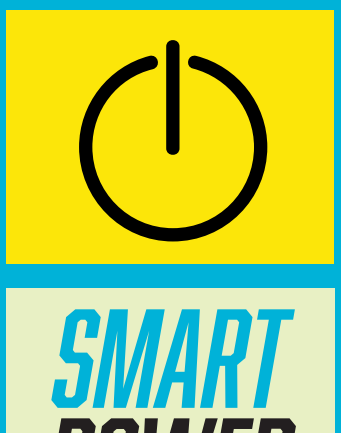
Powering AFRICA

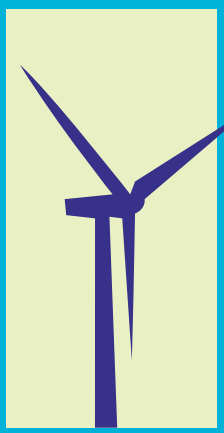
CELEBRATING THE 55TH ANNIVERSARY OF APUA/ASEA

An official publication of the Association of Power Utilities of Africa (APUA)

Une publication officielle de Association des Sociétés d'Electricité d'Afrique



SMART POWER



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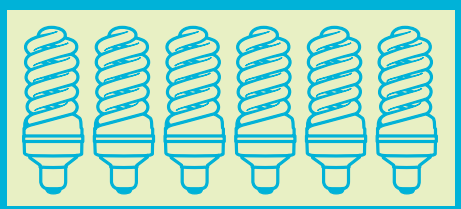
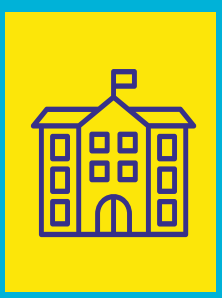
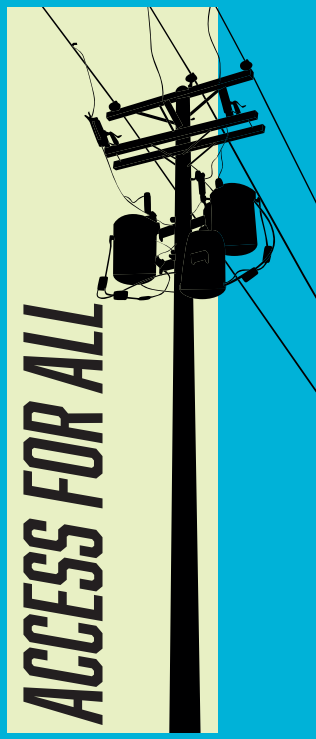






ACCESS FOR ALL

Live line maintenance

E

Energy

Supplying power for every need

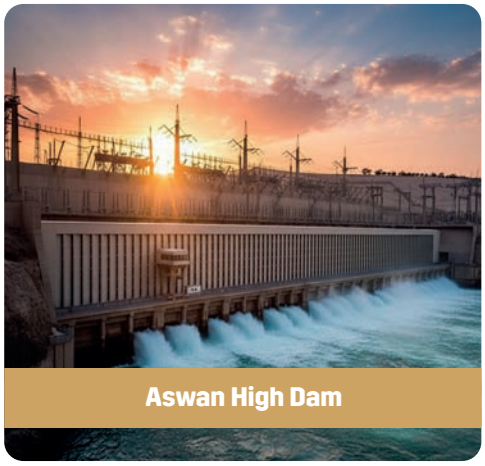
Mega projects

Solar Energy

E

Excellence

Driving innovation and efficiency



Aswan High Dam

DCC

H

Harmony

Connecting nations through cooperation

Electricity transmission

Customer Service Centers

C

Commitment

Dedicated to sustainability and development

Smart Meters

EEHC: Egyptian Electricity Holding Company

EEHC at a Glance

- The largest producer and distributor of electricity in Egypt.
- Developing modern and sustainable power plants.
- Strategic planning for future capacities.
- Digital customer services and advanced marketing.
- Training and capacity building for Egyptian and African professionals.

Ministry of Electricity and Renewable Energy
Egyptian Electricity Holding Company

Training Facilities of Egyptian Electricity Holding Company

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In addition to Two Training Centers Affiliated to EEHC are accredited by APUA/ANCEE as Centers of Excellence (CoE) in Africa



Smart services and digital transformation

Unified Platform for Electricity Services (eservices.eehc.gov.eg)

Egypt's Unified Electricity Services Platform, winner of the 2025 WITSA Global ICT Excellence Award highlights the nation's transformation into a global technology innovator, improving service efficiency transparency, and investment through advanced digital integration and data governance.



EEHC believes that empowering people is the true source of energy by unleashing their potentials and enhancing their skills to lead digital transformation within a smart, inspiring work environment that powers a brighter energy future for Egypt.


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Powering AFRICA

CELEBRATING THE 55TH ANNIVERSARY OF APUA/ASEA

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Published by

AVAUG COMMUNICATIONS

CIE
Compagnie Ivoirienne d'Electricité

Une société du groupe eranove

PRODUCTION

604 MW (capacité hydraulique)
premier producteur Ouest Africain d'Energie renouvelable (6 barrages hydroélectriques)

1er producteur
Ouest Africain d'Energie renouvelable (6 barrages hydroélectriques)

Taux de rendement :
Production : 99,6%

TRANSPORT

7 510 km
de réseau de transport

99,38%
de taux de disponibilité des lignes HTB

Taux de rendement :
Transport : 94,4%

DISTRIBUTION

1 097 294
foyers d'éclairage public maintenus sur le réseau

61 286 km
de réseau de distribution (HTA et BT)

Taux de rendement :
Distribution : 90,3%

COMMERCIALISATION

4 580 256
clients desservis sur le territoire ivoirien

100%
de Taux de réalisation des branchements PEPT

86,34%
Taux d'utilisation des paiements digitaux

5 666
collaborateurs dont 24 % de femmes

CIE, entreprise citoyenne et responsable, partenaire clé de l'Etat ivoirien depuis plus de 30 ans

CIE, un partenaire de référence au service du développement du secteur de l'électricité

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Welcome

Eng. Papa Toby Gaye
President, Association of Power Utilities of Africa (APUA)

It is with great pride and heartfelt gratitude that I welcome you to this commemorative publication marking the 55th anniversary of the Association of Power Utilities of Africa (APUA).

This milestone is more than a celebration – it is a reflection of our shared journey, our collective achievements, and our enduring commitment to transforming Africa's energy landscape. For over five decades, APUA has stood as a beacon of unity and technical excellence, bringing together power utilities from across the continent to pursue a common goal: reliable, accessible, and sustainable electricity for all Africans.

As President of APUA, I am honored to witness the strength of our network, the depth of our expertise, and the boldness of our ambitions. From the early days of regional interconnection to today's dynamic partnerships with global institutions, our Association has evolved into a strategic actor – one that not only advocates for African interests, but also drives innovation and investment across borders.

This publication captures the essence of our mission and the momentum of our movement. It highlights the challenges we face, the solutions we are building, and the opportunities that lie ahead. Whether through Independent Power Projects, Public-Private Partnerships, or the integration of renewable energy sources, APUA continues to lead with vision and purpose.

To our member utilities, partners,and stakeholders: thank you for your unwavering support and dedication. Let this anniversary renew our resolve and inspire us to go further – together.

Welcome to this special edition.

Welcome to the future of Africa's power sector. ●

21ST APUA CONGRESS
EGYPT - CAIRO
2025

The **Association of Power Utilities of Africa (APUA)** extends a warm welcome and congratulations to **Dr. Sidi Ould Tah** on his appointment as the new President of the African Development Bank.

We are encouraged by your vision to accelerate reforms towards improved delivery, mobilising new partnerships, and unlocking vital capital for job creation, building resilient infrastructure, and driving climate resilience across the continent.

APUA supports your vision and looks forward to further strengthening our working relationship with the African Development Bank as, together, we continue to drive the realisation of safe, reliable and affordable electricity across the continent, creating a prosperous future for all Africans.

The power of working together

Dr Kevin K. Kariuki, Vice President,
Power, Energy, Climate and Green Growth, African Development Bank (AfDB)

Africa stands at an inflexion point: its sustained socio-economic growth, industrialisation and climate resilience will largely depend on the availability (24/7) of reliable, affordable, modern and increasingly green electricity – from projects designed to deliver impact and ensure economies of scale and scope. The African Development Bank (AfDB, Africa's trusted premier AAA-rated DFI) and the Association of Power Utilities of Africa (APUA) share an unwavering and urgent commitment to make that happen.

AfDB's partnership with APUA over several decades has leveraged APUA's convening platform of leaders of national electricity utilities, power pools, policy makers and partners to help convert national, regional and continental strategies and visions into bankable and scalable projects across the power value chain. Our collaboration has included revisiting the trends and impacts of power sector and institutional reforms (2008-18), utility performance-benchmarking (2022-25), capacity building and sharing of knowledge, as well as best practices under a south-south cooperation model – through annual CEO Leadership Forums.

Our collaboration, has primarily focused on building Sustainable Utilities, promoting Regional Integration and Power Trade, and Human Capacity Development. Incidentally, these pillars are squarely aligned with both AfDB's Ten-Year Strategy (2024-33) that positions energy as the engine for continental transformation and all five pillars of Mission 300 – a bold joint initiative co-led by the AfDB and World Bank, in partnership with other partners and 30+ African countries,– to deliver electricity to an additional 300 million people by 2030.

The AfDB–APUA partnership will continue to contribute to Africa's growth and enhance power supply security, whilst also meeting energy transition prerequisites by promoting private-sector participation, and harmonising utility performance monitoring and reporting standards. It will continue to strengthen capacity through the AfDB-financed African Network of Centres of Excellence in Electricity (ANCEE), which commenced in 2015 and has trained over 9,000 utility staff. ANCEE 2.0 (2024-29) is equipping utilities with the leadership, technical and digital skills needed to manage smarter, greener and complex interconnected systems – embedding gender and youth inclusion – to face growing uncertainties driven by disruptive technologies and business models, and complex geopolitics.

Utilities are the keystone institutions that connect ambition to reality – by turning investment flows into efficient delivery of electricity supply and services for citizens, business, industries and critical public institutions. We, therefore, view the strengthened utilities (as co-developers, owners, operators and off-takers) as indispensable partners in delivering Mission 300 Action Plans and investments. Under our Sustainable Utility Transformation Programme, we advocate that good governance, integrated least-cost planning, human capital development, reforms and financial sustainability, and smart partnerships are non-negotiable prerequisites, if utilities are to become trusted partners capable of attracting private investment.

As founding and operating members of power pools, utilities also have important roles to play in regional projects. In Mission 300, countries are updating national least-cost plans and accelerating interconnection projects – demonstrating that when cross-border utilities coordinate, investment risks and delivery costs fall.

As AfDB, APUA and partners we come together at the 21st APUA Congress in Cairo, 55 years after establishment of APUA, to deepen our partnership for the sake of accelerating the achievement of Mission 300 goals. I wish all participants successful deliberations. ●

The importance of strong partnerships

Mrs. Nardos Bekele-Thomas, Chief Executive Officer,
African Union Development Agency (AUDA-NEPAD)

Africa stands at a pivotal moment in its development journey. In 2025, over 600 million Africans still live without electricity – a silent crisis that asphyxiates opportunity, constrains innovation, and slows economic growth.

This challenge is compounded by a rapidly growing population, projected to reach 2.5 billion by 2050, alongside an infrastructure investment requirement estimated at USD 130-170 billion annually. Yet current spending remains far below this target, at USD 80-90 billion per year, leaving an annual financing gap of more than USD 80 billion.

Unlocking development

Nowhere is this shortfall more evident than in the energy sector, where the absence of affordable and reliable power continues to hinder industrialisation, education, healthcare and job creation. To unlock development and drive inclusive economic growth across the continent, we must urgently invest in sustainable energy solutions – connecting 300 million Africans to electricity and empowering communities with the tools they need to thrive.

Closing this gap requires more than resources alone – it demands vision, innovation, and above all, strong partnerships. Collaboration with partners, including multilateral institutions, development finance institutions, philanthropic organizations, the private sector and pension funds, is essential. These partnerships bring not only funding, but also technical expertise and capacity building to help our Member States deliver transformative projects. They serve as the bridge between Africa's ambitions and the concrete results that will bring light, power and opportunity to millions.

In the context of ongoing debates across the continent about rethinking traditional development models, there is a growing recognition of the need for innovative financing solutions – ones that blend public and private capital, de-risk investments and unlock new sources of funding. Advancing development in Africa will require bold financial architecture that matches the scale of our vision.

An interconnected future

Africa's energy future is shifting progressively from isolated national grids towards an interconnected, greener and more resilient continental power network. Our focus must be on expanding generation capacity, accelerating the deployment of renewable energy, lowering costs through cross-border electricity trade, and ensuring universal access. Landmark initiatives such as the Continental Power Systems Master Plan (CMP) – which provides a continent-wide blueprint for realizing the African Single Electricity Market (AfSEM), formally adopted by African Heads of State in 2024 – are vital. The CMP framework identifies and prioritises generation and cross-border transmission projects that will enable surplus power in one region to meet demand in another, creating a unified African electricity market that optimises resources, drives down costs and attracts large-scale investment.

Supporting cross-border projects

At AUDA-NEPAD, our mission is anchored in supporting cross-border flagship power projects with the potential to deliver impact at scale in alignment with the CMP. This includes facilitating blended finance models, strengthening policy and regulatory harmonisation, and advancing regional integration.

We work closely with regional economic communities, particularly their regional power pools, as well as with development finance institutions and the private sector, to unlock both the capital and technical capacity required to implement the CMP and operationalise the AfSEM. By aligning national and regional power master plans with the CMP, and harmonising grid codes in line with AfSEM guidelines, we are laying the groundwork for efficient and transparent cross-border power trading.

Transforming lives

Energy access is not simply about connecting households to the grid – it's about transforming lives. It empowers schools and hospitals, supports climate-resilient food systems and drives inclusive economic growth. Crucially, access to clean and reliable energy is a powerful tool for gender equity. When women have electricity, especially clean cooking energy, they gain time, safety and opportunity. We know the harmful health effects of traditional energy

Africa's energy future is shifting from isolated national grids towards an interconnected continental power network (SHUTTERSTOCK/JANANZ)

sources – indoor air pollution disproportionately affects women and children, leading to respiratory illnesses and limiting their potential.

Expanding energy access is not just a development goal – it's a human imperative. More importantly, powering Africa must be understood as the foundation for industrialization – a central pillar of the African Union's Agenda 2063, particularly the second Ten-Year Implementation Plan's flagship aspiration: "Africa is more integrated and connected."

As we mark the 55th Anniversary of the Association of Power Utilities of Africa (APUA), we not only celebrate its enduring legacy of fostering cooperation among utilities across the continent, but also renew our commitment to the task ahead. This milestone calls us to action: to accelerate regional power planning, prioritise interconnection corridors that evacuate renewable energy to areas of need, including stranded power in some countries, and scale up power trade. Achieving this will require united effort to mobilise both domestic and international resources. APUA's continued role will be critical in ensuring robust utilities and power pools as the engines of the power sector integration under the CMP and AfSEM.

AUDA-NEPAD stands ready to lead and coordinate these collective efforts. With the right partnerships, bold policy choices and decisive investment, we can power a brighter, more prosperous Africa – one where no one is left in the dark. ●

CI-ENERGIES
CÔTE D'IVOIRE ÉNERGIES

LA CÔTE D'IVOIRE, HUB ENERGÉTIQUE DE L'AFRIQUE DE L'OUEST

La position de hub régional de la Côte d'Ivoire n'est pas nouvelle. Le pays exporte déjà de l'électricité vers les pays voisins (**Ghana, Mali, Burkina Faso, Liberia, Sierra Leone et Guinée**).

UN PORTEFEUILLE ELARGI DE PROJETS PHARES POUR SECURISER ET VERDIR L'APPROVISIONNEMENT

PRODUCTION DECARBONEE ET MIX DIVERSIFIE

BARRAGE HYDROÉLECTRIQUE DE GRIBO POPOLI (112 MW)

Après le barrage hydroélectrique de Soubré, le barrage de Gribo Popoli, d'une capacité de 112 MW, s'inscrit dans la stratégie de diversification du mix énergétique ivoirien. Il renforce la part des énergies renouvelables dans le mix énergétique national et réduit la dépendance aux énergies fossiles, permettant ainsi de diminuer les émissions de gaz à effet de serre. D'autres projets structurants sont prévus comme le futur barrage de Boutoubré.

CENTRALE SOLAIRE DE BOUNDIALI (83,5 MWC)

La première phase de la centrale solaire de Boundiali a été inaugurée en avril 2024. D'une capacité initiale de 37,5 MWc, la centrale a connu des travaux d'extension, portant sa puissance totale à 83, 5 MWc et permettant à la Côte d'Ivoire de franchir une étape significative vers l'objectif de 45% d'énergies renouvelables dans le mix énergétique.

TRANSPORT, DISTRIBUTION ET DIGITALISATION

PROJET RACA 400 KV

Le projet RACA 400 kV consiste en la construction de lignes 400 kV et de postes pour sécuriser l'alimentation électrique des grands centres de consommation et renforcer les interconnexions avec les pays voisins. Ce projet qui a permis d'élargir « les autoroutes électriques » en passant de lignes de transport 225 kV à des lignes de transport 400 kV, est essentiel pour évacuer la production des centrales, réduire les pertes techniques et améliorer la fiabilité du réseau national.

DISPATCHING NATIONAL DE YAMOUSSOUKRO

Inauguré le vendredi 25 février 2022, le dispatching national de Yamoussoukro constitue la colonne vertébrale du système de gestion du réseau électrique ivoirien. Cette infrastructure moderne permet de superviser et de contrôler l'ensemble du réseau de transport d'électricité national, optimisant les flux d'énergie et améliorant la stabilité du réseau. Son rôle est crucial pour intégrer les énergies renouvelables intermittentes et gérer les échanges transfrontaliers d'électricité.

