a “programme” and not just development or project. There were certain challenges in securing these programmes, the most significant of which is getting the private sector involvement, keeping an eye on making it a lucrative investment opportunity eligible for finance, in addition to coordinating its operational model by connecting it to the national power grid to achieve green production.

When talking about wind power generation, another key challenge arose, related to the height of the wind masts, which is now under review. Approvals have been granted to increase the turbine heights, which will give a big technical boost to the scope of possibilities of renewable generation.

So, the challenges are basically around how to finance, liaising with the private sector and addressing occasional technical challenges; however, all these challenges are now being

addressed thoroughly in different ways resulting in a great improvement in the situation.

In the SCZONE we have created a downstream for connecting and generating the production of green hydrogen capitalising on linking to renewable solar and wind that will enable us to build the plants necessary to produce sufficient quantities of ammonia and hydrogen. We have already signed a number of MoUs and hopefully by October of this year, prior to COP27 scheduled in Egypt in November 2022, we will be ready to receive Final Investment Decisions and sign binding agreements. This will be challenging but I am optimistic we will reach a good consensus by then.

### **What are the main challenges to overcome with regard to green hydrogen?**

The challenges are immense. The world is changing, technology is changing and means of finance are taking on different shapes. Then of course the geopolitical situation is presenting its own challenges. So we are very careful how we address this embarking on this programme. Green Certification is another thing we are considering now as well and aligning it with the international experts. At the end, I wouldn't call these challenges, I would rather call them first movers' advantages!

### **What is the ultimate vision for green hydrogen?**

We consider Egypt, and the SCZONE in particular, are set to become a hub in the region for what will be needed in the very near future of green hydrogen and green products. On the one hand we enjoy the ability to generate

solar and wind energy, and investments and developments of plants in relevant areas are underway. At the same time, we benefit from the Suez Canal itself, as a main global maritime route, and the SCZONE that surrounds it to ultimately respond to the world's needs.

Our vision is clear to become a hub for green ammonia and green hydrogen and we are taking all the necessary steps in providing the incentives for this emerging industry to start at the SCZONE very soon and grow from here.

We are addressing pilot projects as early as next year. Less than a year from now we will have the pilot projects completed and operational in the SCZONE. Nevertheless, the SCZONE is incubating the first project for green ammonia, that is currently under construction and its commercial operation date is set for October 2022.

### **Do you expect Egypt to be able to share the lessons it learns and the technologies it creates with other nations?**

Definitely – this is something that goes without saying. Technology is changing, and the whole scheme is to the advantage of the entire world. We don't just want to localise and become a regional hub for production, but we also want to share with the international community how to engage with better production plans and discuss at a technical level how we can improve on production and the manufacturing components. So we are definitely eager to share the lessons we have learned with the international community. ■

# NOT BY RENEWABLES ALONE

*How do renewables stack up against traditional forms of energy in Africa? As **Jackson Foley** reports, it's a shifting picture – but don't count out coal just yet*



“**A**frica is not a country” is the title of a new book seeking to correct foreigners’ views of the continent. Its author wants her international readers to see Africa just as its own peoples see it: huge, varied and facing many different circumstances. Anyone who works in the African energy sector knows this already. There are vast differences between the markets in Egypt and Equatorial Guinea or between Senegal and South Africa. There is no ‘one size fits all solution’ to the continent’s yawning electricity gaps.

A continental view tells us that Africa as a whole generates about 600 kilowatt-hours (kWh) of electricity per person per year, according to the United States’ Energy Information Administration. But this number is

almost meaningless since it erases the differences between South Africa, where output is over 3,500 kWh/person, and Chad where the figure is a mere 13 kWh/person. The continental average is only useful as indicating the scale of the challenge: telling us that, overall, Africa’s electricity generation per head is just 10% of the global average.

The way that that electricity is generated also varies hugely from country to country. South Africa not only generates the most power per capita, it is also the African country that relies most on coal to do so. In fact, 86% of the entire continent’s coal-fired generation capacity can be found in South Africa. It is a regional thing: most of the continent’s other coal-fired plants are located in South Africa’s neighbours: Namibia, Botswana and Zimbabwe. Only five oth-

er African states burn coal for power: Morocco, Madagascar, Mauritius, Zambia and Senegal.

There is no shortage of coal deposits in these countries and some of their governments once held great hopes of turning these reserves into electrical power. According to the ‘Global Coal Tracker’, a project run by the San Francisco-based NGO Global Energy Monitor, 22 coal-based power projects are currently under consideration across the continent. This does not, however, mean that all 22 will be built. A more detailed examination of the data shows that few, if any, of these plans will come to fruition. Most have failed to obtain funding; most those that had funding agreed have been delayed while others are still on the drawing board.

Of the few actually making pro-





gress, two are Chinese-backed projects in Zimbabwe and the third is in South Africa. Even the future of these plants is unclear. Although the generating plants in Zimbabwe are largely complete, there has been strong opposition to the associated coal mining plans. The Kusile project in South Africa has been delayed and mired in allegations of corruption.

At the 2021 United Nations Climate Change Conference (COP26) in Glasgow last November, both Morocco – the second-largest consumer of coal in Africa – and Egypt – which had been planning several major investments in coal-fired power stations, signed up to the ‘Powering Past Coal’ alliance, the group of countries committed to a complete phasing out of coal by 2050. The overall situation has led the US-based monitoring organisation Global Energy Hub to

conclude that “We remain confident that the future of coal in Africa is dead.”

## BEYOND COAL

The main reason for the demise of coal is the refusal of the big lending institutions to provide further funding for overseas fossil fuel projects. The latest such commitment was announced at COP26 in November. Six members of the G7 group of advanced economies (Japan was the exception) plus 28 others from around the world together with five development banks declared they would “end new direct public support for the international unabated fossil fuel energy sector by the end of 2022, except in limited and clearly defined circumstances that are consistent with a 1.5°C warming limit and the goals of the Paris Agreement”. While they left themselves some ‘wiggle room’, the direction of travel is clear.

Even China, which is by far the largest public financier of coal-fired power plants around the world, has pledged to “completely stop the construction of new overseas coal power projects”. Although private sector funders, particularly in the United States and Japan, provide the bulk of funding to coal-fired electricity plants around the world, very little of this financing is deployed in Africa. So, if the future of African electricity is not coal, what is going to fill the continent’s energy gaps?

There is an assumption embedded in statements such as those made at COP26 that the future sources of African countries’ electricity supplies must be renewable. The 39 signatories of the November statement declared that “We will prioritise our support fully towards the clean energy transition”. As the world prepares for COP27, to be held in the Egyptian re-

sort of Sharm el-Sheikh in November, African states will be looking for evidence of real support for clean energy in Africa.

Prospects for solar and wind energy in African countries look very good, at least on paper. A 2020 survey by the International Finance Corporation estimated a total wind potential on the African continent of over 59,000 GW, enough to meet its entire energy demand. But according to PWC’s *Africa Energy Review 2021*, currently installed capacity amounts to just 0.01% of this figure.

It is the same story with solar. A 2014 study by the International Renewable Energy Agency (IRENA) estimated the continent’s solar PV potential at over 650,000 tWh per year. Yet, the African Solar Industry Association calculates that by the end of 2021, only 8.7GWp had been installed across the continent. It also found that African countries accounted for just 0.5% of the total solar capacity installed around the world during 2021.

Wind and solar are not the only options for renewables. Hydro-electric power has long been a part of the energy mix for several African countries. Over 80% of the electricity generated in the Democratic Republic of Congo, Ethiopia, Malawi, Mozambique, Uganda, and Zambia comes from hydropower, for example. However, the potential for future hydropower development is limited by concerns about the environmental and social impacts of very large dams and concerns that climate change may affect future water supplies.

Another emerging option for some countries is geothermal energy, particularly for countries in the tectonically active East African Rift System (EARS). Kenya is the outstanding example, generating 44% of its electricity from geothermal sources, along



*“A few years ago, people were still talking about coal but the coal quality which is available locally means you have to import another coal to mix it. If there is plenty of gas, why import coal?”*

with a further 36% from hydropower. So far, however, only Ethiopia has followed in Kenya’s footsteps. A 2020 report from IRENA noted the further developments were being hampered by limited awareness of the technology, poor regulatory regimes and limited financing.

### **CAN RENEWABLES FILL THE GAP?**

There is no shortage of public statements from officials and agencies about their support for renewable energy. Back in 2009, at COP15, developed countries pledged to provide \$100 billion a year in climate funding by 2020. The precise definition of ‘climate funding’ was left vague, but even with that flexibility the target still has not been reached. Just before COP26, the OECD noted that less than \$80bn was actually being committed annually and that the original target was unlikely to be met even in 2022.

Some African countries have committed to major investments in renewables. For example, Côte d’Ivoire says it aims to generate 42% of its

electricity using renewable sources by 2030. The problem lies in the implementation. As Valerie Marcel, an Associate Fellow at Chatham House and director of the New Producers Group of 30 emerging oil and gas producing countries, notes, “There are renewable energy projects, but they are just not being developed fast enough or deeply enough.”

It seems likely therefore that large numbers of Africans will continue to live without access to electricity. Instead, potential consumers will keep using their traditional sources of energy. In some countries these will be wood, charcoal and other forms of biomass. According to the African Union’s Africa Energy Commission, charcoal accounts for just over half of all domestic fuel use in East Africa. The consequences include large-scale deforestation, especially in countries such as Uganda, and deleterious health effects, caused by people breathing in smoke particles.

In West Africa, particularly Nigeria, consumers have come to rely on portable diesel-powered generators.



In 2019 the IFC estimated that there were around three million such generators in the country, one for every 12 households. Across West Africa as a whole, generators provide more than 40 percent of the electricity consumed. This is mainly because the installed power capacity of large-scale power stations is so small compared to the market need: just over 5 GW connected to the grid, providing just 30 Watts per person.

In the words of the IFC, “The grid in Nigeria is not sufficient to serve the needs of the country, and the massive population and economy of Nigeria is instead largely powered with electricity from small-scale generators.” Unfortunately for Nigerian consumers, diesel, unlike petrol, is not subject to government price controls so the shocks caused by the Russian invasion of Ukraine are being passed on to those three million generator users.

## FILLING THE GAP

As one investor in West Africa’s energy sector has noted, in Africa there are some 600 million people with no access to electricity and people in Dakar are paying four times as much as people in Houston. “We need to develop Africa with African resources for Africans,” he said.

But with renewables unable to meet consumer demand for at least the next decade, consumers will be obliged to continue using dirty sources of energy such as charcoal and diesel generators, unless something else comes along to fill the gap. What that ‘something’ will be is today’s hundred-billion-dollar question. There is no simple answer. “Africa needs a country-by-country approach not a one-size fits all continental approach” Marcel argues.

According to Leila Benali, the Moroccan Minister of Energy Transition, filling the gap in her country will require investment in gas. She told a side meeting of the International Energy Agency Ministerial Meeting in

late March that, although her country agreed to join the ‘Powering Past Coal’ initiative at COP26, “powering past coal cannot be done without access to sustainable gas.”

Similar views are held by others. “We need to look at the resources available and in Nigeria this is gas” says one commentator, regarding the Nigerian market. “A few years ago, people were still talking about coal but the coal quality which is available locally means you have to import an-

**Opposite: A downriver view of gorge and breakers at Katse Dam hydroelectric power plant in Lesotho.**

**Below: Wind turbine farm – renewable, sustainable and alternative energy.**



other coal to mix it. If there is plenty of gas, why import coal?”

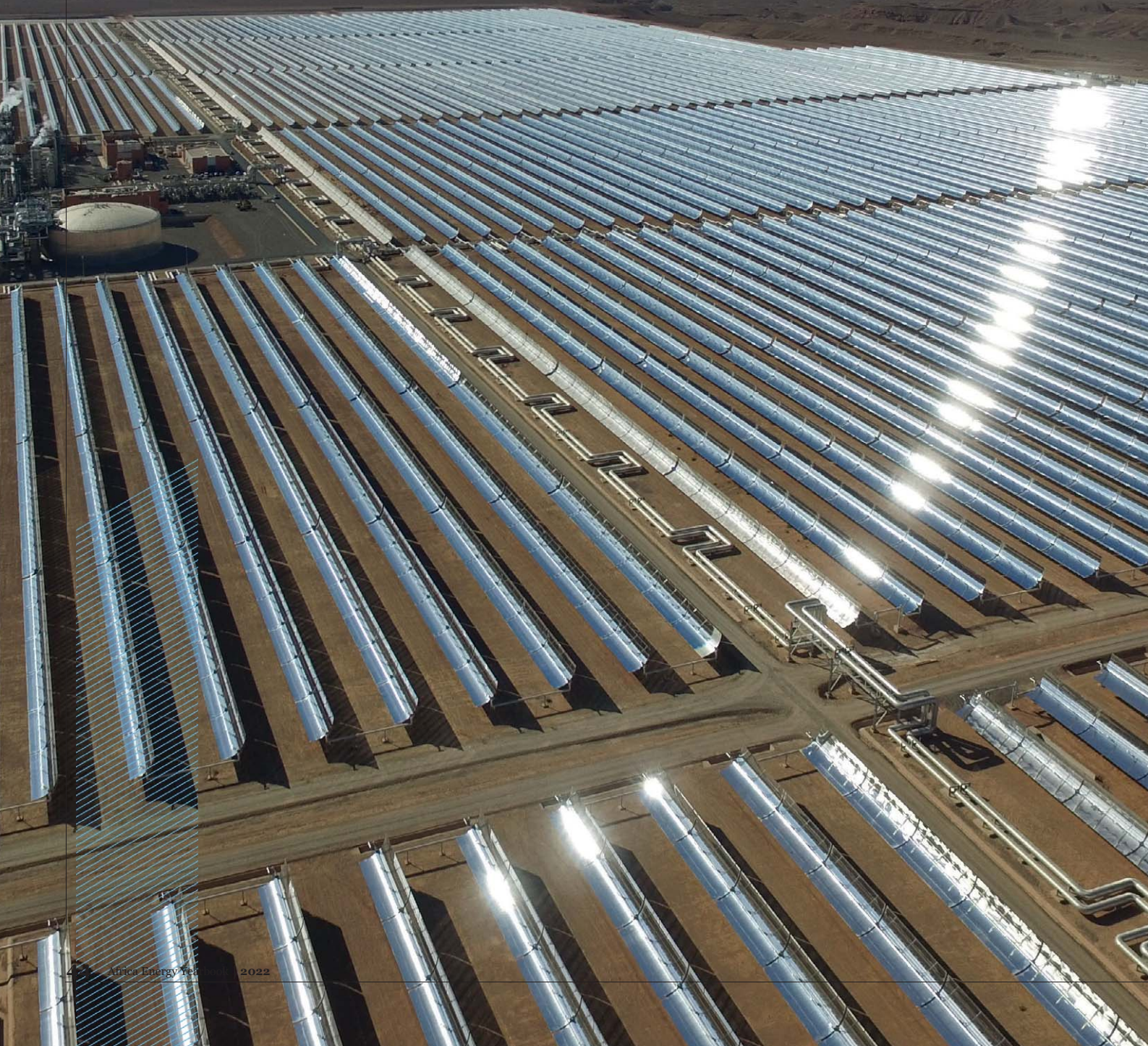
Burning natural gas clearly contributes to climate change but it emits half the amount of carbon dioxide per unit of energy than coal. Moreover, the total volume of emissions required to meet electricity demand in African countries over the next decade is tiny compared to the volumes being produced in more developed states.