PROJET NEDA

L'Opération Nationale de Numérisation et d'Accès à l'Électricité (NEDA) est un programme financé par la Banque Mondiale en Côte d'Ivoire, approuvé en décembre 2022, avec un financement de 300 millions de dollars. Ce programme s'inscrit dans le cadre du soutien à l'expansion et à la numérisation du réseau électrique ivoirien, en particulier dans les régions faiblement desservies, comme le Nord et l'Ouest du pays.

Le NEDA s'aligne sur le Plan de Développement National (PND) 2021-2025 de la Côte d'Ivoire, qui vise à accélérer la transformation structurelle de l'économie et à promouvoir un développement inclusif.

ACCES POUR TOUS

PRONER (PROGRAMME NATIONAL D'ELECTRIFICATION RURALE)

Le Programme National d'Electrification Rurale (PRONER) lancé en 2014 vise à étendre la couverture électrique aux zones rurales et périurbaines encore non desservies. Grâce à ce programme, le réseau de distribution ivoirien est passé de 36 101 km en 2011 à 67 089 km en 2024, permettant à des centaines de milliers de nouveaux ménages d'accéder à l'électricité.
Le PRONER combine à la fois l'extension du réseau national et le déploiement de solutions hors réseau (mini-réseaux solaires, kits individuels) pour les zones les plus reculées.

PEPT (PROGRAMME ELECTRICITÉ POUR TOUS)

Le Programme Electricité Pour Tous (PEPT) complète le PRONER en ciblant spécifiquement la problématique du raccordement des ménages. Ce programme repose sur des modes de financements des raccordements afin de permettre au plus grand nombre d'y avoir accès. Cette approche inclusive a profité à des milliers de ménages, avec un impact direct sur les activités économiques locales, l'éducation et la santé.

INTEGRATION REGIONALE ET COOPERATION

La Côte d'Ivoire joue un rôle moteur dans le processus d'intégration énergétique régionale, en qu'acteur central du Système d'Echanges d'Energie Electrique Ouest-Africain (WAPP). Grâce à un réseau d'interconnexions avec ses voisins, le pays favorise des économies d'échelle substantielles, une réduction des coûts de production et une amélioration de la sécurité d'approvisionnement pour l'ensemble de la sous-région.

Le projet CLSG (Côte d'Ivoire – Liberia - Sierra Leone - Guinée) illustre pleinement cette dynamique d'intégration. Avec 1 303 km de lignes de transport en 225 kV et 12 postes de transformation, cette infrastructure régionale permet de desservir environ 2,8 millions de personnes avec une électricité abordable et renouvelable.

Parallèlement, le projet de renforcement de l'interconnexion en 330 kV Côte d'Ivoire - Ghana s'inscrit dans le Plan Directeur 2019-2033 de la CEDEAO pour le développement des moyens régionaux de production et de transport d'électricité. Il prévoit la construction d'une ligne de transport de 243 km entre les postes de Bingerville (Côte d'Ivoire) et Dunkwa II (Ghana), pour un investissement estimé à 173,7 millions USD. Cette future liaison stratégique renforcera la résilience des deux réseaux nationaux et soutiendra l'émergence d'un marché régional intégré et compétitif.

CHIFFRES CLÉS À FIN DÉCEMBRE 2024

- Capacité installée : **3 019 MW**
- Thermique : **1 998 MW**
- Hydroélectrique : **991 MW**
- Photovoltaïque : **30 MW**
- Temps moyen de coupure : **26,22 heures**
- Longueur du réseau de transport : **7 694 km**
- Longueur du réseau de distribution : **67 089 km**
- Nombre de localités électrifiées : **8 035 (sur 8518)**
- Taux de couverture : **94,3%** (nombre de localités électrifiées sur nombre total de localités)
- Taux d'accès : **98,6%** (population des localités électrifiées/population totale)
- Exportation d'électricité : **730 GWh** (vers 6 pays)

Electricity for all, sustainable energy: Africa on the move

Mamadou Sangafowa-Coulibaly
Minister of Mines, Petroleum and Energy, Côte d'Ivoire

Célébrer les 55 ans de l'Association des Sociétés d'Électricité d'Afrique, c'est honorer plus d'un demi-siècle de coopération, d'innovation et de résilience au service de l'électrification du continent et de l'intégration des marchés de l'énergie en Afrique. C'est aussi l'occasion de réaffirmer notre engagement collectif à bâtir une Afrique énergétique souveraine, inclusive et durable.

En Côte d'Ivoire, cela se traduit par l'ambition forte de fournir à la population et aux entreprises une énergie abondante, durable, de qualité et à moindre coût.

Le Programme Électricité Pour Tous (PEPT), lancé en 2014, incarne notre volonté de garantir l'accès universel à l'électricité, en particulier pour les populations les plus vulnérables. Grace au PEPT, à ce jour, près de 2 400 000 branchements ont été réalisés, touchant 8 835 localités électrifiées à travers le pays, dont près de 70 % en milieu rural. Ce programme permet d'alléger le coût du raccordement et d'accélérer l'inclusion énergétique. Il est soutenu par le Fonds PEPT créé en 2018, mobilise des ressources nationales et internationales, notamment la Banque mondiale. A cet effet, une opération de titrisation des créances du fonds PEPT d'un montant global de 120 milliards FCFA a été initiée par arrêté interministériel en 2023 en vue de la mobilisation des ressources destinées au financement de activités relevant du Fonds PEPT.

Outre l'accès à l'électricité, la vision mise en œuvre embrasse également la transition énergétique. Le Gouvernement ivoirien s'est en effet fixé un objectif ambitieux : porter la part des énergies renouvelables à 45 % dans le mix électrique national d'ici 2030, contre 32% actuellement. Une stratégie de valorisation de l'ensemble des sources d'énergies renouvelables est déployée pour y parvenir.

Plusieurs projets sont ainsi engagés dans l'hydroélectricité, pilier historique du système électrique national. La biomasse, notamment à travers la valorisation des résidus agricoles, ouvre également de nouvelles perspectives de production durable. Enfin, le solaire connaît une accélération remarquable, illustrée par (i) la mise en service de la première centrale solaire de 37 MWc en 2023, ainsi que de sa phase 2 de 46 MWc en 2025 (ii) la signature, en août dernier, de quatre conventions pour la réalisation de centrales solaires totalisant près de 210 MWc et (iii) l'appel à manifestation d'intérêt pour la construction de deux centrales solaires d'une capacité total de 200 MWc.

Les projets solaires réalisés en partenariat avec des acteurs privés nationaux et internationaux, permettront d'éviter plus d'un million de tonnes de CO_2. D'ici 2030, ce sont au total plus de 1000 MW de projets solaires qui seront réalisés.

Par ailleurs, dans le cadre du marché régional de l'électricité qui se consolide au sein du Système d'Echange d'Energie Electrique Ouest Africain (WAPP), la Cote d'Ivoire fournit de l'électricité à six (6) pays de la sous-région à travers le réseau électrique interconnecté. Ce rôle de hub énergétique sera davantage renforcé avec l'augmentation de la production d'énergie et la finalisation de plusieurs projets d'interconnexion en cours.

À l'heure où l'Afrique s'industrialise et s'interconnecte, résolument, l'énergie est plus que jamais le socle du développement économique et social.

Dans cette dynamique, l'ASEA, par son rôle fédérateur, est un catalyseur des transformations nécessaires. Elle offre aux sociétés d'électricité un espace de dialogue, de partage d'expériences et de mutualisation des bonnes pratiques, essentiel pour relever les défis communs: financement, digitalisation, efficacité énergétique, et adaptation climatique.

Je tiens à saluer ici tous les membres de l'ASEA, les opérateurs publics et privés, les partenaires techniques et financiers, ainsi que les femmes et les hommes qui œuvrent chaque jour à éclairer notre continent. Ensemble, poursuivons cette marche vers une Afrique électrifiée, verte et prospère.

Bonne célébration à toutes et à tous. ●

Just and affordable energy transition for all

Dr. Eng Mahmoud Mustafa Esmat
Minister of Electricity and Renewable Energy, Egypt

Energy is considered one of the most important drivers for sustainable development, depending on the economic, social and environmental policies. Energy supply is a global issue needs the activation of cooperation at international and regional levels, especially with the increasing demand for energy leading to the necessity to diversify energy sources, making energy economically available, attracting domestic and foreign investments and expanding energy markets.

The African continent is one of the richest regions in the world in terms of natural resources, especially renewable energy sources and manpower.

Despite the above-mentioned potential, it still suffers from a lack of access to energy and faces many challenges, such as a lack of infrastructure and the high cost and difficulty of securing the required financing, which negatively affects the competitiveness of the continent and its participation in global markets.

Around 600 million people still lack access to electricity, most of these residing in sub-Saharan Africa. The continent faces many challenges, such as financing gaps, inadequate infrastructure, and regulatory and policy hurdles. To overcome these challenges, we all should continue working together in order to be a part of the global transformation of energy systems, to achieve a sustainable economy that includes unlimited opportunities for cooperation between countries, taking into account the social and environmental benefits.

For a long time, the Egyptian electricity sector has started its transition to low-carbon electricity sources, it relies on exploiting renewable energy resources and contributing significantly to improving energy efficiency, securing electric supply and reducing emissions.

Currently, the Integrated Sustainable Energy Strategy is updated until 2040, in light of global developments related to renewable energy technologies, energy storage and hydrogen. The share of renewable energy in the energy mix will reach 65% by 2040.

In addition, energy efficiency has proved to be an effective tool to achieve energy availability, affordability and environment preservation in the most cost-effective manner. This means that energy efficiency can be considered as a powerful tool for market reform, with a minimum impact on consumers.

Egypt is deeply committed to regional electricity integration, which enhances energy security and expands the use of renewables.

We acknowledge that regional electrical interconnection can play a significant role in strengthening power security over the medium and long terms. Therefore, Egypt is working to become a corridor for exporting African renewable energy and a strategic link between Africa, Asia and Europe, enabling sustainable and mutually beneficial energy exchange.

To build our future, the continent needs conscious youth cadres who understand the extent of the next challenge and lead a project of integrated development on the largest possible scale.

Also, we will not forget the role of women in the development of sustainable infrastructure. In this regard, Egypt is creating educational programmes for thousands of African trainees in different energy fields. In addition, our country remains willing to share its experiences in the fields of electricity and renewable energy with our fellow African countries.

Finally, I would like to affirm that Egypt commits to support all efforts of African cooperation in the field of energy. We are fully prepared to share our experience, with its successes and challenges, with our brothers and sisters in Africa with complete transparency, and we are also eager to learn from them and benefit from their successful experiences.

I look forward to a powerful catalyst for cooperation between all African countries and actions towards a future powered by sustainable energy. ●

Illuminating Africa's future: our commitment to sustainable energy

Eng. Gaber Dessouki Mustafa
Chairman, Egyptian Electricity Holding Company

For over five decades, the Association of Power Utilities of Africa (APUA) has embodied collaboration and progress across the continent. As it marks its 55th anniversary, this milestone invites pride and reflection on a shared vision for a sustainable, reliable and inclusive energy future for Africa.

The Egyptian Electricity Holding Company (EEHC) is proud to be part of this historic journey. Our engagement with APUA reflects Egypt's enduring commitment to advancing Africa's energy sector, fostering innovation and ensuring communities gain access to the electricity essential for growth and prosperity

In recent years, Egypt has made significant progress in modernising its electricity infrastructure and diversifying its energy mix. With integrated operations across generation, transmission and distribution, EEHC today serves more than 120 million citizens.

Renewable energy has become a cornerstone of our national strategy. Landmark projects such as the Benban Solar Park – among the largest worldwide – and expanding wind farms along the Gulf of Suez highlight Egypt's clean energy leadership. These initiatives reduce carbon emissions while strengthening Egypt's position as a regional hub for sustainable power.

Equally vital is our investment in people and technology. The future of Africa's energy lies not only in infrastructure but also in the skills and creativity of its people. Through partnerships with international organisations and African stakeholders, Egypt promotes capacity building, knowledge exchange and the empowerment of future engineers and leaders.

As Africa grapples with the dual challenge of rising demand and climate change, cooperation is no longer optional but essential. APUA provides a vital platform for collective action – accelerating interconnection projects, enhancing grid stability and shaping policies that balance affordability, sustainability and growth.

Interconnection remains the backbone of integration. Egypt's geostrategic location and technical expertise position it as a hub linking North, East and Central Africa. Yet physical connections are insufficient without strong institutional frameworks to govern cross-border electricity trade. Here, regional electricity market development becomes critical – an area where Egypt offers valuable experience.

Structural reforms in Egypt's power sector have already enabled surplus capacity and attracted major investments in renewables. This model can inspire other African nations seeking sustainable and resilient energy systems.

Hosting the 21st APUA Conference in Cairo reflects Egypt's dedication to shared progress. For us, this event is both an honour and a responsibility. By exchanging experiences, best practices and innovations, we can transform challenges into opportunities and ensure no community is left in the dark.

At this pivotal stage, Egypt assumes dual strategic roles: chairing the APUA General Assembly and presiding over the Eastern Africa Power Pool (EAPP). The latter aims to build a unified Eastern African electricity market. This dual leadership is not symbolic – it reflects Egypt's long-term vision to achieve integration through two tracks: interconnection infrastructure and robust institutional frameworks.

Egypt's leadership within APUA and EAPP exemplifies its historic and strategic contribution to Africa's energy future. With its location, vision and expertise, Egypt is acting as a catalyst for turning continental ambitions into reality – ensuring a brighter, more prosperous future for all.

Looking forward, EEHC remains aligned with APUA's mission of empowering Africa through sustainable, inclusive and resilient power systems. We reaffirm our readiness to collaborate with utilities, governments and private partners to illuminate Africa's future.

On this 55th anniversary, we extend our heartfelt congratulations to APUA and its members. May the years ahead bring stronger unity, greater innovation and an Africa fully energised by its limitless potential. ●

Powering Africa's future: 55 years of unity, vision and action

Eng. Abel Didier Tella
Director General, Association of Power Utilities of Africa (APUA)

As we commemorate the 55th anniversary of the Association of Power Utilities of Africa (APUA), we are reminded of the extraordinary journey that has brought us here – a journey marked by resilience, innovation and a steadfast commitment to Africa's energy sovereignty.

From its origins as UPDEA to its transformation into APUA, our Association has grown into a continental institution that not only connects power utilities, but also connects visions, strategies and people. Today, APUA stands as a pillar of African integration, working hand in hand with the African Union Commission, the African Energy Commission and global partners to build a truly interconnected grid – one that flows from north to south, east to west, and centre to periphery.

Yet, our mission is far from complete. With over one billion Africans and a projected rise to 1.7 billion within the next decade, the urgency for investment in power generation and transmission has never been greater. Only one in three sub-Saharan Africans currently have access to electricity. This is not merely a statistic – it is a call to action.

The energy landscape is evolving. Coal and other fossil sources are giving way to solar, wind, hydroelectricity and geothermal. Strategic alliances – such as the recent agreement between Africa50 and Power Africa – signal a new era of investment and partnership. Independent Power Projects and Public-Private Partnerships are reshaping the financing and regulatory frameworks, reducing reliance on state funding and unlocking new opportunities for innovation.

The Mission 300 initiative involving the African development Bank, the World Bank and other partners will shape the landscape to the electricity inclusiveness on the continent.

This publication is both a celebration and a roadmap. It honours the achievements of our member utilities and partners, while illuminating the path forward. It is a tribute to those who have powered Africa's progress – and an invitation to those who will power its future.

Let us continue to build, connect and transform. Together, we will ensure that energy becomes not just a commodity, but a catalyst for development, dignity and unity across our continent. ●

Africa's energy future

Eng. Ahmed El Sewedy,
President and CEO, Elsewedy Electric

What is ELSEWEDY ELECTRIC's long-term vision for its role in Africa's energy future? How do you see the company contributing to the continent's development over the next 20 to 30 years?

Our long-term vision is to remain at the heart of Africa's growth story, delivering integrated energy, digital and infrastructure solutions that empower communities and drive inclusive development.

With over eight decades of experience, we see our role over the next decades as not only building power, ports and industrial zones, but also ensuring every village and city across Africa has access to clean, reliable energy. In doing so, we are committed to advancing a low-carbon economy, fostering climate resilience and aligning Africa's progress with the UN Sustainable Development Goals.

From your perspective, what makes Africa a strategically important region for the company's growth?

Africa is not just a market for us – it is home. Our proximity and shared cultural values give us a unique understanding of the continent's needs and the ability to build trusted partnerships. While Africa still faces significant energy access gaps, we see this not only as an opportunity, but also as a responsibility to expand access, support local talent and invest in green infrastructure. This is the essence of our vision: an "Africa for Africans", built on sustainable and inclusive growth.

How does ELSEWEDY ELECTRIC balance its commercial goals with its commitment to sustainable development and social responsibility in the communities where you operate?

Sustainability is at the core of our business model. We work to meet Africa's energy needs while creating value for communities and protecting the environment. Aligned with the UN Sustainable Development Goals, our 2030 strategy focuses on reducing environmental impact while maximising social benefits through jobs, knowledge transfer and infrastructure development.

Beyond business, we invest in education, healthcare, and community growth. Since 2011, the Elsewedy Technical Academy and our Applied Technology Schools have equipped thousands of young people with practical skills, while initiatives such as our solar-powered digital hubs with the World Food Programme bring energy and connectivity to rural communities. This balance of commercial goals with social responsibility ensures inclusive and sustainable growth for the long term.

What specific investments best demonstrate ELSEWEDY ELECTRIC's belief in the long-term potential of Africa's economies?

Our commitment to Africa is reflected in both the scale of our presence and the impact of our investments. Today, we operate 24 production facilities across the continent and manage a project portfolio worth more than $4 billion. Initiatives like Egypt's first inland dry port, which shifts cargo from road to rail and cuts 40,000 tons of CO_2 annually, and renewable energy IPPs such as our 130 MW solar plant powering 30,000 homes highlight our focus on sustainability and long-term value. This is the kind of impact we believe in – building infrastructure that drives growth today and endures for generations.

How is the company addressing the critical issues of power access in both urban cities and rural communities?

In urban and industrial centres, we deliver large-scale infrastructure such as Tanzania's 2.1 GW Julius Nyerere Hydropower Plant and Egypt's 4.8 GW combined-cycle power plant – the largest built in a single phase. These projects strengthen national grids and secure reliable power for industries, businesses, and households.