Gas is therefore being touted as the transition fuel, bridging the gap

between today’s dirty fuels and tomorrow’s clean energy. But there are still bottlenecks to unblock, according to Valerie Marcel. She says the three big blocks relate to domestic markets and immature infrastructure, and the lack of financing. “It’s a frustrating situation,” she concludes. If end users cannot pay the expected charges and if the regulatory framework is not sufficiently robust then commercial investors are unlikely to take the risk.

Ghana’s experience with gas-to-power has been a powerful lesson







in just how costly a poorly managed transition strategy can be. The government initially hoped that the discovery of offshore gas in 2007 would bring down energy costs and boost economic development. Instead, the combination of a weak energy grid with uncompetitive contracts has resulted in the state utility company paying for gas it cannot sell. Cumulative losses are expected to reach \$4.5 billion in 2023.

It is perhaps no surprise, therefore, that despite all the talk of climate funding and green finance, there is still a lack of investment in these under-developed markets. Domestic electricity supply companies tend to be slow, bureaucratic and conservative. In most countries they lack data on demand and the solvency of their customers. If consumers do not pay their bills, then utilities do not get paid and debts mount up. It only takes a few bad experiences to scare away potential funders.

## TOWARDS 2030

There is a big role here for governments to play, according to Marcel.

Countries of the OECD should be working to reduce the risks of investing in African countries' electricity sectors. There is a need for seed funding, credit and public-private partnerships to get things moving she argues.

At the moment, the only multinational development bank supporting gas-to-power projects is the African Development Bank. Even here, this policy has been controversial. Some of the largest stakeholders in the bank are the industrialised countries who signed up to the COP26 declaration on ending support for 'fossil fuels'. They hold a quarter of the votes on its governing board.

What seems clear is that the promise of renewable energy is not likely to be realised in most African countries in the short or medium term. Gas is the least bad option to bridge the gap and to enable hundreds of millions of power-poor Africans to improve their lives. Bringing electrical power to the people is going to require both billions in outside investment and big shake-ups of the frameworks – physical and legal – that actually deliver it. ■



**Opposite: Noor Power Station in the Drâa-Tafilalet region of Morocco.**

**Below: Maguga Dam, Swaziland.**

## DON'T COUNT OUT COAL JUST YET

South Africa's coal exports to the EU increased tenfold in April compared to the year-on-year period, as European utilities started a buying frenzy to replace Russian supply.

VesselsValue data revealed 2.4 million tonnes of coal was shipped from South Africa's main export hub at Richards Bay, of which 0.56m tonnes was exported to destinations such as France and the Netherlands.

This compared with just 0.06m tonnes – carried on one vessel to France – in the first three weeks of April last year.

EU countries are halting new purchases of Russian coal as part of sanctions against the country in response to its special military operation in Ukraine. Imports of Russian coal under pre-existing agreements are to end from 10 August. That has triggered a surge in demand for coal.

While this is a good result for South Africa, there are production challenges in the continent's major coal supplier. For example, in mid-April, South African logistics company Transnet declared force majeure on shipments of coal to Richards Bay, citing its "inability to perform services at its stated system capacity" due in part to a lack of locomotives and vandalism on the rail networks.

South Africa's Just Energy Transition Partnerships (JETP) – an instrument set up to help finance the transition at the UN Climate Conference in Glasgow last year – has seen it receive \$8.5 billion in grants and loans from the S, Germany, France, the UK and EU. But short-term requirements to fill supply gaps left by President Putin's actions in Ukraine mean it has lost its top priority status.

# GOING PRIVATE

*IPPs across Africa are growing in size and scale, thanks to their ability to attract a more diverse array of financing. James Gavin reports*



Over time, independent power projects (IPPs) have emerged as Africa's fastest growing energy sector structures, spreading in popularity across borders and meeting with a surfeit of investment as private sector backers gain comfort with the continent's liberalising power markets.

Though up to now the IPP model has focused on a clutch of major markets – the likes of South Africa and Kenya – these privately financed, owned and operated projects are starting to capture new territory.

The figures show a picture of steady growth. According to the International Renewable Energy Agency (IRENA), since 2000, 340 IPPs have been operating, under construction or reached financial close in 36 countries in Africa, representing 30 GW of installed capacity (of which about half are renewables based) and an impressive \$61 billion of total investment.

IPPs are starting to scale up, with the pace of growth in renewables in

particular pushing the envelope. According to IRENA, investments are now larger and dominated by renewable energy. This is the consequence of the series of reforms undertaken by governments, which has seen the deployment of structured procurement programmes such as feed-in tariffs and auctions, which have helped galvanise funding for African IPPs.

The good news is that renewables are now attracting more financial support. As the agency notes, 85% of the IPPs that have reached financial close since 2010 are renewables based, amounting to more than 12 GW of installed capacity. Before 2010, renewable electricity installed capacity on the continent totalled just over 1.5 GW. The falling costs of renewable energy technologies have helped drive the trend.

So who is doing most of the funding for Africa's most recent wave of IPPs? IRENA estimates that one-third of the direct investment comes from DFIs and MDBs such as the Netherlands' FMO, France's Proparco, the Inter-

national Finance Corporation (IFC), the European Bank for Reconstruction and Development, the European Investment Bank and Germany's KfW.

This support has been extended in a variety of means, including direct investment (equity and debt), technical assistance, risk mitigation, and structured procurement programmes combining all those instruments.

## INCREASING SOPHISTICATION

As comfort levels with IPPs increase, African IPPs are likely to tap into other sources of investment. One such is institutional capital, such as pension funds and insurance companies. For example, in Nigeria's Azura-Edo IPP, pension funds from Nigeria and South Africa as well as those from Europe and the US participated in the financing of the project – both through their investment in some of its project sponsors and through infrastructure private equity funds, such as AIIM's African Infrastructure Fund 2, Actis's Energy Fund 4 Africa Infrastructure 2, ARM-Harith Infrastructure Fund and the Pan African Infrastructure Development Fund.

As a report from Mercer and MIDA Advisors released in 2021 says, as more large IPPs become operational across Africa, they will likely become an attractive source of infrastructure assets for institutional investors, both for direct investing and investing via infrastructure funds.

This increasing sophistication doesn't negate the need for continued DFI and MBD support for IPPs. According to IRENA, more than 100 IPPs have benefited from funds arranged by DFIs. These have a catalysing impact in enticing funding from commercial debt providers and private equity partners. The positive development is that, thanks in part to the greater availability of funding, IPPs are encroaching into African countries that have hith-



erto been firmly off investors' radar screens.

In December 2021, Chad secured its first ever energy sector IPP with the completion of financing for the first phase of a greenfield solar photovoltaic plant with a total capacity of 34 MW, located 30km north of the capital N'Djamena, and sponsored by Djermaya CDEN Energy – owned by Djermaya Holding Limited, DIPF Africa Limited and PIDG company InfraCo Africa Limited. What's clear is that concessionary funding has been key to unlocking the deal. Under the terms of the financing agreements, lenders are providing about €36.6 million, corresponding to 67.5% of the total project cost. Concessionary loans and funding have come from the EU Africa Infrastructure Trust Fund and PIDG Technical Assistance.

The lenders, advised by law firm Clifford Chance, included the African Development Bank (AfDB), Société de Promotion et de Participation pour la Coopération Economique and The Emerging Africa Infrastructure Fund Limited – a Private Infrastructure Development Group (PIDG) company – managed by Ninety-One.

Gabon is another recent entrant to the IPP club. In July 2021, the AfDB approved a €39 million loan package for the construction of the 34.1 MW Kinguéle Aval hydroelectric project. The funding package included €20 million from the AfDB, €10 million from the Africa Growing Together Fund and €9 million in concessional financing from the Sustainable Energy Fund for Africa, a special multi-donor fund managed by the AfDB.

Additional financing to meet the project's €133.8 million budget will come from the IFC, the Canada-IFC Program for Renewable Energy in Africa, the Development Bank of South-

ern Africa and the Emerging Africa Infrastructure Development Fund. The loan funds will be disbursed to Asonha Énergie, a company created to manage the project.

"We are delighted to support the first IPP project in Gabon", said Wale Shonibare, Director of the Energy Financial Solutions, Policy and Regulation Department at the AfDB. "Kinguélé Aval is a showcase project, and the success of the model provides a useful template for future projects that will help move the country closer towards achieving the government's 100% clean energy target."

Namibia is also looking to get its

*Thanks in part to the greater availability of funding, IPPs are encroaching into African countries that have hitherto been firmly off investors' radar screens.*

first utility scale solar power IPP off the ground later in 2022. State-owned NamPower has launched a feasibility study on a 50-150MW concentrated solar power (CSP) plant. If it gets the green light, it will proceed as an IPP on a 25-year build, own, operate, transfer model.

The project costs are expected to be as much as \$1 billion, and – critically – will be based on a power purchase agreement denominated in local currency – a rarity on the continent, outside of South Africa. Namibia's hope is that neighbouring South Africa's experience in rand-based PPAs will make it easier for it to structure it in this way.

## PROGRESS IN KENYA

But the story is not just about the frontier markets. More mature markets are doubling down on IPPs. According to projections from the

Berne Union, in Kenya, existing and pending private sector capacity could increase current IPP generation from 2.8 billion kWh a year by two to three times in 2030 and increase the annual spend of from \$350 million on IPP procurement by the same factor.

The investment required for the additional anticipated 1000-2000 MW capacity addition is estimated at \$1-2 billion with about 40-50% of this could be eligible for export credit agency-backed financing.

Kenya is well placed to attract this funding because it already has a deeper debt market than others. And, said the Berne Union, innovative international efforts such as TCX and Guarantco are delivering new solutions and instruments in both funding and risk markets to support a shift to local currency PPAs.

Here, it cites TCX's offer of hedging contracts with tenors of up to 20 years and that is working with local and international banks to build a swap curve in Kenyan shilling. Despite the impact of the COVID crisis, it is possible to hedge a total volume of about \$500 million, and perhaps even more, each year in the KES swap market, said the Berne Union. Combined with the domestic debt market and domestic savings, it reckons there is sufficient funding and hedging capacity to address a good part of the renewable energy sector investment requirements.

With the prospect of new sources of funding entering the continent's IPP market, and more sophisticated instruments – including local currencies – in the offing, the future looks bright for the country's burgeoning array of privately operated and finance power projects. Watch this space. ■

# ATTRACTING INSTITUTIONAL INVESTORS

*Attracting institutional investors and pensions funds to Africa's energy transition remains a challenge in a world in flux. But where there's a will, there's usually a way, explains **Jackson Foley***

**T**he announcement of a new 'African Energy Transition Bank' in mid-May has highlighted the problems facing energy financing on the continent. The bank's two backers, the African Export-Import Bank (Afreximbank) and the African Petroleum Producers Organisation (APPO) said they had been forced to set up the new institution because of "the co-ordinated withdrawal of international trade and project financing" for Africa's oil and gas industry.

The Director of Client Relations at Afreximbank, Rene Awambeng, told the signing ceremony in Luanda, that "It will be an African-led solution to address the threat posed to the African oil and gas industry from the shortages of funding." Ownership of the new bank will lie with the 15 member countries of APPO, while management will be the responsibility of Afreximbank.

The significance of the announce-

ment lies less in the arrival of a new lender, which may take some time to create, than in the recognition that financing hydrocarbon development in African countries is becoming increasingly difficult. As Dr Omar Farouk Ibrahim, APPO Secretary General, commented, "How else do Africans expect to harvest the 125 billion barrels of crude and over 500 trillion SCUF of gas when the traditional financiers have decided to abandon the continent?"

But is it actually true that traditional financiers have abandoned the continent? With Europe trying to wean itself off Russian gas, following the invasion of Ukraine, the prospects for gas exports from African producers look brighter than they have for some time. Recent research from Rystad Energy suggests African production is likely to increase from about 260 billion cubic meters (Bcm) in 2022 to as much as 335 Bcm by the end of this decade and then to 470 Bcm by the

**Opposite: A large-scale urban and industrial development in Addis Ababa funded by Chinese investors.**







*With Europe trying to wean itself off Russian gas, following the invasion of Ukraine, the prospects for gas exports from African producers look brighter than they have for some time.*



*“Existing pipeline infrastructure from Northern Africa to Europe and historical LNG supply relationships make Africa a strong alternative for European markets, post the ban on Russian imports.”*

late 2030s, “equivalent to about 75% of the expected amount of gas produced by Russia in 2022.”

According to Siva Prasad, senior analyst at Rystad Energy, “Existing pipeline infrastructure from Northern Africa to Europe and historical LNG supply relationships make Africa a strong alternative for European markets, post the ban on Russian imports.” To date, the largest African exporters of LNG have been Nigeria and Algeria, followed by Egypt, Angola, and Equatorial Guinea. Recent discoveries may now bring Mozambique, Tanzania, Senegal, Mauritania, and South Africa into the game. Late last year, before the Russian invasion, the outlook for these fields might have been marginal, given the global policy move to cut carbon emissions. Europe’s push to diversify supplies has changed that calculus completely.

Nonetheless, it is accurate to say that an increasing number of investors are moving out of hydrocarbon development. That does not, however, mean they are turning their backs on

Africa. Rather, they are agnostic about where they seek new opportunities. This could be a boon for Africa or, alternatively, the continent could miss the boat.

In November 2021, on the sidelines of the UN COP26 climate summit, the Glasgow Financial Alliance for Net Zero (GFANZ) declared that its 450 member companies, spread across 45 countries, had an investment pool worth \$130 trillion available to finance moves towards net zero carbon emissions over the next three decades. Those firms included banks, insurers, pension funds, asset managers and export credit agencies.

The question facing investment managers at these GFANZ firms is where they will find enough viable ‘net zero’ projects with sufficiently good rates of return. The question for energy projects in Africa must be whether they can attract this investment, given the competition from Asia and elsewhere. This avalanche of potential cash will face the same problems as those already facing the industry. As one executive from a renewable energy firm notes: “I don’t see any lack of finance at all. The problem is the other way round – the lack of well-structured projects. The question is why aren’t there more projects coming online? We’re way behind in Africa, the strategy isn’t working.”

So, what would it take for big institutional investors and pension funds to take a serious look at the African energy sector? Mark Carrato, Coordinator of the USAID Power Africa initiative, believes the answer lies in making African countries’ regulatory frameworks more investor friendly.

Interviewed at the Africa Energy Forum in November 2021 he laid out his wish-list for change: “You need clear and transparent procurement processes, sound strategic and integrated power sector planning, transparent legal and regulatory frame-







works and international power pools”, he said.

This approach to developing domestic energy markets has not yet been widely adopted despite empirical evidence of its benefits. It has, however, borne fruit in some contexts. The deregulation of the electricity markets in Nigeria, Senegal and Mozambique has created space for private companies such as Azura to build independent power plants (IPPs). So far, Azura has constructed 884MW of gas-fired generating capacity in those three countries, with a further 1232MW under development. Azura has been backed by range of investors including two private equity funds Amaya Capital and Actis, along with the African Development Bank’s project financing arm, Africa50.

Azura’s investment became controversial in Nigeria when politicians publicised the nature of the government guarantees that underpinned it. These were, by all accounts, standard ‘Take or Pay’ clauses and not particularly controversial by industry standards. Nonetheless, the media and political backlash that ensued may hold

back future IPP investments in Nigeria. An unintended consequence of such controversies may be that energy companies redirect their attention from domestic gas-to-power projects in Nigeria towards export-based projects where the producer is not tied to a single customer and the political risk is lower and more easily mitigated.

Investment in gas-based projects, whether for domestic use or for export, is becoming increasingly controversial as voters, governments and key investors demand moves towards low-carbon energy. Gas is not, however, destined to become a stranded asset, provided that projects are done well. In the words of one senior energy investment executive, “There is a very clear route for those projects. It is enhanced scrutiny and focus on the minutiae. There are some European Development Finance Institutions that are not open to gas at all. But I hope that the pendulum is swinging back, that gas has a role in our green future.”

The 450 MW gas-fired power plant at Temane in Mozambique has become emblematic of the problems fac-

ing the gas sector. The investment was only pushed through with the backing of foreign governments, willing to brave considerable criticism from climate campaigners. They argued that the Temane investment was vital to bridge Mozambique’s energy gap before large-scale renewables come on stream.

The UK and Norwegian governments, through their Globeleq joint venture, secured \$650 million in debt funding for the project from the IFC (part of the World Bank group), the Dutch Development Bank FMO, the Emerging Africa Infrastructure Fund (part of Private Infrastructure Development Group, a multi-donor organisation), the US Government, OPEC and the World Bank’s Multilateral Investment Guarantee Agency. Such schemes are likely to become increasingly rare, however. The IFC, the UK and Globeleq have a policy of not investing in upstream oil and gas, for example.

The pressure for moves to restrict funding for hydrocarbon-based projects mean there are now, broadly, four types of investment source for



## Funds in focus

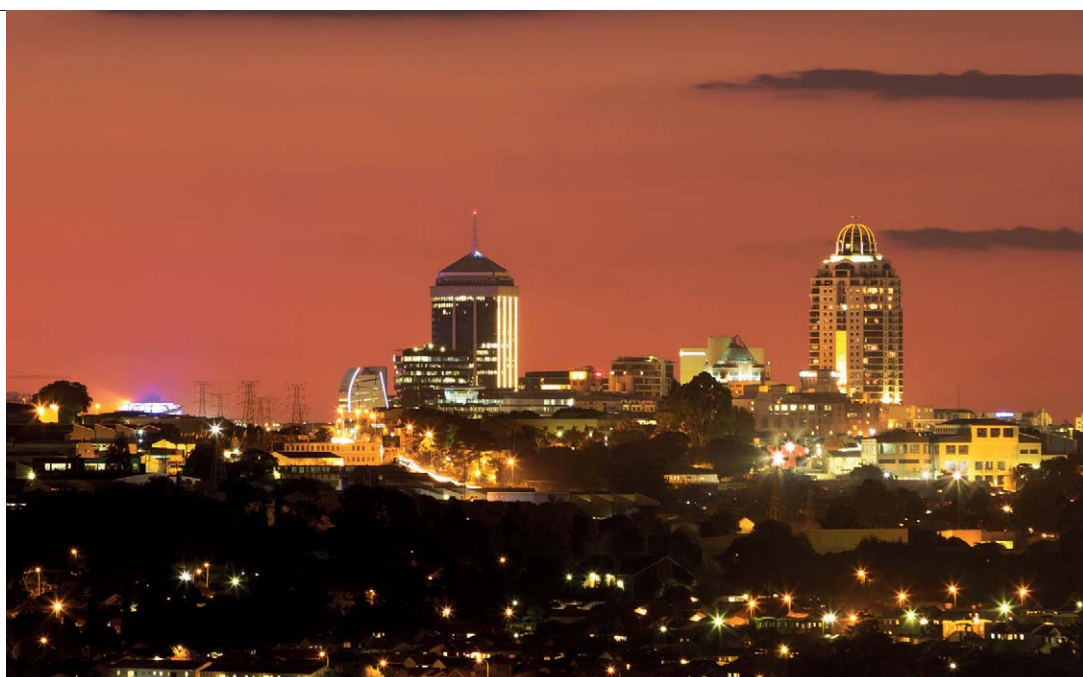
African energy. There is a legacy group of investment funds still able to see commercial returns from investments in hydrocarbons.

There are also funds backed by African governments willing to invest in hydrocarbons as keystones of national development strategies. The new African Energy Transition Bank is one example of these, as is the AfDB's Africa50 financing arm. But even these funds have been slow to roll out investments. Africa50 has just six power projects in its portfolio, for example.

When it comes to low carbon power generation, the vast majority of funding on offer is coming from various forms of concessional lending, whether from OECD governments, philanthropic funds or climate offset investments. What the renewable energy sector in Africa requires is a large expansion of the fourth group: institutional investors seeking commercial investments. That is what appears to be missing from the current funding mix.

As the energy investment executive noted, "There is a lot of interest in renewable energy projects from the financial side but having interest and reaching financial close are different things. The finance community has to do better. Once you have a first RE project, achieving that risk allocation is when the risk should reduce and at that point everyone has to come together and find efficiencies."

There is no shortage of local need for investment in Africa's energy sectors. According to the PWC *Africa Energy Review 2021*, economists estimate the cost of attaining a continent-wide net-zero energy mix by 2050 to be \$2.8 trillion. The figure is based upon annual costs of around \$33bn this decade, around double the level of actual investment in 2019. From 2030 the estimated need will increase dramatically, to \$111bn an-



**Above: Sandton Skyline, Johannesburg, Gauteng, South Africa.**

nually between 2030 and 2040 and then to \$142bn annually between 2040 and 2050.

One country where commercial investors have successfully entered the market is South Africa, which is already the continent's largest electricity generator. With a developed infrastructure and an investor-friendly regulatory framework already in place, it has not been hard to find funds willing to take a risk on renewable energy solutions.

One such player is Revego whose 'yieldco' business model is based on long-term power-purchase agreements for windfarms and solar farms. Its CEO, Reyburn Hendricks, expects a dividend yield of 8-10% for the medium term. He sees this model as predominantly South Africa focused "because that's where most of the opportunities are". With the main South African generator Eskom mired in operational and financial difficulties, there are big opportunities for private providers to fill the country's developing energy gaps.

Those problems are also spurring two of South Africa's neighbours to reduce their dependence on Eskom. Botswana and Namibia are in the

middle of new tendering processes for large scale solar investments. At the end of 2020, Botswana had just 6 MW of installed photovoltaic power, yet it is now part of the biggest solar power project in Sub-Saharan Africa. With the backing of USAID, Botswana and neighbouring Namibia are attempting to construct between 2 and 5GW of solar output. To do so, they are ending the monopolies previously enjoyed by their national power companies and going out to private power companies. The first to receive a contract in Botswana was the locally-listed Shumba Energy, previously a coal mining enterprise.

The economics of the model rely on connecting this huge uptick in capacity to the transnational Southern African Power Pool (SAPP). There are considerable obstacles, as Mark Carrato of USAID's Power Africa initiative, notes. "If you can easily point to one bottleneck that has been holding back the sector, transmission is it. It's expensive, it's hard to do and it's rarely linked in a really sound way to some of the generation projects. There are stranded assets all over Sub-Saharan Africa and we lose a ton of energy each year."



For Carrato, the need for grid investment is a huge opportunity for outside investors, “We need to find new ways of financing them” he said at last November’s Africa Energy Forum. “They’re really expensive. In other parts of the world, you can get private capital to do that. Why would a government want to take that on?” He acknowledged the sensitivities in some countries about involving the private sector but insisted that “Governments can still maintain their sovereignty and own their own system but let someone incentivised to get the job done.”

But according to one investor such objections are not entirely due to bureaucratic obstruction, “There is an affordability issue whereby the government cannot just sign up to the iron clad documents developers want.” As a result, “Developers need to be more

creative in coming up with solutions and sometimes circumventing the government. There was an idea that after the first one the process would speed up, but the reality was that each process was as painful as the last.”

For most external investors, some protection from these pains can be found in the involvement of government-backed lenders and multinational DFIs. They provide, in effect, a form of political risk insurance, a re-assurance that the lender will not be standing alone if local conditions turn against their project. For this reason, most African countries are unlikely to see purely commercial investments for some time to come. Only once viable and trustworthy frameworks for foreign investment have been established – and tested in real world disputes – will purely private money begin to flow. For the time being, the

path ahead is public-private partnerships.

This will require a degree of agility and speed on the behalf of all the participants in the energy investment sector which has, historically, been rare.

The necessary doubling, and then quadrupling, of investment in the overall African energy market over the next decade is going to challenge everyone. Lenders will have to scale up their project assessment and management capacities and governments will need to speed up their decision-making. If they can do so, they will kick-start a virtuous circle. Successful projects will lead to more successful projects and lower costs as risks become known and manageable. The alternative is that investors will see easier returns outside Africa and direct their money elsewhere. ■

## Interview

# Investing in sustainable infrastructure

*Lisa Pinsley, Partner and Head of Middle East and Africa Energy Infrastructure at Actis, a leading global investor in sustainable infrastructure, explains the company's investment rationale towards African energy.*

### **Could you describe the appetite among institutional investors and firms such as Actis towards energy investments in Africa?**

Actis is one of the longest standing and committed investors in the energy sector in Africa, with nearly \$2bn invested in the sector since Actis' inception in 2004. Traditionally our focus has been on power generation with utility offtake and on distribution companies. We continue to invest in these sectors, and we are particularly excited about the recent boom of opportunity in the commercial and industrial power generation space driven by welcome regulatory

reform across the continent.

### **Actis is invested in Azura which is operating in Nigeria, Senegal and Mozambique. How does Actis view the prospects in other African countries?**

In addition to Azura's target markets, Actis has also recently invested in Egypt, South Africa, Senegal, Kenya and Cameroon via our Lekela, BTE Renewables and Eneo platforms.

We target investments in larger African economies with strong underlying macro fundamentals as well as a history of private sector investment in the energy sector.

### **What are the questions that you ask yourselves when considering investing in Africa's energy industries?**

We aim to provide offtakers, whether government or private, low cost, reliable and sustainable power and services. This is the most important aspect of our investment decision-making, as you need to provide a product in high demand rather than shoehorn an ill-fitting product into the generation mix.

We also ask ourselves about the macro fundamentals underpinning the market and whether they are sustainable. ■

James Doree  
*Lion's Head Global Partners Managing Director*

# FINANCING CHALLENGES AND OPPORTUNITIES IN AFRICA

*Lion's Head Global Partners Managing Director **James Doree** speaks to Bill Lumley about progress in funding Africa's energy transition*

## **How do Lion's Head funds play a role in Africa's energy transition?**

It comes down partly to what we mean by energy transition. Our funds all have the ethos of targeting an issue and being able to bring capital into emerging or new sectors. Specifically as it relates to energy transition, our newest fund, AfricaGoGreen, is there to finance through debt for industrial energy efficiency, e-mobility, green buildings, or anything that involves displacing fuel or emissions. The fund is set up with a technical assistance facility that allows it to build knowledge and determine the technical and market feasibility of some of these new areas.

No single finance initiative alone can run energy transition, but this sort of capital is able to enter these new sectors and scale up emerging technologies, while at the same time attracting institutional capital where it can play a crucial role.

## **How important are local currency tranches in the context of renewable energy financing structures?**

In many countries they have been non-existent. Those countries that have had the ability to finance projects in local currency have achieved the most scale, for example South Africa. In many markets, the chicken-and-egg scenario to resolve is the need for long-dated funding to fund this long-dated infrastructure, but often long-dated fixed-rate funding isn't available in some of these local currencies. That doesn't, however, mean that hard currency funding from DFIs is a free option, as it leaves participants open to currency risks.

Using local currency in these projects is really around efficient risk management and developing the financial expertise and ecosystem onshore. In many markets, the main feasible source of long term fixed-rate finance comes from institution-



al investors like pension funds and insurance companies. They are not necessarily expert in lending to infrastructure, so this is one area where support is needed.