At the same time, we recognise that rural communities need different solutions. That's why we invest in decentralized systems such as mini-grids, off-grid solutions,and our Sun Square containerised solar units, which power schools, clinics, and local businesses. Our strength lies in this dual approach, from mega-projects that power entire nations to tailored solutions that bring clean energy to the most remote areas. In every case, our focus is on impact, inclusion, and long-term sustainability.

ELSEWEDY ELECTRIC

- Wire, Cable & Accessories
- Electrical Products
- Digital Solutions
- Engineering & Construction
- Infrastructure Investments

Across Africa,

Our projects range from street lighting in Ghana and substations in the DRC, to 90 MW power plants in Angola and 80 MW solar in Burkina Faso. We are also proud to contribute to the landmark 2,115 MW Julius Nyerere hydropower project in Tanzania. Backed by 19,000 employees and expertise across five sectors, we are shaping sustainable growth and brighter futures for millions.

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CONFERENCES

Whether it is a round-table or a workshop, the Session's Conferences are where the latest trends of the Power Industry are presented and discussed.

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The authors of the 800+ technical papers that underpin the Session present these over several days in the interactive Poster Sessions. Delegates can hold one-on-one discussions with the expert authors. Moving from one paper to the next meeting the relevant authors in their field of interest.

GROUP DISCUSSION MEETINGS

A unique opportunity to attend, contribute and absorb new knowledge. Each meeting includes a contribution process that allows delegates to become contributors.

WORKSHOPS

During the Paris Session up to seven workshops are run on the salient issues effecting the global power system. These must attend events offer in depth technical knowledge shared by experts in their fields.

TUTORIALS

During the Session each of CIGRE's 16 Study Committees present a tutorial on a key subject area. These are highly informative events and offer delegates the opportunity to pick the subjects of interest and absorb the relevant expertise.

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Powering Africa: the case for investment

Energy access remains a significant challenge across Africa, so developing both power-generation capacity and an extensive distribution network is crucial for driving industrialisation, reducing poverty and fostering sustainable development

Reliable access to energy is an essential input for the development of any economy. Plentiful, affordable energy allows economies to increase productivity across all sectors by reducing the cost of business activities, increasing workable hours and creating job opportunities. In Africa, energy shortages continue to inhibit progress, forcing the continent to rely on outdated, inefficient and even dangerous practices in production and daily life. Improving quality of life in Africa starts with sustainable, accessible energy.

More than 640 million Africans do not have access to electricity. These people make up approximately 40% of the continent's population and 53% of the global population without access to electricity. By 2050, two in five births will be in Africa and the population will grow to over two billion. Industrialisation is ever important

Engineers work on high-voltage power lines in South Africa. Effective transmission networks are vital to ensuring energy access (SHUTTERSTOCK/ SUNSHINE SEEDS)

with a population of such size and this demands modern energy generation and supply.

Currently, energy access varies significantly across the continent. Some North African countries have achieved access rates of nearly 100%, while other countries, such as Chad and Sierra Leone, are at less than 5%. Six countries (Nigeria, Ethiopia, the Democratic Republic of the Congo (DRC), Kenya, Tanzania and Uganda) make up more than 50% of the power-starved population in Africa – over 325 million people. Even when a country does have electricity infrastructure, it may not be reliable or affordable, and therefore not truly accessible. In sub-Saharan countries, the cost of electricity can be twice the global average, yet many of these countries contribute the lowest estimates of GDP per capita in the world.

Difficult return to energy growth

The effects of inaccessible energy were exacerbated during the Covid-19 pandemic, which sent an additional 55 million Africans below the poverty line and set the continent back in its aim of universal access to energy. Governments diverted resources to crisis response and away from energy projects. Critical distribution chains were interrupted, causing revenue loss and shortages of some materials essential to the energy transformation. The economic repercussions of the pandemic are still evident around the world and African governments have not been able to reproduce the same energy growth rates as before, working against limited financial opportunity.

A key focus for Africa is to provide access to safe and sustainable energy sources. The majority of energy consumed in sub-Saharan Africa is derived from biomass, which produces toxic fumes when used for cooking, heating and lighting. Inhalation of these fumes is the cause of death for roughly 600,000 Africans every year, so there is an obvious need to phase out such fuels as soon as possible.

Abundant natural resources

As part of the global transition to renewable energy, Africa has enormous potential in its natural resources, but currently has very limited capabilities to exploit them. Currently, a fifth of Africa's energy is produced via hydropower, but this resource is only being utilised to a tenth of its potential, and the continent is also well positioned to capture substantial wind and solar energy.

Africa receives 60% of global solar energy potential, but currently has 1% of the global capacity to generate it. Increasing solar power

Agrovoltaic systems enable farmers to generate electricity, collect rainwater and shade their crops (CHLORIDE EXIDE LIMITED)

In November 2023, Eskom opened the continent's first Battery Energy Storage System (BESS) in South Africa's Western Cape (ESKOM)

generation capacity often comes at the cost of cultivatable land and ecosystem health. In 2022, the Universities of Sheffield, York and Teesside in the United Kingdom, the Stockholm Environment Institute, World Agroforestry, the Centre for Research in Energy and Energy Conservation and the African Centre for Technology Studies collaborated to establish an agrivoltaic system in Kenya. Such systems involve regularly spaced solar panels mounted several metres above the ground, allowing crops to grow underneath with the added benefit of shade from extreme sun.

While renewable sources are ideal in the long term for the environment, sustainability and cost-effectiveness, transition fuels are most important to start providing Africans with electricity that will enable greater productivity and further their transformation. Liquified natural gas (LNG) is an example of an affordable, relatively low-carbon transition fuel, which has been adopted by Ghana.

Emphasising low-carbon innovations can also allow Africa to participate in carbon markets. For every tonne of CO_2e emissions avoided or removed from the atmosphere, one carbon credit is created. These credits are bought by governments, businesses, organisations or individual investors to offset their own emissions, where they cannot be avoided. Africa has an opportunity to capitalise on the development of renewable infrastructure and technologies and use carbon markets to continue funding its energy transition.

Access to energy finance

The African Development Bank (AfDB) works to fund projects to improve quality of life across Africa by collaborating with all types of financiers. The bank has 74 active initiatives and partnerships to support development towards various goals for Africa, and over 30 of these are focused on supporting energy transformation.

A fifth of Africa's energy is produced via hydropower, but currently only a tenth of its potential is being realised (SHUTTERSTOCK/ DUSTANDASHES)

In March 2023, South Africa, the continent's most industrialised country, declared a national crisis due to dire energy shortages. Among the contributors to the power cuts were a heavy reliance on coal for power generation (roughly 80%), outdated power plants prone to breakdowns and strain on existing networks. The government has used this crisis as a catalyst for furthering energy projects, with assistance from the AfDB. Under its Climate Investment Funds partnership, the AfDB is a financier for the Distributed Battery Energy Storage Project in South Africa. This project will help the country to adopt battery technology that allows the storage of 800 MWh of renewable energy. This can improve energy reliability and reduce the risk of future blackouts in South Africa and, in future, other African countries.

Although access to energy must improve across Africa, the quantity and quality of existing infrastructure varies from country to country, so a single approach won't work across the whole continent. Some countries, such as Ethiopia, are building power-generation capacity, but lack adequate distribution. In contrast, Nigeria has 70 million people connected to power, but needs to improve generation capacity to increase the stability of its power supply. Investment decisions must take into consideration the varying needs and cultures of each African country, making cooperation and communication key to success. ●

STEPS TOWARDS ACHIEVING AFRICA'S ENERGY GOALS

Since early 2023, several developments have underscored the ongoing efforts to enhance energy access in Africa. In June 2023, the Republic of Gabon and infrastructure investment platform Africa50 signed a framework agreement to develop and finance power transmission lines, aiming to strengthen the country's electricity infrastructure and improve access for its population.

In October 2023, the government of The Gambia signed a Shareholders' Agreement to manage the Senegambia Bridge under Africa50's Asset Recycling Programme. This initiative is expected to enhance regional connectivity and support economic growth, indirectly contributing to improved energy access by facilitating infrastructure development.

Furthermore, the International Finance Corporation (IFC) announced a $20 million equity investment in the Africa50 Infrastructure Acceleration Fund in 2024. This fund focuses on sustainable infrastructure projects (including energy) across the continent, aiming to catalyse further investments and accelerate project implementation.

Despite these positive strides, numerous challenges remain. High capital costs continue to present an obstacle to clean energy investments across Africa, which necessitate concessional support and innovative financing mechanisms to make projects viable.

Achieving Africa's ambitious energy and climate-related goals by 2030 requires annual investments exceeding $200 billion, according to the International Energy Agency. This factor underlines the critical need for sustained collaboration among governments, international organisations and private investors to bridge the energy access gap and promote sustainable development across the continent.

PRODEL

Empresa Pública de Produção de Electricidade

Producing energy for all

Our mission

To produce electricity efficiently, focusing on safety, environmental preservation, and the development of human capital, contributing to the country's development

Our vision

To fully meet Angola’s demand for electricity and be recognized regionally as a company of excellence and a promoter of technological innovation

Our values

Excellence, sustainability, ethics, innovation, commitment, teamwork and appreciation of human capital

PRODEL
Empresa Pública de Produção de Electricidade

Our strategy

Capacity building, reduction of production costs and ensuring financial balance

PRODEL's strategy is reflected in its Strategic Plan 2018-2022, a document that establishes the business vision of the public service for that period.

Strengthening electricity production capacity, reducing production costs andensuring economic and financial balance are the main Strategic Lines of PRODEL.

The conception of the strategy followed the necessary strategic and institutional alignment with the guardianship bodies. Thus, the objectives,targets and initiatives are in accordance with the Government Programme for the sector.

At the top of the priorities, the Energy sector strategy is focused on improving public service delivery, ensuring quality and operational efficiency, and ensuring system sustainability to reduce subsidisation.

PRODEL is responsible for increasing the capacity to 7.5 GW, combining hydroelectric and thermal production. For renewables, the target by 2022 amounts to 500 MW, mainly through solar, biomass, wind and mini-hydrosources.

At the same time, the actions focus on the optimization of sustainable management whose main premises are related to the collection of invoiced energy, without prejudice to the identification of other sources of revenue, as well as the constant valorization of human and institutional capital.

72% generation of clean energy by 2030

PRODEL is committed to the energy transition. With each passing day, it gains experience in implementing energy production methods that reduce the impact on nature.

Increase of 2,000 MW in the national electric system until 2030

The commissioning of new assets, especially hydroelectric generation, ensures sufficient availability for the electrification of Angola and meeting the demand of the southern African region.

New technologies

The energy transition began in 2016 with the completion of the expansion of the Cambambe Hydroelectric Power Plant, which increased the system's capacity by 700 MW of clean energy

Business intelligence

Critical management areas are now integrated into an online platform with the implementation of Business Intelligence in administrative procedures for accessing and exchanging information. KPIs for electricity production, human resources, finance, sales, and purchasing and logistics are all available in real time for managers.

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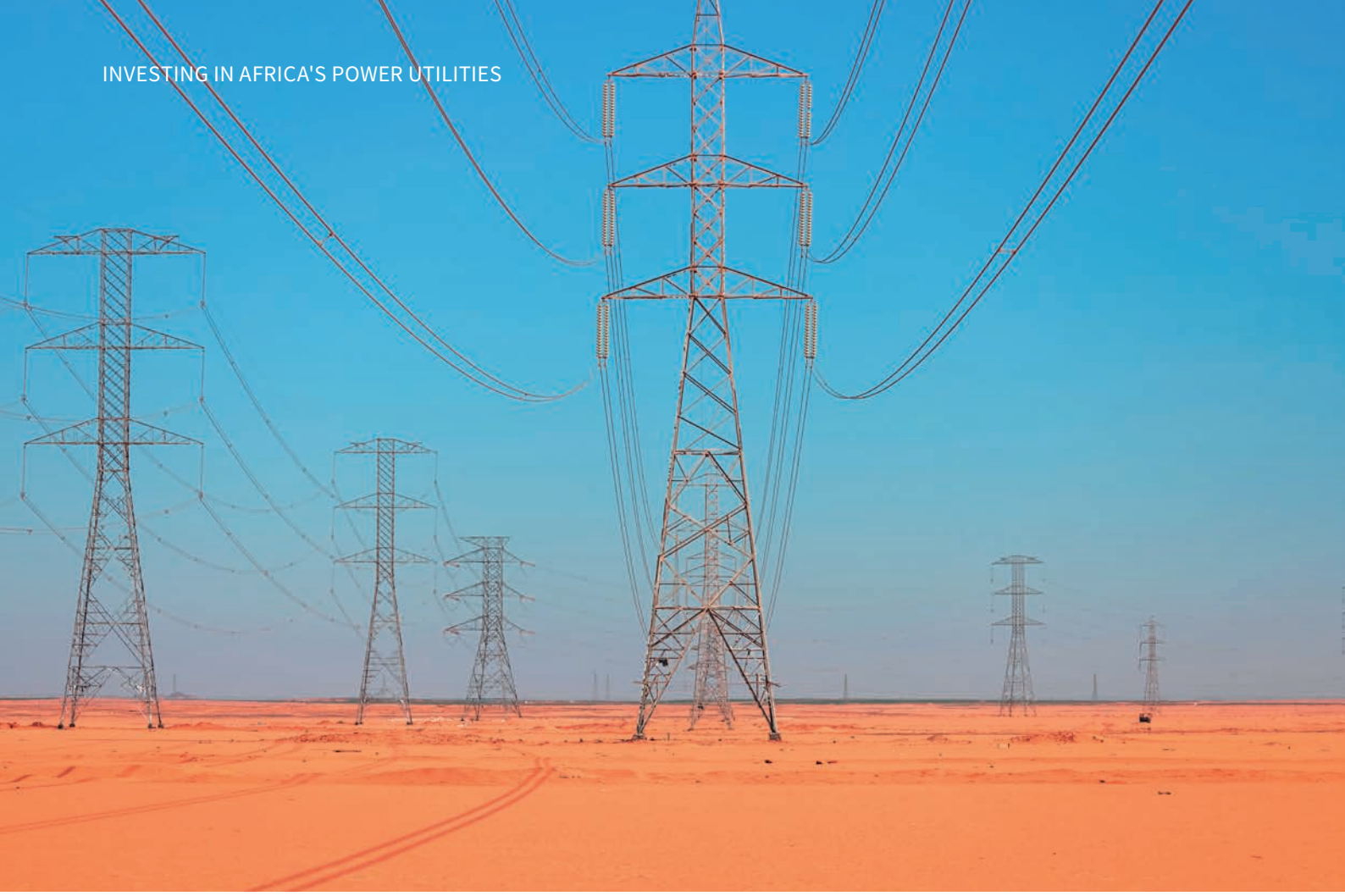

A catalyst for African energy development

Only through cooperation and collaboration can the expansion of Africa's access to energy become a reality. The Association of Power Utilities of Africa (APUA) brings together the continent's energy providers in the pursuit of this goal

Power lines carrying electricity across the Sahara. APUA's mission is to create an interconnected power grid across the continent (SHUTTERSTOCK/ MURATART)

The Association of Power Utilities of Africa (APUA) was formed in 2012 following the renaming of the Union of Producers, Transporters and Distributors of Electric Power in Africa (UPDEA), which had been established in 1970. The founding of APUA followed the decision by UPDEA members to rejuvenate and make the organisation more alive to its responsibilities and consistent with the prevailing climate of the power sector in Africa.

Headquartered in Abidjan, Côte d'Ivoire, APUA, known as the Association des Sociétés d'Electricité d'Afrique (ASEA) in French, currently boasts 57 members spread across 46 countries in Africa, as well as 20 affiliate members and some associate and observer members in Africa and Europe.

Its overarching goal is to create a robust, interconnected African power grid, a vision rooted in the belief that regional cooperation and integration are key to overcoming the continent's energy challenges. By fostering the interconnection of national grids, APUA aims to enhance energy security, improve efficiency and reduce the costs associated with electricity generation and distribution. Such a grid would enable power sharing across borders, from countries with surplus power to those facing shortages, mitigating the risk of blackouts and optimising the use of energy-generation resources – from hydropower in central Africa to solar in the Sahara and wind along the coasts.

Since its inception, APUA has positioned itself as a development institution working in close

collaboration with key stakeholders including the African Union (AU) and the African Energy Commission (AFREC). Such partnerships are vital for aligning energy projects with development goals across the continent, particularly those outlined in the AU's Agenda 2063, the Programme for Infrastructure Development in Africa (PIDA) and the United Nations Sustainable Development Goals (SDGs).

APUA also works closely with Africa's regional power pools, acting as a unifying body. Through these collaborations, it supports initiatives that enhance grid interconnectivity, harmonise regulatory frameworks,and foster competitive electricity markets. Moreover, APUA engages with international organisations, development banks and private-sector investors to mobilise funding and technical support for energy projects. These include the African Development Bank (AfDB), the World Bank and the European Union.

Planning power across borders

Core functions of APUA also include assisting in the planning and implementation of cross-border power projects. This involves conducting feasibility studies, coordinating with national governments and securing funding from international financial institutions. By providing technical expertise and strategic guidance, APUA helps streamline complex projects that would otherwise face significant bureaucratic and logistical hurdles.

An important aspect of APUA's mission is facilitating the exchange of experience and know-how among its members. It organises workshops, conferences and training programmes to help disseminate best practices, innovative technologies and effective management strategies.

APUA also maintains a knowledge hub as a repository of data, research and case studies that serves as an invaluable resource for policymakers, project developers and investors seeking background information on the African energy landscape. ●

APUA provides expertise and guidance to ensure effective delivery of power projects (SHUTTERSTOCK/ BILLY MIARON)

EXAMPLES OF APUA INITIATIVES

INTER-AFRICAN SCHOOL OF ELECTRICITY (ESIE)

Regarded as a symbol of the expertise, cooperation and solidarity between African electricians, ESIE has so far trained more than 250 engineers from across Africa. Designed to train high-level bilingual scientific engineers, the school has benefited from the sponsorship of prestigious schools of engineering in the United Kingdom, France and Switzerland, plus training support from French and Canadian energy companies.