The motivation is clear: people paying the bills in these markets are usually consumers earning local currency, so it is particularly important for households and small enterprises. Obviously there are a number of commercial exporters who can afford to pay in hard currency, but that doesn't mean it is technically straightforward for projects to be structured this way. We've done some work looking at what would be involved for projects that have existing dollar tariffs to be partly redenominated in local currency and essentially the lower the domestic interest rates and the deeper the local funding market, the more feasible it is.

But these things will happen incrementally. If you are going to explore introducing local currency then you need to figure out how to make sponsors at least neutral to the extent to which the equity is still covered by hard currency, or you may have some form of compensation mechanism. So, if you are trying to introduce local currency options into PPAs and tariffs, then you have to figure out how to get the support of sponsors, who tend to be foreign investors. Perhaps this could involve extension mechanisms for the PPA (in response for tariff amendments).

Yes, you can have some local equity, but ultimately international sponsors will want to know that they will be able to get currency out in order to pay their dividends.

Smaller projects tend to be more feasible for local currency finance.

Our "Facility for Energy Inclusion" was recently able to refinance the 20 MW Sakal Solar project in Senegal with a local currency tariff, with proceeds being redeployed into new projects. In Nigeria the African Local Currency Bond Fund participated in the first corporate green bond a few years ago, allowing North South Power to refurbish hydropower turbines (with the support of Infracredit). In general, guarantors like Infracredit and GuarantCo can play a crucial role in developing local currency markets.

### **What needs to be done to develop domestic African capital markets?**

First of all, you need to understand what's in these markets. Many will have commercial banks with limited experience of infrastructure project finance. Even if they did have interest, there's not really market for them to then hedge interest rates to provide long-term fixed rates to finance these projects in the private sector.

Therefore, there's a need to develop interbank lending, liquidity and interest rate derivatives. Otherwise, the only source of long term funding tends to be pension funds and insurance companies.

I think there needs to be a bit more willingness on the part of DFIs to let the local market take the lead. There are no DFIs lending in the South Africa renewables programs, purely domestic banks, for instance.

In another example, one thing helping in Nigeria is that none of the DFIs are lending because they're scared of the currency getting trapped, which is in turn giving space to people like Infracredit and the pension funds to finance it (notwithstanding other

bankability concerns!). Obviously it would be better if the DFIs were able to operate in Nigeria, but it's interesting their inability to participate in the market more is getting done in local currency, the naira.

### **Are energy sector offtaker creditworthiness issues still a major challenge?**

Yes, they are. Most projects are set up with fixed offtake from utilities. Utilities tend to be in financial difficulty or insolvent in most markets in Africa and therefore the whole financing ecosystem is set up to mitigate the fact that the buyer of the power is not bankable. That leads to demands for sovereign guarantees in these projects. If you look at the current trend of rising insurance rates and costs for various players, the political response in many markets is not to raise tariffs to end users because that's bad politics, but this again exacerbates the problem of these uptakers not being financially stable. This is a long term problem.

AfricaGreenCo is an entity set up to provide support in the Southern Africa power pool intermediating between generator and buyer of power, which is more bankable as an optic but also with the ability to sell power to different buyers within the SAPP.

### **What other key energy-related projects are you currently advising on?**

We're seeing a lot of M&A activity, for example, we're currently in the market with JCM Power which has solar and battery assets in Malawi.

We're also working with Decentral, one of the existing players in the South African C&I market, to source equity for its expansion. ■

*Mandy Rambharos*

*Eskom Holdings Just Energy Transition General Manager*

# MAKING JUST ENERGY TRANSITION IN SOUTH AFRICA HAPPEN



*A commitment to long-term decarbonisation in South Africa is set to reinvigorate investment opportunities in the country's energy sector. Eskom Holdings Just Energy Transition General Manager **Mandy Rambharos** talks to Bill Lumley*

## **What are the key challenges and opportunities for Just Energy Transition (JET) in South Africa?**

With coal-fired utilities accounting for 88% of South Africa's electricity, the challenges for transition to renewables are not simply funding, but they are also the socio-economic issues that will arise when coal plants close down. While their closure will bring environmental benefits, they will have a major impact on social structures.

Our challenge has been to determine how to balance meeting the goals of decarbonisation, environmental equality and huge benefits for water-saving in a semi-arid country, with people losing their jobs. We need solutions in terms of Eskom's

JET plans, repurposing plants to enable a return of economic benefits to those areas where plants are shut down. We are looking at how to create opportunities for people in those areas. Our plan is for repowering and repurposing existing power plants to contribute to a demand for renewables in South Africa. If you are committed to a renewables then you also encourage local manufacturer industrialists to move into the area.

We used to have manufacturing capability, but government policy was unclear on renewables and manufacturers left the country, taking with them much of that capability. There is now a huge opportunity to reignite that. There are still many people who are holding on to the coal agenda. We need to up the ante in terms of aware-



ness and communication around the opportunities. The environmental impacts are clear.

**Coal still accounts for most of the country's energy supply. What are you working on, and what else can be done to help drive down that share more quickly?**

We are currently monitoring technologies to see what techniques will be best to help address the high proportion of coal-driven energy. For example, solar wood battery storage is the lowest cost option for us right now, but because of the requirement for grid stability and system flexibility, we do need a certain amount of gas to support the new infrastructure and we would need to import this gas from a neighbouring country. We need first of all to check the viability of investing in gas to supplement the renewables system

**Are there any particular techniques you are deploying to facilitate necessary finance?**

Eskom is a highly indebted company, so the first challenge to overcome looking at the transition plan was how we will manage to finance it all. We put together an overall South Africa Just Energy Transition plan, with the electricity sector being the first phase of that plan. This received cabinet approval and formed the basis of the \$8.5bn deal that was struck at COP26 last year. It's not money in the bank yet, but it comprises pledges by the UK, US and the EU. Negotiations continue on the basis that there is a deal on the table that we can start using.

Eskom meanwhile has good relationships with its multi-lateral banks and development finance institutions.

For example, Eskom already has fully financed its flagship Just Energy Transition project for a renewable plant to shut down one of its coal power plants this year. This includes creating a skills and retraining school there, to re-educate people and enable them to participate in the renewables industry.

***We are currently monitoring technologies to see what techniques will be best to help address the high proportion of coal-driven energy.***

**South Africa has some of the world's lowest renewables tariffs. Why is this and does it bode well for the future in terms of renewables?**

The low renewables tariffs in this country are largely down to the global drop in renewables technology. The cost of PV panels, for example, has fallen by about 80%.

But the price of electricity is not cost-reflective. Eskom is selling its product for less than it costs us to make. The price of electricity in South Africa has been artificially low for many years and we still need to get to cost-reflectivity in the country, but in a struggling economy this is a difficult discussion to have.

However, overall in the long term, as we shut down coal plants and replace them with renewables, we will have to address this.

**What political changes would you like to see occur in South Africa that would help Just Energy Transition?**

From an energy policy perspective we need certainty of demand for renewables in order to attract the necessary

investment and the industrial policy needs to support local manufacturing. As a manufacturer you wouldn't invest in a country where you don't know if it will commit to building a certain level of renewables per year.

The industrial policy needs to support local manufacturing. At present, industrial policy is not conducive to investors coming in, due largely to local onerous localisation requirements. We need a phased-in approach to introducing localisation in the country.

If you look at India and Vietnam, they changed their localisation policies so that they could attract investors, and once they had done so they were able to start ramping up on their localisation requirement. But at the moment localisation requirements are so high in South Africa that it is actually deterring investors.

So the two biggest things I think must change are energy policy and industrial policy.

**Do you see a chance of those changes happening anytime soon?**

We've been in discussion with government for a long time, but I don't know. There seem to be certain positive moves in terms of some of the energy policy changes in the last couple of months, but I am not sure realistically how long it's going to take especially for the industrial policy to change.

We have to learn by doing. We have to start implementing projects now. We won't get everything right when it comes to repowering and repurposing, but if we don't start now then it's going to be too late.

We can't deny just energy transformation is happening, and we need to get on the bandwagon and to start implementing projects, learning by doing. No time like the present. ■

# KENYA SEEKS TO MAXIMISE BENEFITS FROM ‘BASELOAD’ RENEWABLES

*Kenya’s geothermal and hydropower resources have been major contributors to the country’s success in boosting electricity access rates, but can they play a major role in meeting surging energy demand in the future?*

**K**enya has been one of Africa’s success stories in terms of progress towards the UN global Sustainable Development Goal of achieving universal electricity access by 2030. The country experienced one of the fastest increases in electrification rates within sub-Saharan Africa in the last decade.

By 2020, over 75% of the population had access to power, according to Kenya’s Energy and Petroleum Regulatory Authority (EPRA), and the government has said it plans to make it 100% within this decade. That will require substantial investment given

that many of those still without grid power are in more remote areas away from the easier-to-connect towns and cities of the more densely populated south, though low-cost off-grid solutions are helping here.

Kenya’s substantial achievements in electricity connectivity are, in any case, just the start of the journey in terms of investment in the power sector. Greater access to electricity means more demand for power, demand which is poised to rise fast if the Kenyan economy expands as fast as some expect.

The International Energy Agency (IEA) forecasts in its *Kenya Ener-*

*gy Outlook* that, in its high-growth “Africa Case” scenario, Kenya would need to provide more than 80TWh of electricity in 2040, more than five times levels seen in recent years.

That would require substantial investment in both generating capacity and transmission infrastructure, a chunk of it coming from the private sector, supported by guarantees and co-funding from international development institutions.

Attracting this investment will be made easier because Kenya has one of sub-Saharan Africa’s most developed power sectors. The private sector is highly active, and the country



has been open to independent power producers since the mid-1990s. It also helps that Kenya Power, the country's main offtaker, has proved a creditworthy partner for the industry.

Rising demand is likely to be met by an expansion of renewable energy complemented by some form of baseload power. Intermittent renewables solar and wind are already ramping up, but Kenya is one of few countries in the world to already be exploiting two existing renewable energy sources capable of providing low-carbon grid-scale baseload power: hydro and geothermal power.

## HYDROPOWER

Hydropower accounts for about 45% of power company KenGen's installed capacity (around 825 MW), much of it from a series of dams on the Tana River, north-east of Nairobi. But as is the case across much of Africa, unpredictable rainfall patterns are increasingly leading to periods of prolonged drought that lower river and reservoir levels, which in turn reduce power output. Given its unreliable feedstock – water – hydro's status as a major contributor to Kenya's power mix is in question. The problem is further compounded because some

dams are in a poor state of repair and require maintenance to maximise output.

Given the unreliability issues, hydropower is not a main plank of government plans to expand power generation to meet rising electricity demand. That's partly because there aren't enough potential sites that can be developed commercially and partly because climate change trends suggest droughts could get worse in future. The International Energy Agency estimates that hydropower output in Kenya could slowly expand over the next two decades, doubling

*Kenya is one of few countries in the world to already be exploiting two existing renewable energy sources capable of providing low-carbon grid-scale baseload power: hydro and geothermal power.*





## Kenya case study

*The country is one of the global leaders in the sector, having been exploiting its geothermal resources for power since the Olkaria power station in the Hell's Gate National Park started operating in 1981.*

to around 7TWh in 2040, but that would be a fraction of Kenya's forecast power requirements by that time.

Investment in hydropower over the next few years is likely to be focused on rehabilitating existing power stations and relatively small-scale new projects. The latter include the 15 MW Kaptis hydropower project, a run-of-the-river project under development near Lake Victoria. Developer Tembo Power and South African private equity fund manager Metier each hold 40% of the project.

This doesn't mean hydropower won't be an important source of power for Kenya, because – in addition to valuable smaller scale regional projects – the country is likely to be importing more electricity generated from hydropower in coming years, notably from Ethiopia. The two countries have signed an agreement for Kenya to import hydropower from its northern neighbour, which would require upgrading cross-border interconnectors. Those imports could include power from the controversial \$4.5 billion Grand Ethiopian Renaissance Dam (GERD) on the Blue Nile, which started generating power in February 2022.

### GEOTHERMAL

However, few countries would choose to rely on energy imports these days, if it can be avoided – the negative impact of Russia's invasion of Ukraine

on global energy trading has underscored the perils. So, Kenya is keen to maximise the potential of its other non-intermittent green energy, geothermal power, which generates power using steam from deep in the rock beneath the Rift Valley to power turbines.

The country is one of the global leaders in the sector, having been exploiting its geothermal resources for power since the Olkaria power station in the Hell's Gate National Park started operating in 1981. Currently, the country gets a larger share of its power from geothermal energy – almost half – than any other country in the world. It also exports its know-how to surrounding countries with geothermal resources, including Ethiopia, Rwanda and Djibouti.

Kenya's installed geothermal capacity currently stands at 865 MW, most of it supplied by KenGen. Kenya wants to at least double that figure by 2030, which would meet an estimated 60% of power demand by then.

Rebecca Miano, KenGen's chief executive has said geothermal energy is central to Kenya's power generation strategy. In July 2021, she told Bloomberg that KenGen would invest \$2 billion in four new plants, as well as upgrades at Olkaria, over the next five years. This could add 400 MW of geothermal power capacity to the national grid. There is a lot of scope to scale up further. The government says the Rift Valley's exploitable geo-



thermal resources could total around 10 GW.

But geothermal energy is more expensive to produce than intermittent solar or wind power, even if it does have the advantage of being a reliable baseload power provider. The sector also carries similar risks to drilling for oil and gas in that drilling a geothermal well is expensive – up to \$6 million – and there is no guarantee that it will produce enough steam to be commercially viable. Mindful of the risk, KenGen handles geothermal investments through a separate com-





pany, the Geothermal Development Company in a bid to make investment more attractive.

Support is also coming from the international development community. FSD Africa, a UK agency seeking to strengthen financial markets across sub-Saharan Africa, said in October 2020 it would work with Parhelion, a UK-based energy and climate risk finance advisory company, to launch an underwriting facility, backed by East African insurers, to de-risk early-stage development of geothermal energy projects. Doing so could sig-

nificantly expand electricity access and energy sector resilience in Kenya and Ethiopia, FSD said. Other development institutions have supported the sector co-funding, guarantees, or technical support.