Many ESIE graduate engineers have gone on to hold leadership positions in their respective companies, countries and elsewhere in Africa and beyond, working as ministers, general managers, directors and consultants. ESIE has since been handed over to the Ivorian government for integration into the University of Cocody-Abidjan, following institutional reforms in the energy sector.

AFRICAN NETWORK OF CENTRES OF EXCELLENCE IN ELECTRICITY (ANCEE)

In 2015, APUA launched ANCEE, a pan-African initiative and capacity-building project aimed at improving the performance of the power industry and the technical and managerial capabilities of the companies in the sector. The main deliverables of the project include making the sector more attractive to investors, improving the quality of electricity supply and services, increasing access to effective training and skills solutions tailored to local needs, and improving gender balance in the sector.

Funded by the French Development Agency (AFD) and the African Development Bank (AfDB), the initiative is expected to close the human resources and skills-development gaps in the production, transmission and distribution arms of African power utilities, including an ageing workforce, a lack of graduates that are immediately operational, a shortage of skills in new technologies, and low representation of women in key roles.

ANCEE operates 10 centres of excellence – in Algeria, Zambia, Morocco, South Africa, Nigeria, Kenya, Egypt, Côte d'Ivoire, Ghana and Tunisia. Thus far, it has produced at least 7,500 professionals and 250 managers, supporting more than 40 power utilities via grants for the implementation of training plans.

THE NORTH-SOUTH POWER TRANSMISSION CORRIDOR

This ambitious project aims to connect the power grids of Egypt, Sudan, Ethiopia, Kenya, Tanzania, and South Africa. By facilitating the exchange of surplus hydropower from the Nile Basin with energy-deficient regions in the south, it exemplifies APUA's vision of a unified African grid.

Bridging the infrastructure gap

Increasing use of private investment is providing the financial means to upgrade the continent's energy infrastructure, enabling greater generation capacity and enhancing transmission and distribution

Geothermal will form an important part of Africa's future energy mix (SHUTTERSTOCK/ ALRASYIQIN)

Historically tasked with generation, transmission and distribution, Africa's state-owned power utilities have struggled with ageing infrastructure, mounting debt and politically constrained tariffs that prevent cost recovery. Against this backdrop, private capital has emerged as a critical force for change, with independent power projects (IPPs), public-private partnerships (PPPs) and multilateral development finance gradually reshaping the continent's energy mix. By reducing dependence on government balance sheets and introducing new technologies, these models offer a pathway to more resilient and sustainable power systems.

Meeting Africa's rising demand for energy is becoming increasingly difficult as the continent's infrastructure is often outdated, poorly maintained and vulnerable to technical losses that significantly

Afdrica's abundance of solar and wind potential will play a key role in meeting energy demands (SHUTTERSTOCK/ SOFT GRASS)

reduce effective supply. Transmission and distribution networks are frequently overstretched, particularly in fast-growing urban centres, while rural electrification remains limited. Many utilities struggle to keep pace with grid expansion, leaving vast areas underserved.

Financially, utilities are constrained by structural deficits. Electricity tariffs are often kept artificially low, preventing cost recovery and discouraging investment in new capacity. Chronic under-collection of revenues and high levels of unpaid bills exacerbate pressure on liquidity. As a result, utilities rely heavily on government subsidies and external loans, which, in turn, put public finances under strain.

The consequences are evident across the continent, with many national utilities struggling to maintain a reliable supply, resulting in rolling blackouts that disrupt industry and households alike. Such fragility in generation and delivery systems forces businesses and communities to depend on costly diesel generators.

Leveraging private investment

The private sector has become an indispensable partner in power generation and distribution. Currently, IPPs and PPPs account for just over a third of installed generation capacity in sub-Saharan Africa, excluding South Africa, with their footprint steadily expanding. Countries such as Kenya, Nigeria, Ghana and Côte d'Ivoire have been early adopters, leveraging private investment to diversify supply and reduce the fiscal burden on governments. Kenya's geothermal and wind IPPs, for instance, have added significant renewable capacity, while Nigeria has turned to IPPs to bolster thermal generation and stabilise its fragile grid.

Clear advantages

The advantages of private participation are clear. IPPs often bring higher efficiency, better project management and access to advanced technologies compared with state-owned operators. They also help insulate power-sector development from the fiscal constraints of government budgets, ensuring that new projects can proceed even in times of public financial stress. PPPs, meanwhile, spread risk between public and private actors, enabling large-scale investments in generation, transmission and distribution infrastructure.

However, private participation alone cannot close Africa's energy investment gap. Multilateral development institutions such as the World Bank Group and the African Development Bank (AfDB) play a pivotal role in bridging risks and mobilising capital for large-scale projects. By offering concessional loans, credit guarantees and technical assistance, they create the conditions under which private investors are more willing to commit funds to complex power ventures.

The World Bank's Scaling Solar initiative exemplifies this approach, providing governments with standardised tender processes, risk-mitigation

New transmission lines being laid in Kenya. Improved networks will enable more effective distribution and the ability for countries to trade electricity (SHUTTERSTOCK/ MIARON BILLY)

tools and blended finance packages that have helped accelerate solar deployment in countries including Zambia, Senegal and Ethiopia. Similarly, the AfDB's Desert to Power programme aims to develop 10 GW of solar capacity across the Sahel, linking investment with regional objectives.

Such interventions go beyond financing. They provide credibility, reduce transaction costs and help governments negotiate balanced power purchase agreements with private producers. In doing so, they attract commercial lenders who might otherwise shy away from markets with perceived political or currency risks.

Applying effective frameworks

The success of IPPs and PPPs in Africa ultimately hinges on the regulatory and policy environments in which they operate, and several countries have demonstrated how effective frameworks can unlock investment. Kenya has established a relatively transparent system for IPPs, particularly in geothermal and wind, which has attracted both domestic and international investors. Meanwhile, Ghana's PPP Act provides a legal basis for structuring projects, giving lenders greater confidence in the enforceability of agreements. By contrast, in markets where tariff-setting remains opaque or governments have a history of payment arrears, projects often stall, discouraging further participation.

Harmonisation of standards at the regional level also offers promise. Initiatives under the African Continental Free Trade Area (AfCFTA) and regional power pools have the potential to create more predictable investment conditions by integrating cross-border trade and standardising contracts. Ultimately, stable and transparent regulation is as important as finance itself in bridging Africa's infrastructure gap – without it, even the most ambitious projects cannot be sustained.

The outlook for IPPs and PPPs in Africa is one of steady expansion and diversification. According to World Bank projections, private projects are expected to account for approximately 35% of sub-Saharan Africa's installed capacity (excluding South Africa) by 2032. Much of this growth will be driven by renewable energy, as falling technology costs and ambitious climate commitments make solar, wind and geothermal energy increasingly competitive options.

Solar power is likely to be at the forefront of this charge. Utility-scale solar projects have already achieved record-low tariffs in markets such as Zambia and Senegal under competitive auction schemes, while smaller distributed systems and mini-grids are becoming a viable solution for rural electrification. Wind power, too, is gaining ground with landmark projects such as Kenya's Lake Turkana Wind Power plant demonstrating that large-scale renewable IPPs can succeed in African markets.

At the same time, regional integration efforts will play a crucial role in optimising generation resources. Initiatives like the Southern African Power Pool (SAPP) and the West African Power Pool (WAPP) aim to create interconnected grids that allow countries to trade power more efficiently, reduce costs and improve reliability. ●

Regional integration of energy markets

The development of regional markets for electricity is playing an increasingly important role in reshaping the continent's energy ladscape, enabling the sharing of surplus generation, balancing demand and reducing costs

Africa's power sector has long been characterised by fragmentation, with many national grids operating in isolation and relying largely on domestic generation to meet demand. This limited approach has left countries vulnerable to supply shortfalls, forcing them to invest in expensive stand-alone generation capacity and preventing them from exploiting the continent's diverse energy resources.

However, recent decades have seen a shift toward regional integration that has started to reshape the landscape. Power pools, such as the Southern African Power Pool (SAPP) and the West African Power Pool (WAPP), have created formal mechanisms for electricity trade, allowing countries to share surplus generation, balance demand and lower overall system costs. Similar initiatives are under way in East and North Africa, reflecting a growing consensus that regional markets are key to improving reliability and affordability.

The promise of these power pools extends beyond cost savings. By enabling the development of large-scale, least-cost projects and connecting renewable-rich regions with major demand centres, they offer a pathway to more sustainable, resilient,and secure energy systems.

Before the creation of formal regional power pools, electricity trade in Africa was limited, ad hoc and largely bilateral. Neighbouring countries

Regional integration of power grids enables electricity trade between neighbouring countries (SHUTTERSTOCK/ DONGFANG)

Cahora Bassa Dam provides revenue from energy exports for Mozambique (SHUTTERSTOCK/ BPCREATIVEDESIGN)

occasionally exchanged power where physical interconnections existed, often to cover temporary shortages or to take advantage of surplus generation. Examples include Ghana importing electricity from Côte d'Ivoire during dry seasons, and Mozambique exporting hydropower from Cahora Bassa Dam to South Africa and Zimbabwe.

These arrangements, while useful, were constrained by infrastructure gaps and a lack of standardised agreements. Cross-border transmission capacity was often limited to a single line, leaving little room for redundancy or significant trade volumes. Pricing was negotiated on a case-by-case basis, with no regional market to ensure competitive rates.

The result was underutilisation of generation assets in some countries and persistent power deficits in others. Without a coordinated framework, the benefits of sharing diverse energy resources could not be fully realised. This fragmentation underlined the need for formal mechanisms to plan, coordinate and scale electricity trade across multiple jurisdictions.

Regional power pools

Recognising the limitations of bilateral trading arrangements, African governments and regional economic communities began developing formalised mechanisms to coordinate electricity generation and trade. This shift gave rise to regional power pools – institutional frameworks designed to facilitate shared planning, optimise generation resources and create transparent electricity markets.

The Southern African Power Pool (SAPP) was the first of these initiatives, established in 1995 under the Southern African Development Community (SADC). Its 12 member utilities agreed to cooperate on generation and transmission planning, operate a common grid and enable cross-border trade. Over time, SAPP has moved from purely bilateral contracts towards a competitive market structure. In 2009, it introduced a day-ahead trading platform allowing members to submit bids and offers on a daily basis, ensuring that the lowest-cost generation is dispatched first. Additional market products, such as intra-day and balancing markets, have since been added, improving system flexibility and accommodating variable renewable generation.

In West Africa, the Economic Community of West African States (ECOWAS) launched the West African Power Pool (WAPP) in 1999. Its mandate is to integrate national power systems into a unified regional electricity market, supported by a network of high-voltage interconnectors now under construction or operation. The goal is to ensure reliable and affordable electricity supply for all ECOWAS citizens, while fostering long-term energy cooperation and investment.

WAPP's efforts have included synchronising national grids, the construction of priority interconnectors, such as the Côte d'Ivoire-Liberia-Sierra Leone-Guinea (CLSG) line, and harmonising technical standards and tariffs. These steps are critical precursors to launching a full-fledged competitive market. Similar initiatives are progressing elsewhere, including the East African Power Pool (EAPP) and the Maghreb Electricity Committee (COMELEC), signalling a continent-wide trend toward regional integration as a cornerstone of Africa's energy future.

Wider benefits of regional integration

Regional integration offers substantial economic and social dividends that go far beyond simple electricity trade. By pooling generation resources, countries can lower overall system costs, as the most efficient and least expensive plants are dispatched first regardless of location. This reduces the need for costly emergency generation or redundant capacity investment in individual countries. For example, countries with limited domestic resources can import lower-cost hydropower from neighbours, rather than relying on expensive diesel generation.

Integration also strengthens supply security. Countries experiencing temporary shortages or outages can draw on surplus power from the pool, reducing the frequency and severity of blackouts. This enhanced reliability is particularly important for energy-intensive industries – such as mining, manufacturing and data services – which depend on consistent electricity supply to remain competitive.

Socially, regional power trade supports economic development by expanding access to affordable electricity, stimulating business growth and creating jobs. It also provides an

opportunity to better integrate renewable energy, as surpluses from solar- or wind-rich areas can be transmitted to demand centres, balancing variability across wider geographies. In the long term, these benefits contribute to poverty reduction, improved public services and greater regional cohesion through shared infrastructure and mutual economic interdependence.

Obstacles to progress

While regional power pools have made impressive strides, several challenges continue to limit the full realisation of their potential. Infrastructure remains the most pressing constraint. Many planned interconnectors are delayed due to financing gaps, procurement hurdles, or political instability, leaving transmission capacity insufficient to support large-scale trade. Existing cross-border lines are sometimes single-circuit and vulnerable to outages, reducing system reliability.

Institutional and regulatory harmonisation is another major obstacle. Member states have different tariff regimes, market structures and approaches to cost recovery, making it difficult to implement common trading rules. Utilities with weak credit profiles also pose risks to cross-border transactions, as payment arrears or default by a single buyer can undermine confidence across the system.

Market liquidity is still limited. In some regions, there is simply not enough surplus generation to support meaningful trade, which keeps volumes low and limits price discovery. Also, technical issues such as grid synchronisation, frequency control and system balancing become more complex as more countries connect and as renewable penetration increases. Addressing these challenges will be essential to unlocking the full economic and social benefits of an integrated African electricity market.

The next decade will be decisive for Africa's regional electricity markets. Several major transmission projects are scheduled to come online, promising to significantly expand cross-border trade. In Southern Africa, the North-South Transmission Corridor is expected to unlock thousands of megawatts of low-cost hydropower from the Democratic Republic of Congo and Zambia for delivery to energy-hungry markets in South Africa and Namibia. In West Africa, the completion of the CLSG line and other priority interconnectors will allow the West African Power Pool to scale-up multilateral trade and move towards a full competitive market.

Changing the energy mix

Large generation projects are also poised to reshape the regional supply mix. The Inga III hydropower scheme in the DRC and Ethiopia's Grand Ethiopian Renaissance Dam (GERD) have the potential to export significant volumes of renewable electricity to multiple neighbouring countries, reducing reliance on expensive thermal generation.

The long-term vision is a continent-wide power market under the African Union's Continental Power System Master Plan. Achieving this will require not only physical infrastructure but also continued harmonisation of market rules, robust governance structures and innovative financing solutions. If these priorities are met, Africa could achieve a truly integrated and resilient power system capable of supporting sustained economic growth. ●

Grand Ethiopian Renaissance Dam has the potential to export high volumes of renewable energy (GERD)

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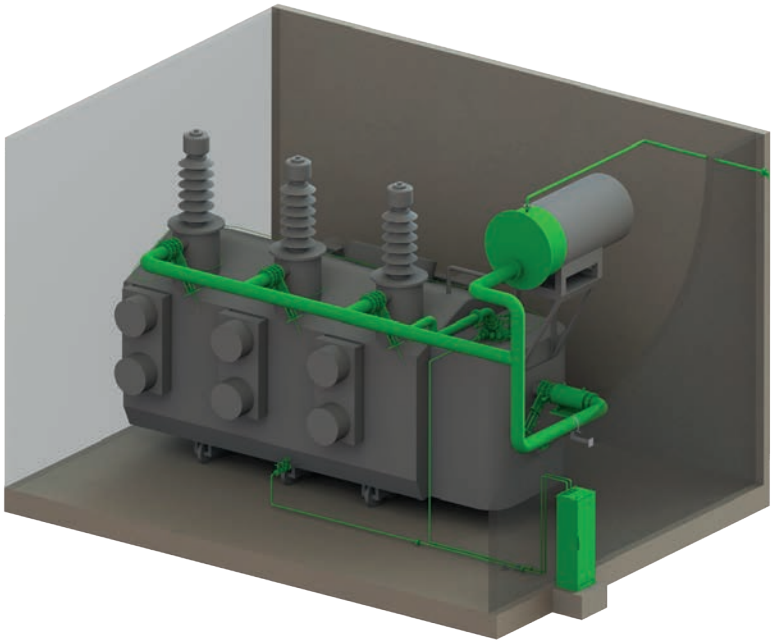
Across Africa, the demand for electricity is growing faster than ever. Urbanization, industrial development, and the expansion of digital economies are placing unprecedented pressure on national power grids. At the same time, these networks face increasing challenges: the rising cost of outages, exposure to climate extremes, and the risk of catastrophic transformer explosions that can take entire substations out of service. Ensuring resilience is no longer optional – it is the foundation for energy security and sustainable development across the continent.



The Challenge of Transformer Failures

Transformers are the backbone of every power grid. Yet, when they fail, the consequences are severe. Explosions can result in devastating fires, human injury, environmental damage, and prolonged blackouts. For African utilities, the cost of replacing a single large transformer can exceed several million dollars, and procurement delays can extend downtime for months. Beyond financial loss, these failures erode public trust and hinder economic growth by disrupting critical services such as hospitals, transport, and digital networks.

Securing the Future of Africa's Energy

Africa is at the forefront of the global energy transition. With ambitious programs to expand renewable capacity and connect millions of households, the resilience of the continent's grid infrastructure will determine the pace of progress. By deploying the TRANSFORMER PROTECTOR™, utilities and regulators can ensure that growth is not only rapid but also secure, reliable, and sustainable.

The TRANSFORMER PROTECTOR (TP): A Proven Solution

SERGI's **TRANSFORMER PROTECTOR (TP)** is the world's only proven solution designed to prevent transformer explosions before they occur. Operating in milliseconds, the TP detects and instantly depressurizes a transformer during the very first stages of a fault. By doing so, it eliminates the risk of tank rupture, fire, and long-term service outages.

Unlike other systems, the TP is a **passive, self-activating technology** that does not require power supply or complex maintenance. With more than 3,500 units installed worldwide – from North America and Europe to Asia and Africa – the TP has become a trusted safeguard for utilities seeking to protect their assets and secure their networks.

Benefits for African Power Networks

Implementing the TP across African grids delivers measurable and lasting benefits:

- **Enhanced Resilience:** Utilities can recover operations rapidly after a fault, avoiding the prolonged downtime associated with transformer explosions.
- **Human and Environmental Safety:** Preventing fires and explosions protects operators, local communities, and the environment.
- **Economic Efficiency:** By avoiding catastrophic losses, utilities save millions in replacement costs and protect revenues from power sales.
- **Sustainability and ESG Compliance:** TP adoption contributes directly to climate and ESG goals, aligning with both African Union priorities and international energy security frameworks.