## COMPETITION FOR INVESTMENT?

Whether the potential of Kenya's geothermal resources can be fully realised remains to be seen. Cheaper-to-build solar and wind energy could look more attractive to investors, especially if grid-scale battery storage

becomes more ubiquitous and cheaper, effectively allowing those renewables to contribute to baseload power. Other options under consideration by the government to provide baseload power, such as a mooted nuclear plant could also make investment in geothermal – and other renewables – look less attractive in the long term.

But these factors are unlikely to play a role in power sector development during the next decade, so geothermal energy looks set to be a major investment destination in Kenya's power sector for years to come. ■

**Above: Olkaria II geothermal power plant in Kenya.**



# CHINA'S COAL PLEDGE BITTERSWEET FOR AFRICA

*China's decision to ditch financial support for coal projects abroad has already hit projects in Zimbabwe and Kenya. Environmentalists hope that the decision will usher in a new era of renewables, reports Tonderayi Mukeredzi*

**C**hinese President Xi Jinping's announcement at the United Nations General Assembly in September that

his country would no longer build new coal-fired power stations overseas has been celebrated by African environmentalists even as policymakers fret about the economic costs.

Immediately after Xi's pledge, the Bank of China, the world's foremost financier of coal-fired power in recent years, said that it would no longer provide financing for new coal plants and coal mining projects outside China from 1 October 2021.

The state lender explained that it would continue to support projects whose contracts it has already signed, meaning that coal projects in the pipeline could still get across the line. The shift in policy has been celebrated by

many green energy lobbyists across Africa as a positive development that will stimulate the inescapable transition from coal to cleaner forms of energy.

The writing has been on the wall for some time. Despite being the single biggest financier of coal-fired power plants abroad, China signalled its retreat from new coal power projects in Africa in 2020. In November 2020, the Industrial and Commercial Bank of China (ICBC) abandoned plans to invest in the Lamu coal project in Kenya. In June 2021, it ditched the \$3bn Sengwa coal project in Zimbabwe.

According to a September report by the *Global Energy Monitor* based on its Global Coal Public Finance Tracker, China's announcement will affect 44 coal plants under consideration for public financing from state-owned Chinese institutions in 20 countries,

eight of which are in sub-Saharan Africa. The cancellation of coal plants in Africa would cut the amount of proposed coal power by half, as China has been a major financial supporter of new coal plants on the continent. The cancellation of the projects would also completely eliminate the pipeline for new coal plants in Kenya, Madagascar, and Côte d'Ivoire, says GEM.

In its September 2021 report, *No New Coal by 2021: The Collapse of the Global Coal Pipeline*, E3G, a European independent climate change think-tank, says Chinese financial institutions are involved in 13 projects in the eight countries, totalling 11.4 GW of planned capacity (76% of the total pipeline in the region).

The report notes that since 2015, seven countries have fully scrapped their pipeline, leaving 13 countries still considering coal, with only South Africa and Zimbabwe currently constructing new plants.

E3G says cancelling such projects would help countries avoid locking





themselves into an expensive and polluting energy source, and the risk of the costly stranding of assets. Some countries may already be left with expensive and useless coal power infrastructure.

President Xi's pledge could hit production in South Africa, with questions over the future of a Chinese-funded coal-fired power station in Limpopo province.

## BOOSTING THE SHIFT TO RENEWABLES

Lorraine Chiponda, Africa coal coordinator for the International Coal Network, believes African countries that have refused to heed the call by civil society groups to transition to renewable energy and still pursued coal projects will bear the greatest costs. They include Djibouti, Tanzania, Zimbabwe, South Africa, Malawi, Botswana, Mozambique, Madagascar and Kenya.

But while the change could leave coal-dependent nations in the lurch, it could boost the shift to renewable

generation. Chiponda says while China's coal pledge will disrupt the energy finance chain temporarily, it is a victory for African communities who have suffered from the environmental impacts of fossil fuel projects.

"The decision will have positive long-term effects as it will put Africa and the globe on the path to clean energy and in the short term it has positive results as communities earmarked to host dirty energy projects will not suffer from air pollution and displacement from their lands by the mega and dirty coal projects that were being proposed," she says.

Having stopped the funding of coal projects overseas, China may now redirect financial support to green and low-carbon energy projects in developing countries. The country's investments into renewable energy have recently constituted the bulk of its overseas energy investments and rose to 57% in 2020 from 38% in 2019. Wu Peng, the director general of China's Department of Afri-

Coal trucks on a huge open caste coal mine at the Hwange Colliery, Zimbabwe.

can Affairs in the Ministry of Foreign Affairs, said last year that China has helped to build more than 80 large power facilities for Africa, most of which are hydro, wind or solar. These include the Noor Ouarzazate Solar Complex, the world's biggest solar power station, and the Garissa solar power plant of Kenya, the largest PV power station in East Africa.

He added that 39 green projects are in the process of construction or implementation in Africa. Africa could also unlock international global finance from other countries like the US that have pledged to increase international climate finance.

## DEVELOPED COUNTRIES MUST SUPPORT TRANSITION

E3G says the international community has an important role to play in ensuring that the 13 countries in Africa that still have a coal pipeline are provided with sufficient financial and technical assistance to move away from coal towards renewables.

Chiponda says developed countries who have principally caused global warming and climate change should finance Africa's renewable energy transition in a manner that does not result in debt accumulation for African countries.

"The transition to renewable energy requires systemic, structural and policy mechanisms in place to ensure that energy is deployed to the groups that have not had access to energy and... greater accountability and good governance of energy to ensure that it serves the people," she says.

And Africa can play an influential part in the transition to renewable energy because of its abundant possession of the minerals that are needed for renewable energy technology such as rare earth minerals. ■





# AFRICA AND GREEN HYDROGEN: A PERFECT MATCH?

*Green hydrogen projects could prove vital in the fight to stem global warming, and African countries could be poised to play a pivotal role as hydrogen production and export hubs.*

**H**ydrogen is a versatile element that is in growing demand. It provides a feedstock for industries such as iron and steel, petrochemicals and ammonia, it can be used in power generation, and it is used in low-carbon fuel cells for the transport sector and for energy storage.

But the hydrogen industry needs to clean up its act, if it is to be part of the solution to meeting climate change targets. Currently hydrogen production relies heavily on fossil fuels as feedstock – the most common production method involves creating hydrogen from natural gas, which produces carbon dioxide as a bi-product.

The good news is that hydrogen can be produced cleanly using electrolysis to split water to produce so-called green hydrogen and oxygen, and it's a technology which is in increasing demand as countries seek to meet their climate change obligations under Paris climate change treaty.

Global capacity of electrolyzers, which are needed to produce hydrogen from electricity, doubled over the last five years to reach just over

300 MW by mid-2021. Around 350 projects currently under development could bring global capacity up to 54 GW by 2030, according to the International Energy Agency.

But, in addition to a local supply of water, producing hydrogen via electrolysis requires copious amounts of electricity, making it expensive, and for the hydrogen to be truly green the power needs to come from low-carbon sources such as renewables.

That's where Africa comes into the picture. Blessed with vast untapped solar and wind resources and plenty of space to develop them, African countries are hoping to tap these resources to create their own green hydrogen sectors.

The attractions are clear: the development of green hydrogen will bring in investment and create jobs. It could drive the domestic use of hydrogen for power, industrial uses and transport in the long-term – and before that, exporting green hydrogen to meet surging demand in Europe and other overseas markets would provide valuable revenues.

A green hydrogen industry would also benefit the development of re-

newables, not just because it creates demand through its heavy power requirements, but also because it could use the power on a flexible schedule, providing steadier revenue streams from intermittent solar and wind energy. A hydrogen plant would effectively add to offtake options for renewables providers, taking solar and wind output when that exceeds demand from other users – or when the grid is down, a common occurrence in many parts of the continent. Then the plant could scale back production when grid demand picks up to allow renewable power to be redirected to other users.

A number of African countries – backed by funding and other support from enthusiastic international development agencies and financial institutions – have already joined the race to become established as hydrogen hubs. Various projects have been announced, though most remain in the early stages of development. Egypt has at least five green hydrogen projects in the pipeline. Mauritania, Morocco, Namibia, Niger and South Africa have also drawn up plans for hydrogen production facilities.





## MAURITANIA'S GRAND PLAN

One of the most ambitious is Project Nour in Mauritania, a planned development to provide 10 GW of renewable energy for a green hydrogen development, outlined in an MoU signed in September 2021 by Mauritania's Ministry of Petroleum, Mines, and Energy of Mauritania with UK-based Chariot Energy Group. The focus initially will be on identifying and developing solar and wind energy sites across an onshore and offshore area covering some 14,400km<sup>2</sup>. No timetable has been outlined for the project, which would export hydrogen to the European market.

"Developing Mauritania's green hydrogen industry promises to bring a combination of environmental, economic and social benefits to our country. We have the potential, and desire, to be a world leader in the field of hydrogen production from renewable energy sources," Abdessalam Ould Mohamed Saleh, Mauritania's Minister of Petroleum, Energy and Mines said on announcing the project.

Landlocked Niger is also seeking to take advantage of its abundant Saha-

ran solar resources to power green hydrogen projects. Germany's Emerging Energy Corporation (EEC) signed an agreement with the government in February 2022 to scope out potential sites and development types.

## SASOL LINES UP SOUTH AFRICAN PROJECTS

South Africa is one of the few sub-Saharan countries with the potential to develop a sizeable home market for green hydrogen, as well as producing for export. It is also keen to promote the hydrogen fuel cell sector, because it holds more than 90% of the world's deposits of platinum, a key component in fuel cells.

South African energy and chemicals firm Sasol has said it plans to start producing 6 tonnes a day of green hydrogen at its Sasolburg plant by 2023, using 60 MW of renewable electricity. The company also signed an agreement with the Northern Cape Development Agency in October 2021 to conduct a two-year feasibility study to assess the potential of Boegoebaai, near Port Nolloth, as a potential location for green hydrogen and green ammonia facility. Sasol says the project could produce up to 400,000 tonnes/year of green hydrogen, based on 9 GW of renewable electricity at an estimated cost of \$10 billion.

Neighbouring Namibia selected Hyphen Energy as preferred bidder to develop the country's first large-scale green hydrogen project in November 2021. The site near the Tsau Khaeb National Park would tap promising local solar and wind resources and is close to Luderitz, providing a port for exports.

The 4.4 billion planned first phase would produce up to 300,000 metric t/y of green hydrogen, powered by 2 GW capacity of renewable electricity by 2026, with plans to scale up further in the late 2020s. Output

would either be sold as hydrogen or processed into green ammonia.

## NORTH AFRICA LOOKS TO EUROPEAN MARKETS

However, it is North African countries that are perhaps best placed to deliver large-scale green hydrogen projects, not only having substantial existing industrial infrastructure, but also having an ideal location for exports across the Mediterranean to Europe.

At least five green hydrogen projects have been mooted for Egypt, though only one currently has an indicated completion date. In October 2021, Norwegian renewables developer Scatec signed an agreement with Fertigllobe plc, and The Sovereign Fund of Egypt (TSFE), to jointly develop a 100 MW green hydrogen facility as feedstock for green ammonia production. Fertigllobe is an ammonia producer jointly owned by OCI NV and Abu Dhabi National Oil Company (ADNOC),

Scatec will build, operate and majority own the facility and a long-term off-take agreement will be entered into with Fertigllobe's subsidiary Egypt Basic Industries Corp (EBIC). It could be onstream by 2024. The facility will be located near the EBIC facility in Ain Sokhna in the Suez Canal Zone, where Scatec is also involved in a consortium building a plant to produce up to 3m t/y of green ammonia.

Morocco has said it wants to put the development of a global hub for green hydrogen at the heart of its industrial strategy. The first project to emerge is a \$10bn green hydrogen and ammonia development in the Guelmim-Oued Nour region of southern Morocco, led by French power producer Total Eren. Power will come from 10 GW of wind and solar power generation, with first production forecast for 2027. ■



# OFFGRID SOLAR SECTOR SEEKS TO REBUILD INVESTOR CONFIDENCE

*There are signs of post-pandemic recovery for Africa's offgrid solar industry. Now it needs to lure back the investors*



**A**frica's offgrid solar power industry is growing but is in urgent need of further support, as the sector struggles to shake off the negative impact of the Covid pandemic on providers of equipment and services, and the ability of customers to pay.

Bringing solar power to communities both remote and in more populous areas that suffer from inadequate grid provision is regarded as vital if the UN sustainable development goal of bringing universal electricity access to all by 2030 is to be realised.

It also promises to replace polluting kerosene with cleaner – and cheaper – solar powered devices for lighting, so helping to meet climate goals as well as the social and economic benefits. Falling costs for solar products and an increase in the number of suppliers in sub-Saharan Africa has seen the sector take off over the last 10-15 years. By the end of 2020, the global off-grid sector had developed into a \$1.75bn annual market, serving 420 million users, mainly in sub-Saharan Africa (SSA), according to the World Bank's Lighting Global Programme.

That was reflected in 30% annual revenue increases for off-grid solar firms in 2017-19.

But the pandemic put an end to those sort of growth rates in many parts of Africa, even if the market is still expanding faster in some countries than others. Overall growth in sales volumes for appliances and services powered by built in or household solar panels – such as solar lanterns, multi-light systems, batteries for phone charging and solar home systems – have faltered. Spending cuts due to the strain on incomes, movement restrictions for suppliers and supply chain problems caused by the pandemic are holding it back. Further disruption to global trade due to the impact of the war in Ukraine has only added to these problems.

## MIXED REGIONAL PICTURE

In East Africa, a hotspot for home solar products, sales of off-grid lighting products reached almost 2.1 million units in the July-December 2021 period. That represented a 4% increase compared to the first half of 2021, but a 15% decrease compared to the sec-

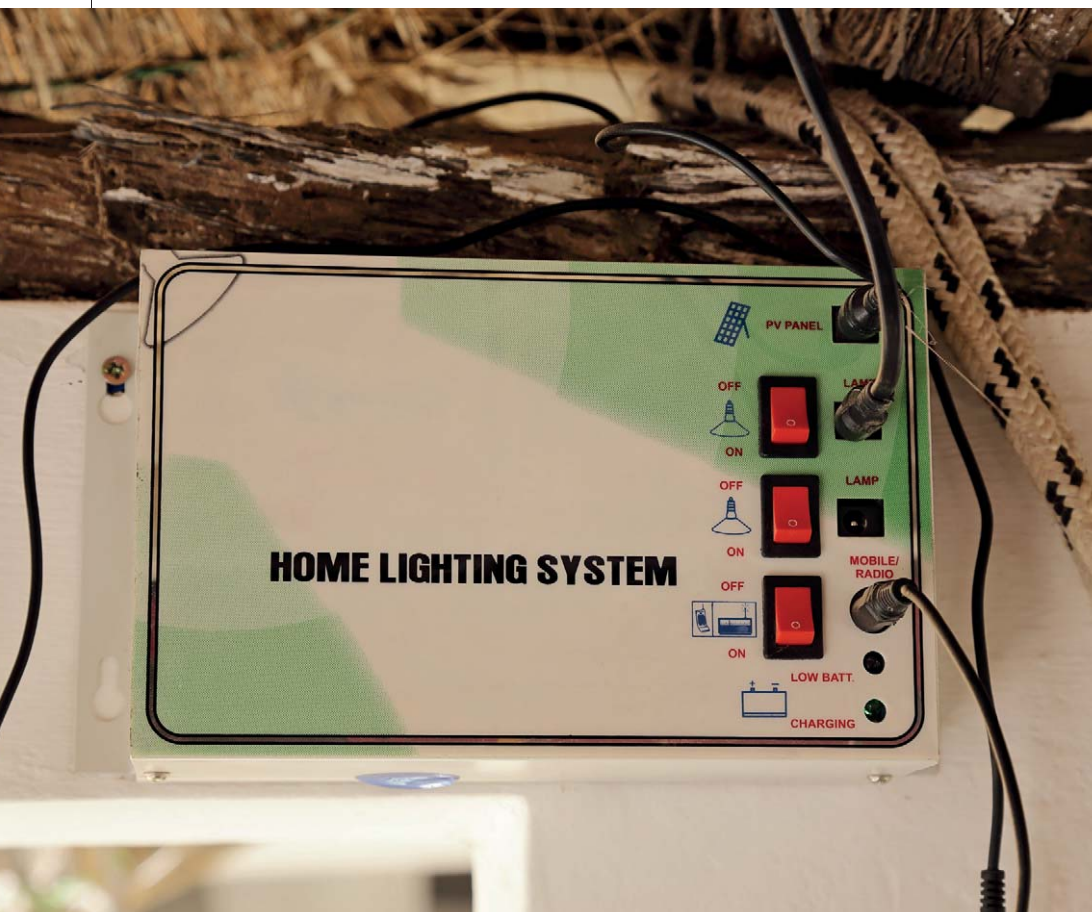
ond half of 2019, according to GOGLA, a global association for the off-grid solar energy industry. However there were large disparities between countries, with traditional market leaders Kenya and Ethiopia suffering further sales slumps, while Uganda, Zambia, Rwanda, Malawi and others reported strong growth.

In West Africa, sales of 586,000 units in July-December 2021 represented a 23% increase compared to the first half of 2021 and a 60% increase compared to the second half of 2019. Again, this positive looking picture hides national disparities, with strong growth in Nigeria, which represented two-thirds of sales in West Africa, outweighing poorer sales in the region's smaller economies, GOGLA said.

This data mostly reflects sales of direct purchases of equipment such as solar lanterns or panels by consumers rather than via so-called pay-as-you-go (PAYG) solar services, which have continued to grow, but comprise a small part of the overall market. With PAYG, customers effectively rent a panel and equipment that it powers, such as lights, rechargers, radios and televisions, from a provider company,







typically on a two-to-three-year contract, after which time the customer owns the equipment and can get their power free of charge.

### BUILDING A LOCAL SUPPLY CHAIN

The pandemic may not have been kind to the industry, heaping extra costs on providers and hitting the spending power of customers, but lessons learned from it can be used to make the sector more resilient, according to sector specialists.

As with many other industries around the world, the African off-grid solar sector has been hit hard by disruptions to global supply chains, which has led to a shortage of panels and other equipment. Companies have been able to offset these problems to an extent by repurposing parts from other industries to carry out re-

pairs, for example, but inevitably companies and their customers have still been affected by delays.

Local companies in East Africa have recognised the advantages of shortening supply chains and increasing regional and local manufacturing to reduce the impact, say researchers at the Smith School of Enterprise and the Environment, University of Oxford.

In a policy brief published in March 2022 entitled *Supporting the East African Off-grid Energy Industry Post COVID-19*, Tonny Kukeera and Aoife Brophy said that while some local off-grid companies faced with rising costs and long delays for deliveries from Asia shut down, others sought new suppliers and manufacturers within the East African region. Most of the companies started new partnership deals with manufacturers in Kenya and Tanzania. In one case, a company

switched to adapting batteries from a Tanzanian motorcycle battery supplier as an alternative to solar battery imports from China.

“This evidence indicates the need for regional governments to create an environment that allows local manufacturing and cross-border trade to thrive,” the researchers say, adding that it also provides an opportunity to develop local systems that can cut down on waste and improve resource use locally.

African governments could draw lessons from India, where production linked incentives boosted the country’s electronics manufacturing production. “Such support is urgent for East Africa to rebuild economies that are more resilient to future risks and crises,” they say.

### DONOR FUNDING WANES

Another area for concern is donor support for the sector. An overall decline in investment commitments towards the East African off-grid sector over the last five years has been exacerbated by COVID-19 crisis, as financing from governments, donors and development partners shifted towards pandemic emergency measures.

Some off-grid organisations reported having had their operational plans stalled due to funding withdrawals by the donors, while in Uganda, a subsidy programme for public electricity access was suspended, the Smith researchers note.

Regional governments, multilaterals and other development partners need to do more by focusing on setting up schemes to reduce investment risks and attract more foreign direct investment in the off-grid sector, they say. The authors share the increasingly popular view within the investment community that there should be more of a focus on funding initiatives that recognise the impact of investment in one sector on others – in this case



by acknowledging the role increased electricity access plays in protecting health and fighting poverty.

“The off-grid renewable sector plays and continues to play a tremendous role in enabling services such as access to affordable and electrified health care and water pumping services in the majority of the African countries,” according to the policy brief, which stresses that the role of electricity access in schools, powering digital tools and promoting digital literacy also helps improve health outcomes.

## MORE REGULATORY CERTAINTY NEEDED

Above all, the offgrid sector is looking for more certainty in terms of operating conditions for the sector in order to attract more investment such as equity financing, which has fallen. Investors have become more reluctant to fund the sector at a time when emergency fiscal measures related to the impact of the pandemic, such as temporary changes in VAT and other taxes, have made assessments of revenue streams and profits difficult to assess.

“To achieve this, governments will have to ensure working frameworks and mobile network standards align with the minimum investment period. That is to say governments need to be consistent and not impose changes in short time periods,” say Kukeera and Brophy.

That extends to ensuring similar reassurance for investors regarding the business framework for other services with which PAYG solar system sales are dependent, such as mobile money, smart metering and Internet of Things (IoT).

“Investments in solar products are attracted by the promise that there is a suitable connection methodology for a minimum period like five years. Hence, consistent mobile money, IoT, and mobile networks regulations are critical,” they say. ■





# KEEPING THE FUNDS FLOWING INTO AFRICA'S OFFGRID PROJECTS

*Innovative financing solutions are helping investment to keep flowing into African offgrid renewables projects despite the difficult operating environment*

*"It's now dramatically more affordable to power a home with a solar system than to extend the electrical grid."*

**F**resh funding for offgrid solar projects in Africa has been more costly and harder to come by in the last two years than it was prior to the Covid pandemic, but that doesn't mean investors are shunning a sector which is one of the main drivers for economic growth, social improvement and a switch to clean energy.

A number of sizeable investments and fund-raising initiatives emerged in the first half of 2022, which underline the potential for a return to rapid growth given the right conditions.

## SUN KING INJECTS NEW OFFGRID FUNDING

For example, private-equity backed solar firm Sun King, one of the world's largest offgrid household solar products providers, said in April

it had raised \$260 million in series D funding to deliver off-grid energy technologies across Africa and Asia. The latest funding round was led by BeyondNetZero, the climate investing venture of General Atlantic. M&G Investments' Catalyst and Arch Emerging Markets Partners also participated. This funding added to \$170 million in equity and debt funding previously raised by Sun King.

"It's now dramatically more affordable to power a home with a solar system than to extend the electrical grid: for less than the cost of a single electrical pole, we can install an entire solar energy system in-home. This funding will further unlock our ability to scale this revolution to the 1.8 billion people who need these products today, and the next billion who will need them tomorrow," Sun King co-founder Anish Thakkar said.

The Nairobi-based company – for-





merly known as Greenlight Planet – plans to use \$100 million of the latest funding to expand its pay-as-you-go (PAYG) solutions and introduce the capability for customers to attach more power-hungry appliances, such as refrigerators, to their solar systems, in addition to lights, mobile phones and small home appliances including TVs.

Sun King says it accounts for more than a third of global industry-wide PAYG revenues, and has sold products in over 40 countries including Kenya, where it estimates it has benefitted 18 million people over the last decade. Sun King also says its user base in Nigeria has tripled in the past year, reflecting that country's status as a new hotspot for PAYG solar services. The company also has a presence in several other African countries including Uganda, Tanzania and Zambia.

## AFDB'S BLENDED FINANCE INITIATIVE

Sun King has been able to leverage its leading position in the sector to raise funds from the private sector. However, publicly funded institutions, including foreign government donor vehicles and multilateral development banks (MDBs) have played a crucial role in supporting the sector during the pandemic. In this regard, blended finance – mobilising funding from both public and private sectors – is proving to be important.

In December 2020, the African Development Bank (AfDB) launched a five-year, \$50m blended finance initiative to provide relief and recovery capital to energy access businesses, supporting them through and after the pandemic. Financial close was reached on financing agreements for a \$20m concessional investment from the AfDB-managed Sustaina-

ble Energy Fund for Africa (SEFA) in August 2021. The loan agreements to finance the establishment of the Covid-19 Off-Grid Recovery Platform (CRP) were signed with fund managers Lion's Head Global Partners, Triple Jump, and Social Investment Managers and Advisors.

## REPP FUNDS MADAGASCAR SOLAR

The potential for carefully targeted support to make a major contribution to emissions reductions while also providing offgrid access is evident in the deployment of hybridised solar PV at three heavy fuel oil (HFO) plants in Madagascar. This was made possible by \$6 million bridge loan to developer LIDERA Green Power from the Renewable Energy Performance Platform (REPP), a UK government-funded programme supporting the development of Africa's



## Offgrid investment

small-scale and distributed renewable energy market. REPP is managed by Camco Clean Energy, a UK-based specialist climate and impact fund manager.

Madagascar currently relies on imports of costly and polluting HFO and diesel as feedstock for plants that provide 75% of all its power requirements. That means one of the world's poorest countries has some of the world's highest electricity costs and

is highly vulnerable to supply chain interruptions.

By building solar farms close to the HFO plants, renewable energy can substitute for HFO when it is available, helping to both diversify and clean up Madagascar's power sector. In 2015, the country set a conditional nationally determined contribution (NDC) target of a 14% reduction in greenhouse gas emissions by 2030

The loan, which helped cover EPC

costs, has allowed LIDERA to install 2 MW and 1.25 MW of solar PV panels at plants in Toamasina and Mahajanga, respectively. Work to install a further 2.4 MW at a third plant near Diego is being completed in 2022. The intention is that by proving the concept, this first phase will mobilise funding from other investors to back further expansion. The plan is to build a total of 10 MW, 12 MW and 20 MW of solar PV capacity at the Diego, Mahajanga and Toamasina, plants respectively.

REPP says it has so far provided clean energy access to more than 1 million people in sub-Saharan Africa via 21 renewable energy projects with 24.7 MW total capacity across 18 countries, with £46 million of capital contracted. Investments include solar mini-grids, solar home systems, isolated grid projects (metro grids), onshore wind and run-of-river hydro projects. These investments have resulted in avoidance of 58,870 tonnes of CO<sub>2</sub> equivalent in emissions. REPP says it expects its portfolio to expand rapidly, reaching 57 MW of capacity by end-2023, with 41 projects reaching final close.

Ben Hugues, Investment Director and REPP Lead at Camco, said in May that while passing one million connections was a huge achievement for REPP, some 600 million people in Sub-Saharan Africa still did not have access to electricity. "REPP has been instrumental in developing a thriving and dependable market for the region's small-scale and decentralised renewable energy sector. Now we just need to scale it up by 600 times," he said.

### MICROSOFT REC PURCHASES FUND DRC MINI GRID

The task of bringing offgrid energy to some parts of the continent is also



*"REPP has been instrumental in developing a thriving and dependable market for the region's small-scale and decentralised renewable energy sector."*



being facilitated by the renewable energy certificate (REC) market. A good example is Microsoft's purchase of so-called P-RECs to help fund the development of the 1.3 MW Nuru solar-powered mini-grid in Goma, in the eastern Democratic Republic of Congo.

P-RECs are a type of REC issued by US-based Energy Peace Partners (EPP), an organisation which seeks to leverage climate finance solutions to support peace in areas affected by violent conflict. A REC represents the environmental attributes of the generation of 1 MWh of energy produced by renewable sources, which can be used by to offset against emissions from the holder's energy usage using other sources.

EPP has developed P-RECs to support renewable energy projects in poorly electrified, fragile and vul-

nerable countries. Microsoft's initial P-REC purchase in 2020 funded installation of streetlights connected to Nuru's minigrid. The second purchase, announced in May 2022, supports first-time electricity connections to the grid for households, businesses, and social institutions, as well as additional streetlights. The purchase also contributes to the funding Nuru's new 3.7 MW solar metro-grid anticipated to serve nearly 20,000 direct beneficiaries in Goma. Both Microsoft purchases were facilitated by 3Degrees, a climate solutions provider

These two mini grids combined, when complete, will be one of the largest off-grid mini-grids in Sub-Saharan Africa, benefiting 125,000 people and raising the average electricity rate from 3% to around 20%, according to EPP.