SERGI brings over 25 years of expertise in transformer protection to support Africa's journey. Our mission is simple: to help utilities safeguard their assets, protect their people, and deliver continuous, reliable power to their nations.

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A mission to transform the energy landscape

Mission 300 is a bold initiative to bring electricity to 300 million people in sub-Saharan Africa by 2030, aiing to transform lives, boost economies and accelerate progress towards universal energy access

A cornerstone of Mission 300 is its emphasis on clean energy (SHUTTERSTOCK/ HUSTIEODOR)

April 2024 saw the launch of a groundbreaking initiative that could mark a turning point for energy access across sub-Saharan Africa. Mission 300, spearheaded by the World Bank Group and the African Development Bank (AfDB), with critical support from international partners including the Rockefeller Foundation, aims to provide electricity access to 300 million people by 2030. The initiative is also expected to yield transformational benefits, including economic growth, social development and progress in combating climate change.

The bold strategy seeks to bridge one of the most significant infrastructure gaps facing the continent and redefine Africa's development trajectory. Mission 300 rests on three main pillars: grid expansion and rehabilitation, renewable energy integration, and policy reforms to unlock private-sector participation.

Africa's electricity grids are often outdated, fragile and inefficient. According to research by the World Bank, as much as 20% of generated electricity is lost during transmission and distribution. Mission 300 will allocate substantial resources to both expanding grids into underserved areas and rehabilitating existing infrastructure to reduce losses, enhance reliability and provide support for greater integration of renewable energy.

Ethiopia, Kenya, Nigeria and Senegal are among the countries earmarked for significant grid extension programmes. In Kenya, for example, the government's ongoing Last Mile Connectivity Project will be aligned with Mission 300 to accelerate household connections.

One of the defining features of Mission 300 is its emphasis on clean energy, with the aim of exploiting Africa's rich solar, wind, hydro and geothermal resources, which remain vastly underutilised. The initiative seeks to capitalise on this potential by promoting hybrid mini-grids, decentralised solar systems and large-scale renewable energy projects that will integrate seamlessly into national grids.

Another cornerstone of Mission 300 is to address regulatory and financial barriers that have traditionally deterred private-sector involvement. The initiative encourages governments to implement reforms to encourage investment. These include regulatory simplification to streamline licensing and approvals, currency risk mitigation mechanisms to protect investors, and transparent tariff structures to ensure financial sustainability for utilities. The aim is to create bankable environments where private capital feels secure and welcome. In this regard, Mission 300 builds upon earlier efforts such as the World Bank's Scaling Solar initiative, which helped standardise solar project development across Africa.

Financing Mission 300

Financing such an ambitious programme requires innovative solutions. Mission 300 proposes a mix of public and private funding, multilateral guarantees, concessional loans and results-based financing.

The International Finance Corporation (IFC), a member of the World Bank Group, is leading the private-sector engagement efforts, while the AfDB's Sustainable Energy Fund for Africa (SEFA) is supporting risk-mitigation tools and early-stage project development. Initial estimates suggest that the initiative will require $35-40 billion in investment, with around 60% expected to come from private capital mobilised through de-risked project pipelines.

The Rockefeller Foundation, a long-time advocate for energy access in developing countries, plays a vital role in providing grant funding and technical assistance, particularly in supporting decentralised renewable energy systems. Other partners, such as the UK's Foreign, Commonwealth & Development Office (FCDO) and Germany's KfW Development Bank, are contributing through technical expertise and financing. Moreover, Mission 300 has strong links with other continental frameworks, notably the African Union's Agenda 2063 and the United Nations Sustainable Development Goal 7, ensuring alignment with broader development goals.

In January this year, the Mission 300 Africa Energy Summit, held in Dar es Salaam, Tanzania, marked a pivotal moment in the continent's drive toward universal energy access. At this landmark gathering, African heads of state and energy ministers endorsed the Dar es Salaam Energy Declaration, affirming a united front in advancing transformative energy reforms. The declaration commits governments to scaling electricity access and clean cooking solutions, accelerating the deployment of renewables and mobilising greater private-sector investment.

In a direct response to this political will, Mission 300 partners pledged more than $50 billion to support Africa's energy transformation. The commitment underlines the growing international momentum behind the initiative and reflects confidence in Africa's vision for a sustainable energy future.

Extending access to electrcity will provide a major boost to industry across the continent (SHUTTERSTOCK/ MANGKORN DANGGURA)

National Energy Compacts

Central to Mission 300's success is the leadership of African governments themselves. With technical and financial support from the World Bank Group, 12 countries – Chad, Côte d'Ivoire, Democratic Republic of Congo, Liberia, Madagascar, Malawi, Mauritania, Niger, Nigeria, Senegal, Tanzania, and Zambia – were the first to launch detailed National Energy Compacts last January. They have recently been joined by Burundi, Ghana, Mozambique, Togo and Zimbabwe. These compacts define specific policy and investment targets to expand electricity access, increase renewable energy deployment and attract private capital.

Adopted at the highest levels of government, these compacts mark a shift from fragmented interventions to integrated national strategies. Preparations are now under way to support the next cohort of countries in developing their own compacts, laying the groundwork for widespread, coordinated energy access planning. ●

Kenya's energy future

James Opiyo Wandayi
Cabinet Secretary of Energy and Petroleum, Kenya

Energy is central to Kenya's socio-economic transformation and industrialisation. The **National Energy Policy 2025–34** sets a clear path to ensure reliable, affordable, sustainable, and inclusive energy supply that drives economic growth, supports universal access and anchors Kenya's leadership in Africa's clean energy transition.

Kenya has made significant strides in expanding electricity access, with national access levels rising from approximately 30% in 2014 to over 75% (65% on grid, 0.84% mini grid and 9.2% standalone PV) as at 2024. This progress has largely been complemented by a strong focus on renewable energy development, which now accounts for 82% of the country's total installed electricity generation capacity and 93% of actual energy consumption.

Notably, Kenya leads the African continent in installed geothermal capacity and ranks sixth globally. The country also boasts an extensive transmission network, spanning 9,484 km, including three regional interconnectors that support cross-border electricity trade. Despite these achievements, major challenges still exist, necessitating the need for urgent, strategic and coordinated interventions.

Approximately 25% of Kenyans still do not have access to electricity, with the rural areas disproportionately low on access. Over 69% of households rely on traditional biomass for cooking, contributing to deforestation, health risks, and environmental degradation. The high cost of energy, compounded by reliance on imported fossil fuels impedes energy security, economic stability and industrial growth.

As a result, key strategies and focus areas have been developed to aptly address these challenges and risks while sustaining the country's momentum towards achieving its National Development Goals.

Key strategic directions

- Achieve **100% electricity access by 2030**, connecting an additional 5.1 million households through grid expansion, off-grid systems and renewable integration.
- Deliver **universal clean cooking access by 2030**, phasing out reliance on biomass and promoting modern cooking technologies.
- Operationalising the Integrated National Energy Plan (INEP) Framework and regulations. This will ensure adaptive, data-driven power planning aligned with least-cost principles and emerging technologies, supporting sustainable development, productive use of clean electricity, and cross-sector decarbonization.
- Increasing renewable power generation to 5,952MW by scaling up the installed capacity to 1,681MW of geothermal, 1,403MW of hydro, 966MW of wind, 807MW of solar, 295MW of biomass/cogeneration, 400MW of import, 400MW of BESS and the use of transitional fuels like LNG. The increase will drive the country to achieve its target of moving from 83% to 100% clean energy sources on the national grid by 2030.
- Modernisation and expansion of the transmission network by 8,000km and 12,000MVA transformation capacity by 2030, hence increasing efficiency and availability of the transmission system.
- Enhancing the automation, reliability and efficiency of the distribution system, while expanding it by 212,937km and further increasing the number of household connections by 5.1 million, will increase access to reliable electricity. Competitive energy procurement and pricing will be promoted through operationalisation of the Renewable Energy Auction Policy and Open Access, bulk supply and market regulations, which are aimed at achieving transparent, least-cost procurement of power at cost-reflective tariffs.
- Innovative and sustainable financing options from local and international sources, including de-risking instruments, will be explored as avenues to mobilise the targeted funding (USD 19.1 billion: private sector USD 5.1 billion, Ppublic sector USD 14 billion) for energy projects from public and private sources, as well as operationalising the Consolidated Energy Fund.
- Finalising and operationalising **competitive local and EAPP regional power market regulatory frameworks, guidelines and procedures** by 2027, while building institutional capacity to support regional power trade. These efforts will support the country in actively participating in the Eastern Africa Power Pool (EAPP) by buying/selling power and providing wheeling services. It will further deepen regional integration and optimise the use of regional generation resources.
- Leveraging on the existing and planned regional interconnectors by **scaling up imported and exported power to 1000MW** by 2030. This will maximise the capacity and investment made in these interconnections, while optimising Kenya's strategic positioning in regional power trade.
- Completing pending transmission infrastructure (**Kenya–Uganda 400 kV interconnection** by 2030) and **expanding cross-border electricity supply to underserved border towns** and communities (target: Mandera,

Wind turbines on the Ngong Hills in Kenya, which is aiming for 100% clean energy sources on its national grid by 2030 (SHUTTERSTOCK/SYME MWANGI)

Takaba, Banisa, Rhamu, Sololo and other towns) will enhance energy security and power supply while providing additional revenue from power trade and cross border power supply, as well as access to cheaper sources of power.

- Mobilise **USD 19.1 billion** in new financing, including USD 5.1 billion from private sector, leveraging green bonds, carbon markets and PPPs by 2030.
- Create a competitive investment environment with transparent auctions, cost-reflective tariffs and risk-mitigation instruments.
- **Connecting an additional 5.1 million households to electricity** through on and off-grid solutions, as outlined in the Kenya National Electrification Strategy (KNES 2025), will drive the achievement of universal access to electricity.
- Various strategies towards **achieving universal access to clean cooking by 2030** have been developed which will require implementation. These include the Kenya National Cooking Transition Strategy (KNCTS), Kenya National Electric Cooking Strategy (KNeCS), the Behaviour Change and Communication Strategy for Promoting Clean Cooking in Kenya, the Bioenergy Strategy and the supporting regulations. Transitioning 65.6% of the population from traditional biomass cooking methods to clean cooking solutions by 2030 will require the supply and affordability gap for clean cooking solutions to be bridged. In addition, a national clean cooking support facility will be established to implement these initiatives.
- **Productive Use of Energy (PUE) across grid and off-grid sectors** are key energy demand and economic drivers. The finalisation and implementation of the Kenya National PUE Strategy by June 2026 will also stimulate the increase in access to productive use appliances and equipment across essential rural based sectors of the economy such as agriculture, blue economy, industry, health, transport among others.
- Decarbonise the energy sector in line with the Paris Agreement, targeting net-zero by 2050.
- Ensure a **just transition** by prioritizing energy access for vulnerable communities, supporting job creation, and mainstreaming gender and youth inclusion.
- Strengthen participation in the **Eastern Africa Power Pool (EAPP)** by scaling cross-border trade to 1,000MW by 2030.
- Expand interconnectors to enhance energy security, market stability, and regional industrial growth.

The way forward

Kenya has achieved major milestones – electricity access has risen from **30% in 2014 to 75% in 2024**, with over **82% renewable energy share in installed capacity**. Yet, challenges remain: 25% of Kenyans still lack electricity, over 69% depend on biomass for cooking, and energy costs remain high.

The Policy addresses these gaps through a coordinated, inclusive, and sustainable approach. It emphasises **capacity expansion, clean energy development, financial sustainability of utilities, regional integration and private sector-driven growth**.

Conclusion

Kenya is on course to become a **regional and global leader in clean, reliable, and affordable energy**. By 2030, the country will have achieved universal energy access, transitioned fully to clean power and built a resilient energy sector that supports green industrialization, climate action, and prosperity for all. ●

Keeping up with Africa's power needs

Balancing growth, resilience and sustainability, Africa's energy transition blends renewables, infrastructure expansion and innovation to extend electricity access across the continent

Morocco is home to one of the world's largest solar power stations, the Noor Ouarzazate complex (XINHUA/ALAMY)

The United Nations Sustainable Development Goal 7 set a target of universal access to affordable electricity for all by 2030. With Africa's population set to rise by 40% on 2015's figures, and with rapid economic expansion across the continent, the need to increase its power generation capacity is all too urgent. Economic development – coupled with a demand for greater resilience and sustainability – is driving many energy initiatives as the continent works towards the African Union (AU) Agenda 2063 aim to "optimise use of Africa's resources for all Africans".

The continent faces a massive task to achieve its energy goals. While there is a global push to cut carbon emissions, most of Africa – which is rich in natural resources – emits and consumes very little carbon, widely recognised as the engine of industrialisation and economic growth.

Many of its citizens are acutely aware of the challenges of climate change, living as they do on the front line of climate-related catastrophes, such as water stress, reduced food production and increased frequency of extreme weather. Policymakers are, therefore, under pressure to achieve a just energy transition that balances a global commitment to decarbonisation with domestic needs for growth that isn't prone to blackouts and rationing.

South Africa and the International Partners Group (IPG) – comprising founder members the United States, European Union, United Kingdom, Germany and France, and more recently Denmark and the Netherlands – are advancing the US$9.3 billion Just Energy Transition Partnership (JETP) to decarbonise the country's economy and expand renewable energy. Key progress includes grant funding of US$713 million to support economic diversification, skills training and renewable energy initiatives, especially in coal-dependent Mpumalanga.

Elsewhere, there is debate about what a just transition to renewable energy means for the continent. While some argue for a leapfrog approach towards renewables, others favour a more incremental method that enables African nations to gradually reduce emissions by moving from coal to gas and pivoting from fuelwood to gas for cooking.

The scale of the challenge

According to the International Energy Agency (IEA) Africa Energy Outlook 2022, 600 million people lack access to electricity, the vast majority of them located in sub-Saharan Africa. However, countries such as Ghana, Kenya and Rwanda are on track for full access by 2030. The IEA's analysis shows that extending national grids is the least costly and most prudent option for almost 45% of those set to gain access by 2030. In rural areas, where more than 80% of the electricity-deprived live, mini-grids and stand-alone systems, mostly solar-based, are the most viable solutions.

Steps are being taken across the continent to promote investment in the energy sector, improve public utilities' financial health and implement regulatory reforms that affect the industry. For example, South Africa's Renewable Independent Power Producer Procurement Programme (REIPPPP) is aimed at adding extra megawatts to the country's electricity system by incentivising private-sector investment in a range of renewable projects including biomass, wind and small hydro. Bidders for the programme's seventh round in 2024 included eight wind projects (1,692MW) and 40 solar projects (7,826MW) across five provinces.

Countries such as Nigeria, Libya, Algeria, Angola, South Africa and Mozambique have long been important players in the continent's energy mix, thanks to their oil or coal wealth. According to market data provider Statista, Libya accumulated 48.4bn barrels of proved reserves in 2021, while Nigeria was close behind with reserves of 36.9bn barrels of crude oil.

Situated on the Kyoga Nile, Uganda's Karuma Hydropower Station started operating in 2024, with an installed capacity of 600MW (UEGCL)

Meanwhile, in 2019, South Africa registered an output of roughly 254.4m tonnes of coal (90% of the continent's total production). In 2019, the oil sector accounted for 7% of Nigeria's GDP and contributed nearly 40% to Angola's GDP. Statista also reveals that natural gas reserves in Africa totalled around 625.6tr cubic feet in 2021, with Nigeria holding around one quarter of the continent's total reserves.

As Africa's power mix expands to include more sustainable sources, there are increasing opportunities for even more nations to get in on the energy act, providing renewable sources such as hydrogen, sun, wind and hydropower. According to Statista, 9% of all energy generated in Africa during 2020 came from renewable sources.

Renewables in action

The IEA says Africa is home to 60% of the best solar resources globally, but has only 1% of installed solar PV capacity, so this is seen as an area ripe for growth. Solar initiatives that are attracting attention include Morocco's Noor Ouarzazate solar complex, a 580MW power plant and one of the world's largest solar stations. In Ghana, Bui Power Authority (BPA) is involved in building solar plants in the north of the country. A 1MW floating solar plant was recently completed, and it is also creating a hydro-solar PV hybrid (HSH) system.

SNEL, the national electricity company of the Democratic Republic of Congo (DRC), is building two 100MW solar power plants in the south-east of the country. Meanwhile, activities funded by the World Bank-supported US$311m Regional Emergency Solar Power Intervention Project (RESPITE) kicked off in Liberia's capital Freetown in early 2023, aiming to rapidly increase grid-connected renewable energy capacity in the participating countries.

Kenya's Lake Turkana Wind Power project comprises 365 850KW wind turbines and a high-voltage substation (LAKE TURKANA WIND POWER)

Large hydropower projects are already in the pipeline in 15 countries, including Angola, Ethiopia, Nigeria and Tanzania. Notable hydro schemes include the DRC's Grand Inga Hydropower Project. Launched as one of the AU Agenda 2063 flagship projects, it aims to have a total installed capacity of more than 42,000MW and is designed to contribute significantly to the country's electricity supply and that of the wider continent.

Developing hydrogen

Hydrogen is also high on Africa's energy agenda. According to the IEA, the continent has the potential to produce 5,000 megatonnes of hydrogen per year at a cost of less than US$2 per kilogram. In Egypt, the European Bank for Reconstruction and Development (EBRD) is supporting the decarbonisation of the country's economy with a US$80m loan to Egypt Green to develop the country's first green hydrogen facility.

In Mauritania, German project developer Conjuncta signed a Memorandum of Understanding with the government, energy provider Infinity and renewables developer Masdar in March 2023 for a US$34bn green hydrogen project. In Morocco, 2022 saw the establishment of the country's first green hydrogen production system. In Namibia, HDF and the European Investment Bank have partnered to build the country's first green hydrogen power plant. In South Africa, the Hydrogen Valley integrated hydrogen ecosystem – which will stretch from Mokopane to Johannesburg – is being planned.