*The offgrid sector will need to benefit from further innovative investment strategies if the target of universal electricity access is to be met.*

The worst of the Covid pandemic may be over, but with the Ukraine crisis' impact on the global trade producing new challenges for fragile African economies, the offgrid sector will need to benefit from further innovative investment strategies if the target of universal electricity access is to be met. ■





# KENGEN TARGETS EAST AFRICAN GEOTHERMAL OPPORTUNITIES

*Once considered prohibitively expensive, geothermal energy is gaining in prominence as part of the global energy transition. Having successfully begun to tap their own country's resources, Kenyan firms are now targeting projects across the region, writes **Amine Dinar***

*Kenya has moved quickly to establish itself as the world's seventh largest producer of geothermal energy.*

**G**eothermal energy is a fundamental resource which is at the centre of Kenya's energy policy and East Africa's energy transition.

Geothermal energy uses heat from reservoirs of hot water below the Earth's surface to generate electricity. To extract it, wells are drilled into underground reservoirs to tap steam and hot water which is brought to the surface and goes into a turbine to make electricity.

Having gained experience in the home market – which, sitting atop the Great African Rift, is blessed with geothermal resources – Kenyan firms are now being enlisted for geothermal energy projects throughout the region.

At the end of November, Kenya Electricity Generating Company (Ken-Gen) started drilling geothermal wells in Djibouti in a bid to reduce the country's dependence on imported electricity and fuels and meet the increasing demand for energy from large-scale





developments including urban, port and industrial infrastructure.

For Djibouti, devoid of fossil resources, power generation is an issue of economic and social development, but also a matter of national sovereignty in an unstable region. Following Kenya's lead, Djibouti has established the ODDEG (Djiboutian Office of Geothermal Energy Development), whose mandate includes removing upfront costs and reducing risks for infrastructure, surface exploration and drilling as well as promoting di-

rect uses of geothermal energy and developing skilled labour.

Djibouti has geothermal reserves of 500-1000 MW, according to ODDEG, roughly the equivalent of what Kenya injects into its national grid each year from geothermal power.

## GEOTHERMAL'S RISE

Until now, geothermal technology has received less attention than other technologies at the forefront of the global energy transition, including solar and wind power.

Italy was the first country to generate electrical power from geothermal energy in 1904 and in Africa, geothermal explorations began in Uganda and Kenya in the 1950s. But the potential of geothermal energy was long neglected due to its relatively high cost compared to other available energy sources, the persistence of fossil

fuel development, and because it only occurs in specific locations.

However, the Cop26 conference in Glasgow in November 2021 has led to a renewed focus on the transition to clean energy and the importance of using all available sources of energy to move away from fossil fuels as quickly as possible. Proponents say that geothermal technology has several major advantages.

Unlike wind or solar, geothermal power plants produce power consistently, regardless of weather conditions and even well into the night, says Paul Brophy, president and principal geologist of EGS, a development and exploration company.

Critics point to the impact of noise pollution on conservation tourism, the potential of projects to unleash local seismic activity including earthquakes, and the necessity of clearing

*While Kenya is the African leader, the same geological features exist in other countries along the Great Rift.*

**View of the Olkaria IV geothermal power plant near the Rift Valley town of Naivasha, Kenya.**





## Geothermal energy

*A strong institutional framework for the energy sector is another essential element that led to a successful development of geothermal energy in Kenya.*

vast areas of land for development – in Kenya, pastoral Maasai communities have been displaced by the expansion of the giant Olkaria project.

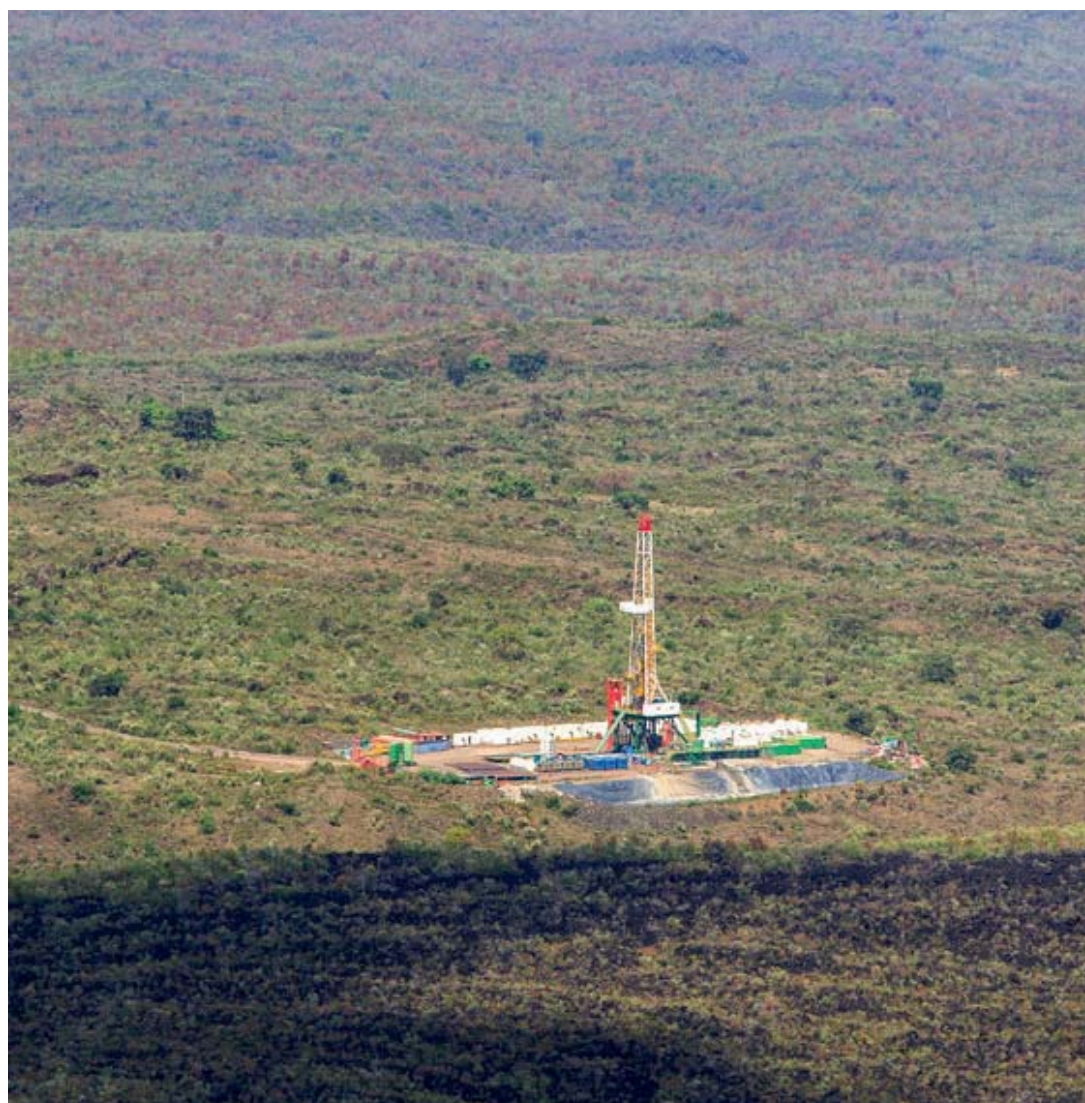
Still, Kenya, the region's largest generator of electricity, has moved quickly to establish itself as the world's seventh largest producer of geothermal energy. Through KenGen, which produces 85% of the country's geothermal energy, the country now has an installed capacity of 823 MW, compared to the 2,555 MW of the industry leader, the US. Kenya relies on geothermal steam for 38% of its power, according to the BBC.

When the current 86 MW expansion at Olkaria is complete, the overall project will have a capacity of 791.5 MW, enabling it to produce about 27% of Kenya's energy.

### CREATING AN ENABLING ENVIRONMENT

The focus on geothermal is part of Kenya's wider push in renewables, which also embrace hydroelectricity and solar and now account for more than 90% of its energy.

The country's success can partly be explained by the fact that it took advantage of its geographical location on the eastern branch of the Great Rift. Yet even with an advantageous location, there is a substantial risk in



**Above:**  
Geothermal power plant in Menengai Crater, Nakuru, Kenya.

**Right:** Thermal spring at lake Bogoria, Kenya.

timing and cost associated with the early phases of geothermal development.

"It takes five years to build a geothermal power plant, each well costs \$5m and finding reserves is a risky bet in the sense that results are not always guaranteed," says Brophy.

In a bid to make this challenging environment more attractive to explorers, Kenya has improved its geothermal energy application system and created enabling conditions for geothermal energy development. Kenya used public finance to attract private investment in geothermal,

explains Ralph Nyakabwa-Atwoki, a geothermal expert and technical director at Sustenersol Uganda.

A strong institutional framework for the energy sector is another essential element that led to a successful development of geothermal energy in Kenya, he says. The Geothermal Development Company (GDC) was established by the Kenyan government in 2008 specifically to undertake the exploration and development of geothermal resources, leaving geothermal power generation to KenGen.

By carrying out the initial phases of projects, GDC assumes the initial



exploration and development risks which open the prospect of public and private participation in later stages of geothermal development. Through its state-owned corporation, the Kenyan government absorbs some of the upfront risk and finances the exploration phase to then allow the exploitation of steam reserves by private companies.

## REGIONAL CUSTOMERS

The regional market for geothermal and other renewable energy sources remains vast. East Africa has one of the lowest electrification rates in the world, with less than a quarter of the population having access to electricity. Driven by strong partnerships, East African countries are substantially increasing the share of renewables in their electricity production.

Still, due to the length of the project development cycle and development costs, geothermal energy is not likely to offer a quick fix to the region's power generation problems, but it can be part of a long-term generation strategy.

While Kenya is the African leader, the same geological features exist in other countries along the Great Rift. Ethiopia has made heavy investments to explore geothermal energy and KenGen, as part of its expansion plan, has secured two drilling contracts there. KenGen already operates 22 wells in Ethiopia alongside its Djibouti efforts. Several countries in the region show interest in geothermal energy but for most, the technical and institutional capacity to implement geothermal energy development projects remains insufficient, as does the political will to enable a major policy shift. With its supportive policies and institutions, and the successful generation of power at home, Kenya could play an increasingly prominent role in the regional geothermal sector. ■



# GABON PLOTS FOREST PATH TO SUSTAINABLE DEVELOPMENT

*With 88% of its surface occupied by rainforest, Gabon is in a strong position to develop its green economy. Jack Dutton reports on the country's plans to pursue a conservation-led development path*

**L**e Fromager, French for “the cheesemaker”, is a tree named after its soft wood, which is used in the manufacturing of cheese boxes. The tree is one of the tallest in Gabon’s rainforests, and is also considered one of the most sacred. Spanning up to 65 metres tall, the trees are considered by some Gabonese tribes as a conduit between the living and the spiritual world.

The spiritual discipline of Bwiti combines worship of ancient forest spirits with elements of Christianity. In some villages, people are buried at the foot of the tree to ensure their passage into the afterlife. When a woman gives birth to twins, seeds of the tree are planted in the front and back of her house, so that the cheesemaker can grow and flourish.

The cheesemaker is just one species of tree that makes up Gabon’s tropical rainforest, which is one of the most biodiverse in the world. It covers 88%

of Gabon’s landmass, and makes up part of the Congo Basin. The basin is arguably the world’s most important carbon sink, after it was announced in July that the Amazon is now emitting more CO<sub>2</sub> than it is absorbing.

## CARBON COUNTING

Vincent Medjibe is on a mission to measure Gabon’s forests tree by tree to measure how much carbon they can capture. Medjibe is the managing coordinator of the Natural Resources Inventory Project (NRI) in charge of carbon accounting at the national scale in Gabon, which helps guide the government’s national development plan.

“The goal is to set up a network of 500 permanent plots across the country and the size of each permanent plot is one hectare, 100 metres by 100 metres,” says Medjibe. His team measures each tree and records the different species in each plot. On average, a plot has 300 different tree spe-

cies in it. The diameter and height of each tree is measured, and from that Medjibe can calculate the total weight and the carbon it can sequester.

“The carbon that is in the tree varies from species to species,” he says. “The wood density is really the parameter that explains that variability in terms of carbon in each individual tree.”

The national project, which started in 2012, will help Medjibe’s team know roughly how much carbon Gabon’s rainforest can absorb from the atmosphere per hectare per year. As well as data on emissions factors, Gabon has data on above and below-ground biomass, soil carbon and coarse woody debris, Medjibe says.

“This is why Gabon really provides a good example that other countries in Central Africa, and even across the world, can use. To my knowledge, it’s the first country in Africa to have a network of permanent forest plots,” he says.

Medjibe has been working with the African Conservation Development Group (ACDG), a private sector operator that focuses on conservation-led development, eco-tourism and green financing. They are working with Gabon’s government to develop the country’s carbon pricing system.

## GRANDE MAYUMBA

ACDG is also working on a number of conservation and development projects. It holds long-term rights to sustainably develop 731,000 hectares of forest and savannah in Nyanga Province, southern Gabon. The project, known as Grande Mayumba, will conform to Gabon’s sustainable development law. It will see more than \$160m invested in commercial activities and infrastructure in the area, and is expected to create between 2,400 and 4,000 jobs, according to Josh Ponte, ACDG’s creative director. At least 700 of these will be in forestry, and there will also be employment across fields including agriculture,



infrastructure and tourism. ACDG is looking to transform the region with an urban infrastructure plan with a small industrial zone, and an aggregate quarry.

After ACDG secures rights to develop land, it analyses the landscape using a combination of in-house and external experts, including academics from the London School of Economics (LSE) and the University of Sterling. After it has determined a sustainable development plan, it raises capital and begins developing the landscape in a way designed to minimise its carbon emissions, Ponte says.

Gabon has limited annual deforestation to less than 0.1% over the last three decades, and it has mainly been able to do this because of oil revenues supporting the economy. Development typically causes environmental degradation and raises emissions, but Ponte says ACDG's projects are focused on conserving the environment and lowering emissions.

Current stored carbon in the Grande Mayumba has been measured at 435m tonnes, and ACDG says its integrated land use plan will save 85m tonnes of CO<sub>2</sub> over 10 years and 200m tonnes over 25 years. By 2030, the agribusiness from the project is predicted to produce 1,000 head of cattle and 228,000 tonnes of sugar, which can also be used to make biomass to turn into green energy. ACDG is also looking at using hydropower to help power its agribusiness, Ponte says.