Although there is potential for wind power, installed wind capacity in Africa represented less than 1% of global installed capacity, according to 2020 research from the International Finance Corporation (IFC). In 2019, Africa's largest wind power project was inaugurated at the 310MW facility at the Lake Turkana Wind Power project in Kenya. And in April 2023, the EBRD issued a senior secured loan of up to US$100m to Red Sea Wind Energy to develop, construct and operate a new 500MW onshore wind farm in the Gulf of Suez.

One size doesn't fit all

While major initiatives such as the DRC's Grand Inga project are capturing global headlines, smaller-scale projects are also proving their worth in communities throughout the continent. In Kenya, the M-KOPA pay-as-you-go solar scheme combines digital micropayments with Internet of Things connectivity, with the aim of making credit more accessible. According to the people behind M-KOPA, since the concept was born in 2010, it has been used to provide credit that has enabled more than one million customers to access solar lighting, energy-efficient televisions and refrigerators, smartphones, cash loans and more.

As the continent works towards the AU Agenda 2063 aim of optimising use of Africa's resources for all Africans, more mega projects and micro business opportunities will continue to emerge. In turn this will enable countries that have traditionally played minor roles in the continent's energy provision to improve their energy security and support domestic development. The challenge will be to ensure that regulatory frameworks are fit for purpose to de-risk investments and keep investment coming in. ●

Transforming energy with digitalisation

From artificial intelligence to smart grids, the adoption of new technologies is revolutionising Africa's energy sector, enhancing efficiency, grid reliability and renewable energy integration

Africa's energy sector is undergoing a major transformation with the rapid growth in the deployment of renewables, plus the introduction of decentralised energy systems connected to power grids. This transition gives rise to new levels of complexity for power and utility companies across the continent, while also presenting an opportunity for creating new business models and securing additional revenue to incentivise players in the power industry and beyond.

Along with the rest of the world, African energy firms and policymakers are weighing up the digitalisation mechanisms that could accelerate the continent's energy transition. They are evaluating how these can maximise production, improve grid reliability, reduce emissions, match energy supply to demand, cut the cost of access to power and also target some of the most difficult to reach

Digital technologies have a key role to play in providing sustainable energy (SHUTTERSTOCK/KANGWANS)

citizens in order to de-risk investment and ensure delivery of universal access to electricity by the end of this decade.

Digitalisation techniques that are being considered include drones, artificial intelligence, machine learning, digital twins, Internet of Things (IoT), cloud services, outage management systems, smart metering and data analytics.

Artificial intelligence (AI) has been gaining traction globally and has the potential to improve energy efficiency and encourage the adoption of low-emission technologies. It can help keep power grids stable by providing better prediction capabilities and improving demand forecasting.

Deployment of drones

Drones are being combined with AI and thermal imagery to identify power-line defects, internal faults, theft and vandalism. Additionally, they can be used for simple repairs and to reduce response times. Although there are regulations in some countries forbidding the use of drones, in regions where they are permitted a growing number of utilities firms are adopting the technology.

For example, Cote d'Ivoire has trained drone pilots to cover the country's 25,000km of high voltage transmission lines. Ghana and Kenya are also making progress in using drones for a variety of tasks: those with thermal-based tools will be flown for routine inspections to locate hotspots on the grid, while others will be deployed to monitor the completion of infrastructure works, manage vegetation and plan the construction of new lines using digital terrain modelling.

IoT is also gaining a foothold and being utilised to ensure the sustainable operation of power systems, to enable remote monitoring of systems and to optimise maintenance schedules. This technology can also be used by households to improve energy efficiency via interconnecting devices, controlling how much power each device uses, which to use and when.

Drones speed up routine inspections, helping to improve network reliability (SHUTTERSTOCK/ TONG STOCKER)

A number of projects are being rolled out in Africa using digital technology and innovation to secure universal electricity access. In Mozambique, the government launched its Electricity for All National Programme (Programa Nacional de Energia Para Todos) in 2018 with the aim of ensuring all Mozambicans have access to electricity by 2030. The scheme, which is supported by the Tony Blair Institute for Global Change (TBI) in partnership with Power Africa, uses a platform developed by Endev to integrate on-grid and off-grid data reported by electricity stakeholders to the Ministry of Energy and Mineral Resources (MIREME) every month.

Another initiative is the European Union (EU)-funded €23.5m Digital Energy Facility (DEF), which finances digital innovation projects and products to support the integration of renewable energy sources into grids and to increase the rate of energy access, particularly in sub-Saharan Africa. Its aims also include improving the performance of companies in the energy sector and reducing their technical and commercial losses.

According to the EU, by its conclusion the DEF will have helped to increase access to electricity for a million people. It will also have financed the installation of 100MW of additional power generation capacity from renewable sources and reduced annual CO_2 emissions by 100,000 teq. Initiatives under the DEF include the Digital Energy Challenge – launched in 2020 by Agence Française de Développement (AFD) in partnership with the European Commission and the French Agency for Environment and Energy Management (ADEME) – which has supported 30 projects in 17 African countries by the end of 2024.

Although the arrival of new technologies in Africa could help address the energy trilemma around availability, affordability and sustainability, it can only achieve so much. The other pieces of digitalising Africa's energy jigsaw are investment in capacity and implementing the policies and regulations that can help de-risk investment and create bankable projects in the sector.

Steps are being taken across the continent to establish regulatory frameworks that provide clarity on incentives and companies' obligations, and to consider privacy implications and ensure effective monitoring of energy access in areas outside the grid. Additionally, to enable digital services for the energy industry, governments and their partners are working to improve telephone and internet coverage.

Decentralised energy systems

As Africa looks to hit targets for universal access to electricity, decentralised solar energy systems are becoming an important part of the mix. These have the potential to offer quicker access to affordable and reliable electricity in locations where grid or mini-grid connections aren't economically or technically feasible yet,

Digitalisation offers opportunities for developing new services, such as electric vehicle charging (SHUTTERSTOCK/ SCHARFSINN)

potentially paving the way for more widespread and decarbonised electrification of both homes and businesses. Telecoms provider Orange has deployed 10,000 solar sites in Africa and the Middle East that supply its mobile telephone systems and reduce its use of fossil fuels.

To improve access to decentralised power in Africa, energy supplier ENGIE has created Energy Access. This arm of its business offers mini-grids and pay-as-you-go technology that aim to make a basic and modern electricity supply more affordable and more accessible. Customers can make small payments to unlock the system for a day or week of usage a time, until they have paid the full price and the systems are permanently unlocked. Systems such as this and the similar M-KOPA pay-as-you-go solar scheme build on the growth of digital tools and the strong penetration of mobile money in sub-Saharan Africa.

Other projects include the African Development Bank Group's Leveraging Energy Access Finance Framework (LEAF), under which the bank is committing up to US$164 million to promote decentralised renewable energy in six African countries. The programme aims to encourage commercial and local currency investment to scale up the activities of decentralised renewable energy companies in Ghana, Guinea, Ethiopia, Kenya, Nigeria and Tunisia.

Developments in digitalisation are paving the way for new business models and additional revenue streams for existing energy firms, as well as stakeholders from other sectors. Energy-as-a-Service (EaaS) and Power-as-a-Service (PaaS) concepts are providing opportunities for collaboration, to de-risk public projects and reduce capital expenditure. In Nigeria, AP Renewables and PowerGen signed a Memorandum of Understanding in 2023 to develop a PaaS solution under which both firms would generate more than 10MW of renewable energy in the country.

New products and services

Digitalisation also enables energy and utilities firms to offer new products and services, such as the electric vehicle (EV) charging stations that are being rolled out across roads in countries including South Africa, Morocco and Kenya. This is providing opportunities for start-ups such as electric motorcycle firms Zembo in Uganda and Ampersand in Rwanda, as well as energy firms including Kenya Power and Total Energies.

Even companies such as car manufacturer Audi, which has expanded its South African EV charging network, and real estate firm Dowgate Properties – which has set up an EV charging station in Naivasha, Kenya – are embracing new opportunities in a re-energised African market. ●

Leading Ghana's green transition

How Volta River Authority (VRA) is leading Ghana's green transition for sustainable energy

As a long-standing member of the African Power Utilities Association (APUA) and a partner in marking the significant anniversary milestone, the VRA stands tall as a beacon of leadership, innovation, resilience and transformation in Africa's energy landscape. With a diversified generation portfolio, a bold commitment to clean energy and a forward-looking strategy, VRA continues to redefine power generation and utility services across the continent.

The Government of Ghana has a vision of powering the economy through a green transition to deliver clean energy, decarbonize, expand access in rural communities, and build resilience against climate variability.

At the centre of that transition is VRA, which has historically powered Ghana's industrialisation and has repositioned itself as a leader in sustainable energy deployment, innovation and community-focused electrification.

Diversified generation portfolio: a legacy of reliability and innovation

For over 60 years, VRA has been the cornerstone of Ghana's energy security and a pioneering force in West Africa's power sector. Our strength in power generation is anchored in our diverse portfolio – a testament to strategic foresight and engineering excellence.

From the iconic hydroelectric stations at Akosombo and Kpong, which together contribute 1,180MW of clean energy, thermal energy in excess of 1063MW and 37MW solar assets, the Authority has built a robust and flexible energy infrastructure. This ensures energy security, reduces carbon emissions and supports socio-economic development in the West African sub-region.

The Authority is also advancing its other generation capabilities through strategic projects to enhance efficiency, reduce fuel consumption and meet the evolving demands of consumers.

Our commitment to clean energy and renewable expansion

The VRA Renewable Energy journey began modestly with a 2.5MW solar plant in Navrongo in 2013. Today, the Authority generates 37MW from solar and is poised to scale up to nearly 200MW within the next two years, including a Floating Solar Photovoltaic (FPV) project on the Volta River. This climate-resilient infrastructure is a particularly smart fit for Ghana as it leverages existing water bodies, reduces evaporation and pairs naturally with hydropower for complementary dispatch.

In alignment with Ghana's green transition agenda, other clean energy options will be explored and designed to reduce reliance on fossil fuels, lower operational costs and position VRA as the leader in Africa's clean energy revolution.

- **Deploying solar infrastructure at scale – rooftop, ground-mounted and floating** VRA has moved beyond small pilot installations to larger solar investments. The Authority's portfolio already includes embedded solar sites and small plants such as Navrongo, and a pipeline project list of larger solar developments across many regions. By pursuing multiple solar formats (ground-mounted, rooftop and floating), VRA aims to expand clean energy supply while protecting the grid stability.
- **Mini-grids and rural electrification – bringing power to the periphery** Ghana now boasts of almost 90% electricity access. However, the commitment to leave no one behind inspired the decision to scale-up renewable energy to island communities.

With support of the World Bank and the Swiss Government, eight solar/wind energy mini-grids with a total capacity of 481,04kWp now provide 24-hour electricity to 630 households with over 5,000 people. VRA bridges the rural-urban divide, reducing reliance on diesel generators and unlocking economic opportunities in underserved areas.

Catalysing industry with VRA value-added services

Beyond power generation, VRA provides engineering consultancy services as a multifunctional business dimension, offering Value-Added Services that improve operational performance and efficiency, enhance compliance with regulatory requirements, and reduce operational costs. This initiative leverages long-serving expertise to support national development.

Our Value-Added Services (VAS) offer Environmental Impact Assessments (ESIAs), Energy and Water Usage Auditing, Safety Auditing, Technical and Management Training, Environmental Compliance Auditing and Specialised Equipment & Field Testing to clients.

Shaping capacity building and innovation in Africa's electricity business

The VRA Academy is the Authority's continental hub committed to training and knowledge development of the leaders who sustain Africa's energy industry.

As Africa embraces cleaner energy solutions, the VRA Academy takes a lead role in building renewable energy competencies. From solar integration and grid management to environmental sustainability, VRA prepares the continent's workforce for the energy transition. This inclusive approach makes VRA a trusted partner for capacity building across the continent.

Conclusion

VRA has positioned itself at the heart of Ghana's energy transition strategy. By combining the reliability and availability of hydropower with solar, wind, mini-grids and responsible environmental stewardship through forging partnerships that bring finance, technology and training, a new chapter of Ghana's sustainable and secure development is unfolding.

Ing. Edward Ekow Obeng-Kenzo

Chief Executive, Volta River Authority

Ing. Edward Ekow Obeng-Kenzo is the Chief Executive of the Volta River Authority (VRA). He is an accomplished Business Executive and Engineer with over two decades of experience in the power sector, specialising in strategic leadership, operations management and infrastructure development.

Under his leadership, VRA is embracing data-driven decision-making, investing in world-class training and fostering a culture of innovation and excellence. His message is clear: "The goal is to sustain the organisation as a leader in our industry, recognised for our excellence, innovation and customer-centric approach. With a business mindset, I am confident that we can achieve remarkable success and create long-term value for our stakeholders and boost economies."

He previously served as Deputy Chief Executive for Engineering and Operations at VRA, where he supervised key operational areas, including power generation and strategic projects. He managed over 2,500MW of hydro, thermal and solar power plants and led initiatives that improved efficiency and profitability, notably through a Thermal Operations and Maintenance Improvement Plan (2020-23).

During his tenure, VRA recorded significant achievements, including the successful dismantling, relocation and re-installation of an erstwhile 250MW Ameri Power Plant from Aboadze to Anwomaso, executed entirely by in-house engineers to enhance power quality in northern Ghana.

Obeng-Kenzo's earlier career includes his role as Director, Thermal Generation Business Unit, where he led the restructuring and performance turnaround of VRA's thermal operations, achieving record availability and reliability levels. He has also held positions including Operations Manager, Plant Manager and Project Manager for major expansion and modernisation projects such as the Tema 2 Thermal Power Station and the Takoradi Thermal Power Station Life Extension Programme, ensuring an additional 15 years of reliable plant operation.

He holds a Masters' in Public Administration from the Ghana Institute of Management and Public Administration and a Bachelor of Science in Mechanical Engineering from Kwame Nkrumah University of Science and Technology. He has completed an executive programme in decision-making and negotiations at the University of Chicago's Booth School of Business, as well as specialised training in power system economics, contract management, gas turbine operations and energy auditing. He has a certificate in Cultural Transformation in Corporate Governance from Anucana Business Company.

He is a Fellow of the Ghana Institution of Engineering (FGhIE) and has received commendable industry awards, including the 2024 Local Content Leadership Impact Award and Special Leadership Award – Energy Sector.

DIVERSIFYING OUR GENERATION PORTFOLIO FOR SUSTAINABLE POWER SUPPLY

The Volta River Authority (VRA) has since 1961, harnessed the resources of the Volta River to provide electrical energy for industrial, commercial and domestic use in Ghana as well as transportation, fishery and recreation.

Starting with a generation capacity of 588MW, the VRA now operates 2,547MW from its hydro, thermal and solar plants.

VRA continues to diversify its generation portfolio by exploring cleaner, cheaper and renewable sources of power generation such as wind and solar energy to sustain power supply.

VOLTA RIVER AUTHORITY

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Smart power innovation

Africa has a unique opportunity to lead in developing smart power solutions, leveraging modern technologies to reshape energy generation and consumption, while bypassing outdated infrastructure

Although Africa is catching up with much of the rest of the world when it comes to energy generation, this can be an advantage, enabling new systems and networks to be designed around future environmental stressors and energy demands, without the limitations of old infrastructure and legacy systems. The continent, therefore, has the chance to lead the way in smart power innovation.

Encouraging smart power solutions is seen as crucial because Africa currently has insufficient generation and transmission capacity. Among the opportunities in smart power are:energy storage, smart cities and buildings, data monetisation, and new ways of buying and selling power. As such, it is well placed to leapfrog the traditional model of centralised power generation and transmission to revolutionise the way in which energy is generated and consumed.

Energy storage

As renewable energy begins to provide a greater share of the power generated, ensuring that a system is flexible enough to cope with times when the sun doesn't shine or the wind doesn't blow –

SESA is creating 'Living Labs', to develop and test local energy access solutions (SESA)

Among the benefits of extending access to electricity is the creation of new opportunities to develop local economies (SESA)

or simply to match supply with demand at peak times – is becoming more important. Combining renewables production with storage systems offers the potential to optimise grid management by increasing demand-side management, adding storage, promoting regional interconnections and safeguarding the supply of reliable electricity during peak periods. It also enables the management of surplus energy production and reduces the costs associated with grid infrastructure to enable renewables to make up a greater share of energy generation.

One example of this in action is Smart Energy Solutions for Africa (SESA), a collaboration between the European Union and Ghana, Kenya, Malawi, Morocco, Namibia, Nigeria, Rwanda, South Africa and Tanzania. The project aims to provide energy access technologies and business models that are easily replicable and generate local opportunities for economic development and social cohesion in Africa. This is being facilitated through the creation of local 'Living Labs', which will develop scalable and replicable energy access innovations that can be tested, validated and later deployed throughout the continent. Solutions will include renewables, as well as energy storage systems such as second-life vehicle batteries, smart micro grids and rural internet access.

Other storage projects that are attracting attention include Malawi's Dwangwa power plant, which will combine 55MW of solar generation and 10MW of storage, with the finance arrangement mandate having been signed by Voltalia with the International Finance Corporation in 2023. Also, power utility Eskom launched the continent's largest battery energy storage system (BESS) at Worcester in South Africa's Western Cape, as part of its flagship project to strengthen the country's electricity grid. Phase 1 of the project adds 833MWh of storage capacity across eight sites and 2MW of solar PV, with the Worcester site alone capable of storing 100MWh – enough to power a town for five hours.

South Africa is already home to the Drakensberg Pumped Storage Scheme, which enables up to 27.6GWh of electricity to be stored in the form of 27 million m^3 of water. Another South African storage initiative is Bokport CSP, a greenfield Independent Power Project. According to ACWA Power, which leads the development consortium, the concentrated solar power thermal energy plant is equipped with the largest thermal storage capacity ever adopted for a similar operational size, providing nine hours of storage. And in Morocco, the Noor Ouarzazate Solar Power Complex can store up to three hours of electrical energy.