"This is optimised multi-industrial land use, with a social development component, all tested against the [UN] SDGs [sustainable development goals]," Ponte says, adding that it also uses other metrics to determine whether the project benefits the local community as well as the environment.

## ECO-LODGES

ACDG is also working on what Ponte

believes is the first luxury eco-lodge embedded into a scientific research station. ACDG looks to merge ecotourism with "an interactive museum" in Loango National Park in Western Gabon. It is one of the most biodiverse regions of the country, and home to animals including buffalo, elephants, hippos, and olive ridley sea turtles and humpback whales off the coast.

It will be the first of a planned network of lodges the organisation intends to establish in Gabon's national parks. Ponte says that at Petit Loango, there will be an "interface space between the tourists and the scientists".

"So you would go to the bar, and you'll end up sitting with the guy who is actually studying the local humpback whales or changes to carbon in the forest landscape," Ponte says. The pandemic has posed challenges. Ponte says ACDG is doing some research on the tourism market before deciding when to go ahead with the development.

"We think, in real terms, it should open by the end of 2023. We had it earmarked to open at the end of 2021, but we think there's no need to push it at that rate. We've done the whole of the back of house, so it's the front-of-house building that needs to go on.

It's probably a year's job. We can trigger it at any time."

There will be 20 rooms at the lodge, made with timber that is sustainably sourced, Ponte says.

## CARBON BONDS

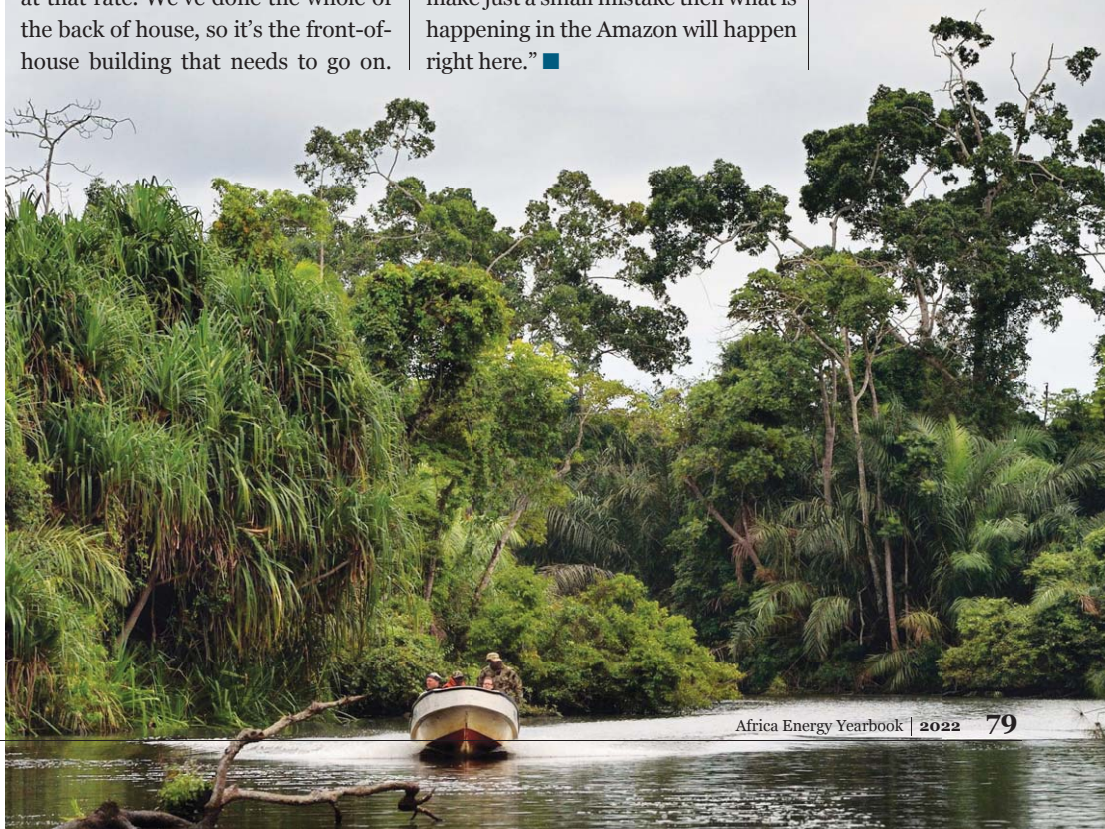
ACDG funds these projects through a number of sources, including sovereign wealth fund investment and bond issuances. But it has also been developing green finance structures, such as carbon credits, for which Ponte says there is a "huge appetite".

"We've worked very, very hard to put together financial instruments that have a carbon component that makes sense in the market. And we are strongly of the belief that one of those will come to pass over the next short period of time," he says.

With the data to monitor carbon sequestration and potentially make conservation profitable, Medjibe says other nations could learn from Gabon's approach to its forests. But he acknowledges that if Gabon fails to tread the fine line between development and conservation, it could come at a great cost.

"It's a big deal for us because if we make just a small mistake then what is happening in the Amazon will happen right here." ■

**Below: A motor boat on a river in the Fernan Vaz (Nkomi) Lagoon area of Gabon's Loango National Park.**



# ONE RULE FOR THEM?

*Hydrocarbons-related projects across the globe are finding it harder to get a hearing these days. But, asks **James Gavin**, is Africa being held to tougher standards than other parts of the world?*

**S**tricter environmental, social and governance (ESG) monitoring is making the financing of hydrocarbons ever more challenging, even in a climate where the global call on oil and gas has spiked this year – and Opec is struggling to fill the gap left by absent Russian barrels.

For international oil and gas companies, many of whom are in the process of transitioning away from fossil fuel reliance, the terrain is getting increasingly treacherous. They continue to make easy targets for protestors, and the public's sympathy for their predicament is limited – particularly while high commodity prices are translating into sizeable revenue streams and, in the case of the majors, booming profits.

This is having consequences. In the UK, the Conservative government announced in May a windfall tax on oil and gas companies active in the UK North Sea that was twice as high as anything the opposition Labour party was initially proposing.

Internationally, the world's G7

group of industrial economies have agreed to halt funding any fossil fuel developments from the end of this year. According to a G7 communique agreed on 27th May, all taxpayer funding for oil, gas and coal projects overseas will be stopped.

Africa is now central to the debate, being asked to sacrifice potential growth industries before they have even got underway, even though the continent's carbon footprint is a tiny fraction of the global total. That feeling among many Africans that they are being held to a higher standard than major CO<sub>2</sub> emitters in mature markets is not going away.

For hydrocarbons sector newcomers like Tanzania and Uganda, the timing of this pressure is proving less than opportune. Their ambitions to develop resources for export are facing ever greater challenges. Reuters reported in mid-May that Deutsche Bank would not be financing the planned \$3.5 billion East African Crude Oil Pipeline (EACOP) from Uganda's oilfields to the Tanzanian coast that environmental campaigners say would displace thousands of

families and disrupt the environment. Germany's largest lender had come under pressure to clarify its stance on the financing, as many major banks and insurers had already pulled out of the EAOP project.

## LEGAL CHALLENGES INTENSIFY

The challenge facing the financing of African hydrocarbons projects was put in stark relief, when, in early 2022, a UK court considered the legal implications of the Paris climate change agreement on government support for fossil fuel production. A judicial review brought by environmental group Friends of the Earth (FoE) challenged the decision of UK Export Finance (UKEF), an export credit agency, to provide up to \$1.15 bn in export credit support in relation to the Area 1 liquefied natural gas (LNG) facility in Mozambique.

Under the Paris agreement, international finance flows are regarded as critical to the strengthened response to climate change and should be consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.

FoE argued that this project would be inconsistent with that objective, noting that the construction phase of the LNG project alone would increase the greenhouse gas emissions of Mozambique by up to 10%. Furthermore, emissions from the gas when burned by end users would add around 116m tonnes of CO<sub>2</sub> equivalent per year – similar to total annual emissions from the aviation sector for all EU member states combined, according to the environmental group.

But perspective is needed here. For its part, Mozambique would argue that the 13m tonnes a year Area 1 project – the country's first onshore LNG development – will have a transform-



ative impact on its struggling economy, which currently produces a tiny amount of greenhouse gas emissions.

Or to look at it another way, as one southern African financier recently put it, while 1.4bn Africans generate about 4% of the world's emissions, the same number of Chinese generate about 30% of the world's emissions, so it's hardly a level playing field.

Meanwhile, FoE and other environmental groups appear less exercised by gas expansion plans of the US, for example, which has 27 GW of new gas-fired power coming on stream in the next three years. Mozambique, by contrast, is building just one power plant with less than half a gigawatt of gas-fired power. Yet it is Maputo that has found its ability to tap concessionary funding facing legal obstacles.

The court eventually dismissed FoE's case, effectively siding with the view that the project would do more good than harm overall. As one of the judges in the case noted in his ruling, if ECAs were not allowed to fund any fossil fuel projects this would perpetuate "the classic injustice that developed countries have had the advantage of developing their fossil fuels, but seek to prevent their under-developed neighbours from securing the same advantage, condemning developing countries to continuing poverty".

The policy question is whether ECAs, development finance institutions and multilateral banks can coalesce around a generally accepted consensus approach, which is that carbon-intensive projects in very poor countries should only be considered once all the alternatives have been properly assessed. On paper, that seems reasonable enough. But if developed world schemes somehow evade such strictures, that hardly seems fair.

*Africa is now being asked to sacrifice potential growth industries before they have even got underway... That feeling among many Africans that they are being held to a higher standard than major CO2 emitters in mature markets is not going away.*

If Mozambique were to build a fertiliser plant, a strong case could be made for making sure solar power played a role and that would probably get funded relatively easily. But natural gas would still be required as back-up – as well as supplying feedstock for the fertiliser – to make it a commercial proposition. If that put it out of bounds for financiers, such projects are unlikely to get off the ground.

**IF IT'S GOOD ENOUGH FOR THE WEST...**

Western countries, looking at supply shortages induced by the Ukraine crisis, are choosing to boost fossil fuel production and exports, so it is no surprise if Africans look at their own hydrocarbons resources through a similar energy security lens. Why wouldn't African countries want to use locally produced natural gas as the main baseload complement to intermittent wind and solar in the electricity system? But if there is now a consensus that carbon-fuelled projects in poor countries will only be sanctioned if all alternatives have been exhausted, how will this play out?

Clearly there is scope for policymakers and finance institutions to examine credible alternatives. That means taking a hard look at projects or initiatives to decide whether they can be developed without fossil fuels in a similar time frame and at a similar cost, and whether they would

meet the required purpose.

But that is not always going to be the case. There's plenty of effort being put into building out African solar and wind power, both on- and off-grid. But the idea that renewables can solve all the continent's power and industrial feedstock deficiencies in the next decade seems somewhat idealised.

The reality is that most of Africa is urban and becoming more urban. Industrialisation is unavoidable, and gas is likely to have an important role to play.

The past year has seen increased interest in African upstream prospects, with those such as TotalEnergies' Venus discovery in offshore Namibia galvanising wider industry interest. These gas developments could displace significant amounts of more polluting coal in regional economies. That is likely to have a more marked impact on curbing emissions than thwarting new pipeline projects like EACOP.

DFIs in the West will continue to pursue alignment with the Paris agreement. But the message from parts of Africa is loud and clear that this should not mean funding renewables only.

There is scope for a more nuanced application of environmental, social and governance (ESG) issues. It can be argued that the "E" gets more priority than the "S" in Africa, but there is no reason why this should be the



case. The onus falls to a large extent to the sponsors of large energy schemes to prove that they can deliver major economic benefits that result in a much broader social payoff.

### RENEWABLES FINANCING CONCERN

Another important point is that, even if Africa is starved of funding for traditional oil and gas projects, that doesn't automatically mean it will magically be prioritised for renewables funding.

As the *Global Landscape of Climate Finance 2021* report published by think-tank Climate Policy Initiative notes, out of a total of \$632 billion committed to climate finance in the financial year 2019-20, just \$19bn (equivalent to 3%) went to sub-Saharan Africa. It finds that around three-quarters of global cli-

mate investments were concentrated in the East Asia and Pacific, Western Europe, and North America regions, while the remaining regions received less than a quarter.

Private funding continues to benefit the wealthier countries. Climate investment in the economically advanced regions of Western Europe, North America, and Oceania were primarily funded by private finance, while other regions sourced their climate investments mostly from public sources, the report finds.

Indeed, the highest dependency on public finance (88%) was observed in Sub-Saharan Africa, underpinning the critical role of public institutions and governments in driving climate actions in economically constrained and vulnerable countries, as well as the importance of using public finance strategically to further mobi-

*Even if Africa is starved of funding for traditional oil and gas projects, that doesn't automatically mean it will magically be prioritised for renewables funding.*

lise private funds towards these territories.

Serious arguments can be made that Africa's hydrocarbons plans should be exposed to greater scrutiny. Practical issues will need to be addressed, such as likely demand from export markets.

For example, China's next-generation ultra-high-voltage direct-current transmission links will be able carry heavy loads of renewable electricity over long distances. That may erode the urgency for sending oil and gas long distances to Asia.

And if pressure groups are ultimately successful in curbing the flow of funds to African oil and gas schemes, it will force local institutions to build up their fledgling resources.

The likes of African Export-Import Bank (Afreximbank) have been prominent in backing major African oil and gas development. Other forms of funding can be made available. The question is, will it be enough to fill the sizeable gap that would be left if western ECAs are prevented from funding African projects?

The next year may go some way to help answer that question. ■

**Left: A wind farm in south africa, supplying eco-friendly electricity.**





COUNTRY HOST



# Africa. In one place.

## 20-23 June 2023 | Nairobi, Kenya



For more information, please contact: [aef@energynet.co.uk](mailto:aef@energynet.co.uk)  
[www.africa-energy-forum.com](http://www.africa-energy-forum.com)

#aef23





# Your reliability shines

**MAN Energy Solutions**  
Future in the making

## Energy & Storage solutions expertise

---

### **Securing energy supplies**

Ensuring a reliable power supply is one of the key factors for progress and prosperity around the world. Building on decades of MAN innovation, we can help secure clean and efficient energy supplies for your customers. Our expertise covers solutions for hybrid power, LNG to power, energy storage, power-to-X, thermal power plants, and CHP.