Smart thinking

The development of smart cities is also contributing to Africa's energy story. In Kigali Innovation City in Rwanda, smart sensors measure air quality, monitor power grid safety and detect water leaks. In Kenya, the Konza Technopolis is being built from scratch with the aim of being a world-class technology hub, powered by a thriving information, communications and technology (ICT) sector, with superior, reliable infrastructure and business-friendly governance systems.

Konza's development authority says it is on course to deliver sustainable energy solutions to power the city's commercial and residential

usage. The digital infrastructure being installed will help provide information on energy and water consumption, enabling residents to practise more sustainable living.

In South Africa, technologies such as Internet of Things (IoT) and sensors are being used to collect real-time data from water and electricity meters in the city of Cape Town to help meet demand. And in Nigeria, Eko Atlantic is being built as a self-sufficient and sustainable coastal city of green buildings and advanced telecommunications with the capacity to supply itself with clean water and generate its own electricity.

Africa is also making headway in the smart buildings sector. In Morocco, a project dedicated to experimentation, training and research in green buildings, energy efficiency and smart grids was launched in February 2023. According to the Mohammed VI Polytechnic University (UM6P), one of the project partners, this scheme aims to contribute to the creation of the Moroccan and African sustainable city of the future through the development of low-carbon construction materials, the integration of renewable energy and the digitalisation of the buildings and electrical grids.

Advancing through innovation

Many stakeholders are keen for Africa to piggyback on the advances in the continent's mobile technology and to use the lack of existing electricity transmission infrastructure as a strength, creating opportunities for communities to leapfrog the traditional model of centralised power generation and transmission. Countries such as Kenya, with its M-PESA mobile app for payments, have a history of success in large-scale technological innovations that boost inclusion and connectivity by eschewing traditional infrastructure, and this is an approach that could benefit many parts of the continent if it is adopted for the energy sector.

The pay-as-you-go (PAYG) business model that has already been used so successfully in the digital telecoms and mobile banking worlds is creating new business opportunities for innovators, entrepreneurs and incumbents in the continent's energy sector. According to the International Renewable Energy Agency's (IRENA's) 'Pay-As-You-Go Models – Innovation Landscape Brief' report, PAYG can provide affordable energy access from renewable sources to off-grid communities, using available technologies to facilitate payment by instalments.

Although mainly used for solar energy (such as in M-KOPA or Kenya's Solar Run), IRENA says that the PAYG model can also be used to deliver electricity from other renewable energy sources such as biomass. It says the core components of a solar home system based on the PAYG business model are: a solar PV power plant; a battery storage system (optional); a mobile payment system; ICT that provides information on charge left in batteries, weather forecasts and payment reminders; and power-consuming appliances, such as LED bulbs or mobile phones.

PayGo Solar provides lighting, phone charging, TV and radio with an innovative service that users can top up with payments as required (AZURI)

Variations on PAYG include the lease-to-own model, which involves customers paying for the entire generation capacity in instalments over a period of one to three years. Another approach is the usage-based payment model, also known as the micro utility model, in which customers prepay for the electricity supply in kilowatt hours.

Pay-as-you-go in action

Azuri is one of the leading players in Africa's PAYG market. Its PayGo Solar system combines solar and mobile technology to provide emission-free lighting each day and enough power to charge mobile phones. The company claims that its innovation learns and adjusts to a home's energy needs. Users pay a small one-time installation fee and then top up their unit by buying a scratchcard or using an integrated mobile money service. The company says that, since 2012, it has delivered more than 150,000 solar home systems on a commercial basis to customers in 12 countries across sub-Saharan Africa.

Just as Africa led the way with mobile payments, the continent could be in pole position to set the agenda in smart power innovation. One of the next steps will be to create an enabling regulatory environment, and governments and regulators across Africa are keen to show that they are ready to grasp the nettle and deliver what is required. For example, South Africa published proposals to reform the country's energy generation licensing regime in 2022. The continent-wide challenge remains for all states to continue taking steps that will enable further smart power development to close the energy divide. ●

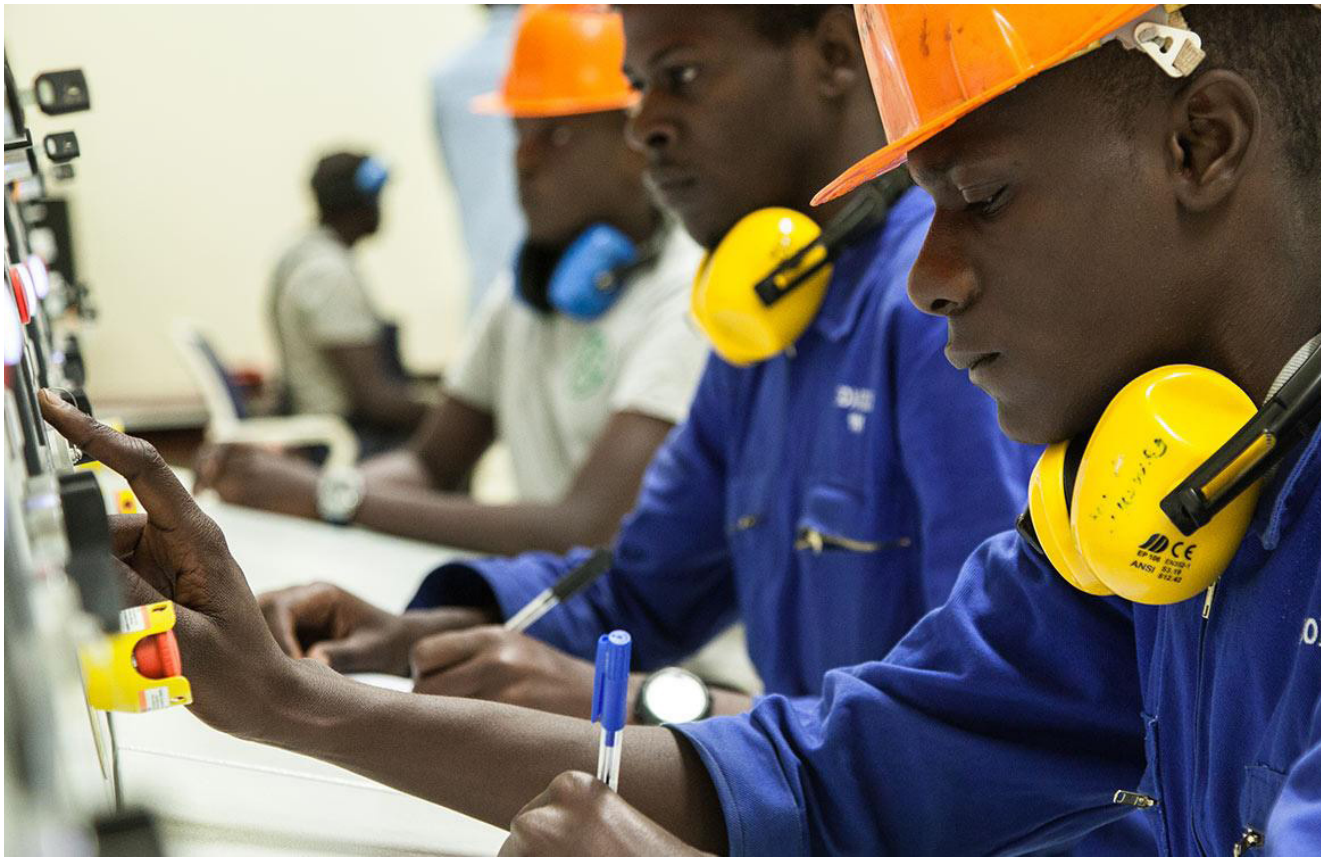
Improving the performance of power utilities

Launched in 2015. the African Network of Centres of Excellence of Electricity (ANCEE) is leading the way in developing the skills and techniques that will be crucial to ensuring the success of a modern energy sector across the continent

The success of sustainable energy will be reliant on people with the right skills (SHUTTERSTOCK/ SERHII)

The shift towards sustainable energy systems on a global scale is rapidly picking up momentum, propelled by the continuous decline in renewable energy costs and performance improvements. This transition creates vast opportunities to revolutionise and update energy systems worldwide.

African nations, which are endowed with abundant renewable resources, stand to benefit significantly from this change, particularly in terms of developing a robust and affordable low-carbon energy system, while ensuring universal access to electricity. However, they can only do so with suitably trained people in place to help harness these natural resources and drive



Raining the skill levels of staff through formal qualifications is a central aim of the initiative (FÉLIX VIGNÉ/IMAGEO/AFD)

the creative change needed. This means implementing a training programme that will ensure skills are developed across the board, ensuring the best chance of success.

The African Network of Centres of Excellence of Electricity (ANCEE) is an initiative aimed at improving the performance of the power sector in Africa. With support from the Agence Française de Développement and the African Development Fund of the African Development Bank Group, ANCEE seeks to intensify regional trade and strengthen technical and managerial skills across the continent.

Strategic objectives

ANCEE's key strategic objectives are to increase the performance of African power utilities, make the sector more attractive to investors, and achieve a better quality of electricity supply and services. The areas of intervention include:

- More and better training for utility staff
- Subsidising the training of the most fragile utilities
- Improving the training offering of Centres of Excellence
- Expanding the network with more training centres
- Promoting gender equality
- Increasing the use of renewable energy and the energy transition
- Supporting power utilities in assessing their training needs
- Financing feasibility studies and building training capacity

One of the main challenges facing the power sector in Africa is the lack of qualified human resources. There is a need to increase the qualification level of staff in the sector through training, and ANCEE seeks to address this issue. The initiative aims to improve the technical and managerial capacities of those working in power utilities, thus enabling them to provide a better quality of electricity supply and services.

Training plays a critical role in improving the performance of power utilities in Africa. By providing training and development opportunities, power utilities can improve the skills and knowledge of their staff, enabling them to operate, maintain and manage power systems more effectively. This, in turn, can lead to a better quality of electricity supply and services, increased operational efficiency and cost-effectiveness, and enhanced regulatory compliance.

Attracting and retaining talent

Further to this, training can also help to attract and retain talented individuals within the energy sector, by creating opportunities for professional development and career advancement. This can help to build a highly skilled and motivated workforce that is equipped to meet the challenges of an evolving energy landscape.

Finally, with the development of training centres with state-of-the-art equipment and facilities and diversified and complementary expertise, ANCEE can build a sustainable pipeline of highly skilled, qualified professionals to support the growth and modernisation of the power sector. This can help to

"A well-trained and skilled workforce can help to create a more resilient and sustainable power sector"

bridge the skills gap and ensure that Africa has the necessary human capital to achieve its energy goals, while also promoting local job creation.

ANCEE seeks to improve the training offering of its Centres of Excellence, and to expand the network with more training centres to meet this need. This will help to ensure that training is available to a larger number of people across the continent and that it is of consistently high quality.

Diversity and inclusion

Promoting gender equality is another important area of intervention for ANCEE. Its initiative seeks to promote the professional development of women in the electrical industry. This will help to address the gender imbalance in the sector, and ensure that women are given equal opportunities to advance their careers. Studies have shown that more diversity in the workplace can have significant benefits, including improvement of personal growth, innovation and creativity, and this is a benefit that ANCEE is looking to embrace.

Attracting necessary investment

Better training in the African power sector can attract investors by creating a more skilled workforce and improving the performance of power utilities. Investors are attracted to well-performing power utilities with efficient systems and well-trained staff who can deliver reliable and quality electricity services.

If African power utilities are able to demonstrate their ability to deliver sustainable and efficient energy services through the skills and knowledge gained from training, this will result in increased investor confidence. Additionally, a more attractive investment climate can be generated by promoting gender equality, increasing the use of renewable energy, and supporting power utilities in assessing their training needs.

Ultimately, a well-trained and skilled workforce can help to create a more resilient and sustainable power sector that is better able to meet the needs of investors, consumers and society as a whole. This is the end goal for ANCEE and one it is working hard to meet. ●

Another of ANCEE's aims is to realise the proven benefits of a diverse workforce, inlcuding promoting gender equality (SHUTTERSTOCK/ WIRESTOCK CREATORS)

Powering Zambia's transformation and Africa's energy future

For over half a century, ZESCO Limited has been at the heart of Zambia's and the Southern Africa regional bloc's economic and social transformation. As the country's largest power utility, ZESCO has not only electrified industries and communities, but has also become a key player in regional power trade and Africa's energy transition. Today, as the Association of Power Utilities of Africa (APUA) marks 55 years, ZESCO's story stands as a testament to resilience, reform and a bold vision for the future.

A strategy anchored in national vision

ZESCO's 10-Year Rolling Strategy (2022-31) is closely aligned with Zambia's Eighth National Development Plan (8NDP), Vision 2030, the National Energy Policy (2019), and the Integrated Resource Plan (IRP). One notable objective of this strategy, which ties in with the 2025 APUA theme "Energy Transition Challenges", is to improve how electricity is generated, transmitted and distributed, while also expanding into cleaner and renewable energy sources.

One key goal of this strategy, which ties in with APUA's "Energy Transition Challenges" theme, is to improve how electricity is generated, transmitted, and distributed, while also expanding into cleaner and renewable energy sources like solar, wind, and hydro.

To address the various challenges, the Government of the Republic of Zambia operationalised the Electricity Open Access framework in 2024 to promote competition and encourage private investment in the energy sector. this policy reform has attracted over 9,000MW in signed Power Purchase Agreements (PPAs) between ZESCO and Independent Power Producers (IPPs) as of second quarter of 2025.

Expanding Zambia's energy mix

ZESCO is pursuing one of the most ambitious expansion programmes in Africa, targeting 2,656MW of new capacity by the end of 2026.

Key projects and initiatives supporting the energy transition agenda

SPECIFIC OBJECTIVE	PERFORMANCE
To enhance the national energy mix to achieve surplus and security of supply	» Rooftop Solar Solutions: 345 MW targeting 10% of ZESCO's current customer base (130,000) through ZESCO subsidiary, Kiyona Energy Limited » Green Cities Initiative: - A cumulative capacity of 57 MW covering 15 towns across the country » Presidential Solar Initiative: - A targeted capacity of 400 MW, covering critical public institutions and services, including the water pumping stations, first level hospitals, clinics and higher learning institutions. 62 MW of the target capacity is already under signed PPAs » Microgeneration: 270 MW PPAs signed with 24 individual Developers » ZESCO Solar PV Projects: • Chisamba Phase 1 – 100 MW: Commissioned in June 2025 • Chisamba Phase 2 – 100 MW: Contractor on site • Kariba Phase 1 – 100 MW (of 200MW): Preliminary studies being undertaken • Kafue Gorge Lower Phase 1 – 100 MW (of 200MW): Preliminary studies underway • Mansa 50 MW – 56% progress as at August 2025 (COD December 2025) • Mumbwa 50 MW • Kasupe Phase 1 – 7.5 MW (of 15MW): Contractor mobilised to site
To increase transmission network power transfer capacity, access and security	» On-going projects towards planned target of 1,000 MW and 960 MVA (Transformer) capacities: • Kabwe-Pensulo Line 2: Completed • New 330kV, 1400 MVA Lusaka West–Kabwe Transmission Line: To increase transmission capacity on the central corridor to support mining, agriculture and SAPP power trading. EPC contract executed • New 330kV, 1400 MVA Kafue West–Muzuma line: To enhance power evacuation from new power stations to be set up in Sinazongwe and Livingstone.
To increase the distribution networks' power transfer capacity, access and security	» Strategic Plan Target of 520 MVA: • 619 MVA from ongoing projects under rehabilitation and re-enforcement • Connection of Chadiza to the national grid • Lusaka Transmission Distribution Rehabilitation Project progress at 87%
To increase interconnector capacity	• Zambia–Tanzania: To enable and enhance electricity trade between Southern Africa Power Pool (SAPP) and Eastern Africa Power Pool (EAPP) member countries. • Mozambique–Zambia • ZIZABONA (Zimbabwe-Zambia-Botswana-Namibia) • Zambia–Malawi • Angola–Zambia Interconnector
Strengthen partnerships	» Exploring Joint Ventures, PPP SPVs as business models: • JV: ANZANA distribution network in the Lobito Corridor • Circle 5,000 MW in signed PPAs with various IPPs • Solar Century: 25 MW Mailo solar PV commissioned; 35 MW under construction • JV: JIGSCO (with JIGSAW) 100 MW solar PV in Siavonga and Kafue Gorge Lower

The 8NDP sets out a blueprint for economic transformation, job creation, industrial growth, and environmental sustainability. ZESCO has embedded these aspirations into its other four strategic pillars:

- **Expanded infrastructure:** Scaling up generation, transmission, and distribution
- **Customer satisfaction:** Enhancing service delivery, digital engagement, and stakeholder confidence.
- **Financial sustainability:** Building a stable, efficient and profitable utility.
- **Effective maintenance:** Ensuring reliability and operational excellence.
- **Optimised human capital:** Investing in skills development and workforce alignment.

Together, these pillars define ZESCO's vision to be an effective provider of reliable and environmentally sustainable electricity services to all customers by 2031.

Milestones in reform and growth

ZESCO has delivered tangible progress across key areas:

- **Debt reduction and financial reforms:** Reduced IPP debt from USD 1.8 billion in 2021 to USD 262 million by June 2025. Secured a Multi-Year Tariff Framework and introduced innovative premium power contracts to strengthen cashflows.
- **Customer-centric innovation:** Deployed 9,400+ smart meters, simplified new connections, and rolled out Faults Rapid Response Teams. Over 800 customers registered for net metering, with digital platforms (ZESCO App, USSD codes, online reporting) expanding access.
- **Operational efficiency:** Cut rental costs by over USD 34,800 annually, streamlined the maintenance structure, and introduced automation in employee services.
- **Loss reduction:** Transmission losses dropped from 7.88% in 2024 to 4.42% by Q1 2025, meeting regulatory benchmarks.
- **Human capital development:** More than 730 employees have undertaken professional training since 2022, enhancing institutional capacity.

Innovation and sustainability

ZESCO recognises that sustainability and innovation are central to Africa's future. Its initiatives in this sphere include:

- Welding and securing transformers to curb vandalism and improve supply reliability.
- Advanced smart systems for real-time customer experience monitoring.
- Community sensitisation campaigns on energy conservation and infrastructure security.
- Public-private partnerships and joint ventures in new generation build and grid extension.
- In-house development of software and solutions, including for vandalism and theft deterrence.

These innovations reinforce ZESCO's role, not only as the national utility but also as a regional energy leader.

Looking ahead

With a clear mission of innovation, excellent service and sustainable energy solutions, ZESCO is building a future of reliable power, regional interconnectivity, and clean energy growth. Its 10-Year Plan is not just about meeting Zambia's demand but is intentional about positioning the country as a power hub for Southern Africa.

As APUA celebrates 55 years of collaboration and progress, ZESCO proudly shares its story: a utility in reform, expansion and transformation, powering Africa's future, one milestone at a time.

ZESCO

West African Power Pool

Abdoulaye Dia
Secretary General, West African Power Pool (WAPP)

Le West African Power Pool (WAPP) est une institution spécialisée de la Communauté Économique des États de l'Afrique de l'Ouest (CEDEAO), créée en 1999 pour promouvoir l'intégration régionale dans le secteur de l'énergie et garantir un approvisionnement fiable et abordable en électricité aux populations de l'Afrique de l'Ouest. Son siège est situé à Cotonou, en République du Bénin. Le WAPP regroupe 53 (confirmation du nombre avec le légal) sociétés publiques et privées, unies dans la construction d'un marché régional unifié de l'électricité.

Depuis sa création, le WAPP s'est engagé avec détermination dans le développement d'infrastructures régionales, l'harmonisation des cadres réglementaires et le renforcement des échanges transfrontaliers d'électricité. Aujourd'hui, ses projets occupent une place centrale dans la vision d'un écosystème énergétique ouest-africain interconnecté, résilient et durable.

En décembre 2024, le WAPP a accueilli son nouveau Secrétaire Général, Monsieur Abdoulaye DIA, expert chevronné du secteur électrique africain, reconnu pour son engagement en faveur du développement régional et de la coopération internationale . Sous sa direction, l'institution entre dans une nouvelle phase stratégique, axée sur l'accélération de la deuxième phase du Marché Régional de l'Électricité de la CEDEAO, l'intensification des projets d'interconnexion et le renforcement des capacités opérationnelles aux niveaux national et régional.

Fort de ce nouveau leadership et d'une vision stratégique affirmée, le WAPP consolide son rôle de pilier de l'intégration énergétique en Afrique de l'Ouest. Ses priorités portent sur le lancement de la phase concurrentielle du Marché Régional de l'Électricité, la consolidation des infrastructures clés d'interconnexion, la synchronisation en un seul réseau des 14 pays de la CEDEAO et l'amélioration du cadre réglementaire et technique pour faciliter les échanges transfrontaliers d'électricité. Ces efforts sont essentiels pour libérer le potentiel énergétique de la région, garantir la sécurité énergétique et générer des bénéfices concrets pour les populations des États membres de la CEDEAO. ●

Transmission and distribution

The modernisation of sub-Saharan Africa's transmission and distribution infrastructure presents a pivotal challenge, but also an opportunity. The integration of smart grids, automated metering and digital technologies offers a transformative path forward

While Africa's energy demand is set to expand rapidly, its grid infrastructure is outdated in many places, leading to inefficiencies, high losses and limited range, particularly in rural areas. Grid modernisation is essential not only for expanding access, but also for integrating renewable energy sources and enhancing overall system reliability.

Smart grids are transforming the way electricity is delivered, monitored and managed across sub-Saharan Africa. These digitally enabled networks employ advanced sensors, meters and communication technologies to collect and analyse real-time data across the electricity supply chain – from generation through transmission and distribution to end-user consumption. This integrated intelligence allows utilities to respond instantly to changes in demand or system faults, reduce outages and better manage the integration of variable renewable energy sources, such as solar and wind.

For a continent where many national grids are under strain, smart grids offer a compelling solution. They can reduce technical and

The benefits of smart grids include the reduction of transmission losses (SHUTTERSTOCK/URBANS)

Grid modernisation is enhancing service quality and reliability (SHUTTERSTOCK/ JOSE LUIS STEPHENS)

non-technical losses, which in many African countries exceed 20%, compared to the global average of under 10%. With automation and predictive analytics, utilities can pinpoint faults remotely, send out repair crews faster and even prevent failures before they occur. Smart grids also support time-of-use pricing, helping utilities manage peak loads and providing consumers with the incentive to shift energy usage to off-peak periods.

In Nigeria, several companies are piloting smart grid systems. Ikeja Electric has launched a 'Smart City' initiative, which includes the deployment of automated distribution management systems and geographic information systems for improved asset tracking and fault detection. In East Africa, Kenya Power is working on a grid modernisation roadmap, integrating automated substation control systems and distribution automation to enhance service quality and grid reliability.

Rwanda has adopted a national smart grid strategy, which includes steps to digitise the grid, improve demand-side management and scale-up distributed energy integration. The government has partnered with Japan International Cooperation Agency and the World Bank to roll out smart grid pilots in key urban and suburban areas. These pilots aim to improve load forecasting and enhance grid resilience in anticipation of increased renewable energy penetration.

Smart Grid Knowledge Hub

On a regional scale, the Smart Grid Knowledge Hub for Africa, launched in 2023 under the African Union Development Agency, is helping to standardise practices, train engineers and spread knowledge among utilities and energy regulators. Its goal is to accelerate smart-grid adoption through shared learning and regional cooperation.

Further driving this momentum is the growing presence of international partners and technology firms. The likes of Siemens, ABB, GE Vernova and Schneider Electric are increasingly active in providing technical support and deploying smart-grid solutions across Africa. These partnerships not only bring investment and expertise, but also help to pass on essential skills to local professionals, which will be crucial to the long-term success of smart infrastructure.

Alongside smart grids, automated metering infrastructure is fast becoming a key element of energy-sector reform in sub-Saharan Africa. By enabling real-time, two-way communication between utilities and consumers, automated metering is leading to improved transparency, billing accuracy, energy usage monitoring and theft detection. This makes it a critical tool in reducing both technical and commercial losses.

Problems associated with traditional metering systems – such as inaccurate billing, illegal connections and the need for manual readings – are among the issues being addressed by the advent of automated metering. The new technology provides detailed consumption data, allowing utilities to identify discrepancies promptly and to disconnect or reconnect services remotely. Furthermore, consumers benefit from being able to monitor their energy usage, promoting more efficient consumption habits.

Smart meter roll-out

The Electricity Company of Ghana is among those leading the way in automated metering with its ambitious rollout of smart meters to enhance both service delivery and revenue collection. The Ghanaian government recently announced plans to install one million smart meters, supported by the Millennium Development Authority under the Ghana Power Compact, in urban and suburban areas.

Kenya Power has initiated a similar project that targets high-demand consumers, such as commercial and industrial entities, with the aim of reducing power losses and increasing billing efficiency. Thousands of smart meters have already been installed across Kenya, and the utility is working with partners such as the World Bank to extend the initiative to cover smaller energy consumers and rural areas.

In Cameroon, the city of Douala implemented a successful pilot project in 2023 that saw smart meters deployed across nine municipal facilities. The project, supported by the Local Climate Adaptive Living Facility and the United Nations Capital Development Fund, enabled real-time monitoring of energy consumption, providing actionable data to improve energy efficiency and reduce municipal energy costs (COMSSA).

Utilities across Southern Africa are also seeing the benefits of automated metering infrastructure. In South Africa, Eskom is conducting pilot projects in municipalities including Buffalo City and Nelson Mandela Bay, to replace outdated prepaid meters. The new smart meters are integrated with Eskom's central system, allowing for improved forecasting, revenue collection and fault resolution.

Importantly, the integration of automated metering with mobile and digital payment systems has further enhanced its effectiveness. In Tanzania and Uganda, where mobile money adoption is high, smart meters enable seamless, remote bill payment, while smart meters integrated with the Rwanda Energy Group's billing system now allow for instant top-ups. ●

Transforming Africa's Power Sector: An Interview with Beacon Power Services CEO Bim Adisa

Beacon Power Services (BPS) tackles Africa's electricity challenges with data-driven solutions for utilities. We spoke with their CEO and Founder, Bim Adisa, about their journey, impact, and vision for transforming power across the continent.

BPS was established in 2011 in Nigeria to provide innovative digital solutions for the African power sector. Since 2017, BPS has developed solutions dedicated to electricity utilities, with a focus on improving distribution. BPS is active in Nigeria, Ghana, Tanzania, Togo, Zambia, Madagascar, and Gabon, helping Africa's Utilities drive revenue & reduce losses.


Bim Adisa

"Our technology doesn't just digitize; it transforms operations from being reactive to proactive."

Having worked in various African countries, what do you think are the most pressing challenges utilities are facing today?

Having seen firsthand the inefficiencies in Africa's electricity distribution, I realized that despite rising power demand, similar challenges exist across various countries. Utilities struggle with poor grid visibility, high technical and commercial losses, and outdated customer management systems. Many utilities struggle to detect energy theft, predict asset failures, or accurately locate customers. These issues result in considerable revenue loss and unreliable service, complicating growth and investment opportunities.

I identified significant gaps: the lack of real-time data and innovative tools to enhance operations, as well as insufficient investment capacity to improve the distribution network.

How is Beacon Power Services tackling these issues? Can you tell us about your main approach?

Absolutely! We offer a range of innovative software solutions, with three distinct products: CAIMS, ADORA, and XEPP.

CAIMS creates a digital twin of the grid, integrating Geographic Information Systems (GIS) to maintain an up-to-date database of all customers and electrical assets.

ADORA enables utilities to monitor electricity flow, detect faults, manage the billing lifecycle for all customers, and process customer data in real-time.

XEPP is a user-friendly mobile app that enables users to digitize utility services, functioning like a digital branch. It also offers customers tools to monitor their energy consumption and explore clean energy options to supplement their energy sources.

What sets us apart is our "local" strategy; we create solutions by Africans for Africans, ensuring they are relevant to the specific needs of our markets and adopted quickly. Our technology doesn't just digitize; it transforms operations from being reactive to proactive.

Can you share a specific success story that demonstrates your impact?

Sure. We worked with a major utility that was losing over 40% of its distributed energy. Within a year of implementing our solutions, they reduced losses by 18%, improved billing accuracy by 25%, and added over 100,000 previously unregistered customers to their database. This resulted in a $42 million increase in annual revenue. More than the numbers, it rebuilt trust between the utility and its customers, showing that data-driven change is achievable.

What kind of efficiency improvements and revenue gains do your clients typically see?

Our clients typically see a 15-30% reduction in energy losses and a 40% boost in billing efficiency. Revenue gains can vary, but we usually observe an increase of 60% to 100% of annual revenue. Our key differentiator is that we help our clients maintain this revenue growth over the years.

What is your commercial approach with utilities?

We like to start with a proof of concept to demonstrate the efficiency of our solutions and get a detailed understanding of our clients' challenges. Once done, we invest significantly in our client distribution network, acquiring, installing, and financing smart meters to digitize operations, ensuring real-time data to improve operations and revenue collection, notably.

Looking at the utilities reading this, what should they know about partnering with you?

We aren't just a vendor; we become a strategic partner. From onboarding to deployment, our dedicated product specialists collaborate with utilities from their offices to ensure effective use of our solutions and gather feedback for improvements. We also offer training, support, and customized solutions tailored to your needs. We prioritize long-term success over quick fixes. Operating in Nigeria, Ghana, Zambia, Togo, Tanzania, Madagascar, Gabon, and more, we adapt to each market's unique needs.

What's your vision for Africa's power sector, and how is Beacon Power Services driving that transformation?

We envision an Africa with reliable electricity and utilities that operate with complete transparency and efficiency. By the end of 2026, we aim to help increase energy access by 30% across our markets. Beacon Power Services is leading this effort by digitizing grids, empowering utilities, and demonstrating that with the right tools, Africa's power sector can be sustainable and inclusive. For utilities ready to improve, we're here to help make that change happen.

Our Impact in Numbers

We empower Africa's power sector with sustainable and efficient solutions, leveraging data-driven technologies to unlock its full potential.

$600M+
in annual revenue growth achieved across our client base

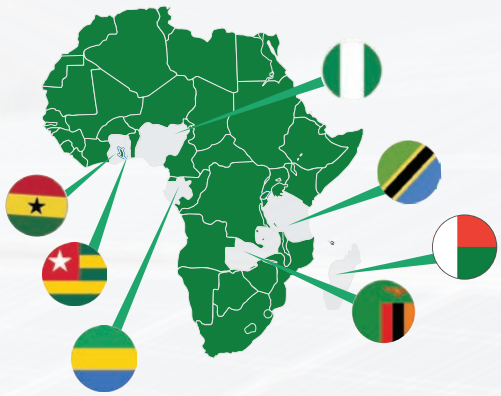
94.5M
Customers and businesses impacted

2M+
customer payments processed every month

4.96M
Grid nodes connected

3.71B
Grid data and transaction points processed

7M+
customer and assets physically tagged



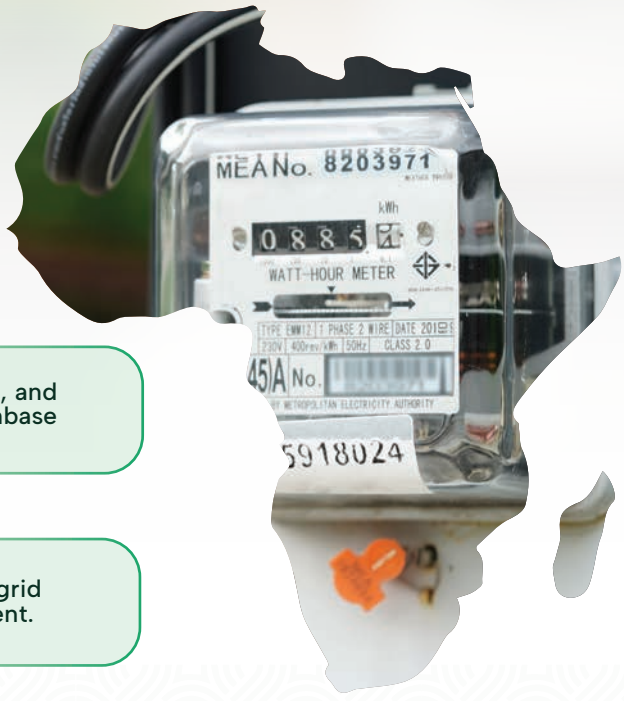
12 active utility clients in Nigeria, Ghana, Zambia, Togo, Tanzania, Madagascar, and Gabon

Our Solutions

We offer three innovative modular solutions to increase revenue and reduce losses.
These include CAIMS, a digital network twin and customer & asset database (CRM); Adora, which offers utilities real-time grid network management and visibility; and Xepp, our direct-to-customer mobile app designed to enhance customer engagement for utilities.

CAIMS –Digital Asset & Customer Mapping

GIS enabled data platform that transforms/digitizes the management of customer and asset information.



What it does

BPS conducts physical verification of every customer, building, and asset while also mapping the network, creating a central database and digital twin of the grid.

CAIMS solves data problem

Creating a comprehensive, accurate digital database of all grid components — the foundation for effective network management.

BEACON
POWER SERVICES

ADORA – Real-Time Grid Visibility

Modular grid management (smart grid) solution that provides real-time network management.

What it does

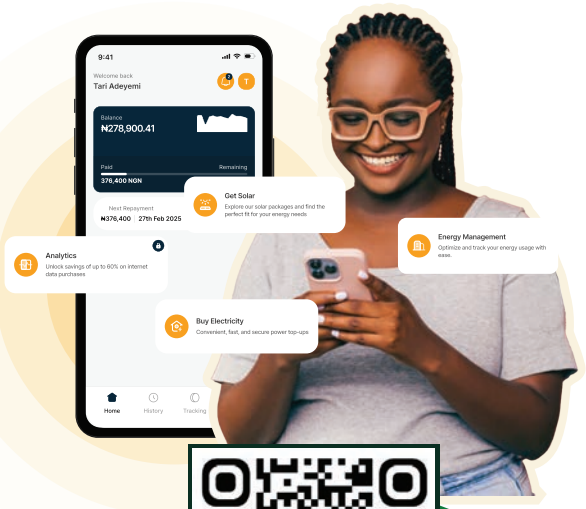
Connects to smart meters and measures energy flow at source (box supply point), feeders, transformers, and customers to provide real-time grid visibility (both technical & commercial).

ADORA solves network management problem

Provides real-time energy accounting, localizes grid losses, live outage data & location, plus predictive maintenance to pre-empt outages.

XEPP – Energy Intelligence, Pay for electricity & Get Solar – All in One App

Xepp is an all-in-one app that enables utilities to interact with their customers digitally. It allows users to track their energy usage, pay bills, and easily access clean energy options. It makes energy management easier for both individuals and businesses.



Benefits

- For the utility, it provides a modern, digital, and reliable tool to interact with its customers.
- For the customer, it simplifies their lives and helps manage their electricity sources more efficiently.

CONTACT US

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or visit www.bpsafrica.com

Extending rural electrification

Although there has been notable progress in expanding electricity access across the continent, a significant disparity persists between urban and rural areas. Recent advances in off-grid solutions offer methods of bridging this gap

Off-grid solar is one of the solutions for bringing power to rural locations (SHUTTERSTOCK/ TOLU OWOEYE)

Expanding the central power grid to remote rural areas in sub-Saharan Africa often proves economically unfeasible, due to vast distances and low population densities. Consequently, decentralised energy solutions, particularly off-grid renewable energy systems, have emerged as practical alternatives to traditional grid expansion. These systems – including solar home systems, mini-grids and pico-photovoltaic devices – offer scalable and cost-effective means to provide electricity access to underserved communities.

According to the International Renewable Energy Agency (IRENA), off-grid renewable energy solutions have become lifelines for remote communities benefitting 155 million people in 2023 alone. The World Bank also highlights the potential of off-grid solar as the most cost-effective way to bring power to the 41% of people globally living without energy access. Between 2020 and 2022, off-grid solar provided 55% of the new connections in sub-Saharan Africa, where over 80% of the unelectrified population resides.

In Zambia, the government has set an ambitious target to have at least 200 solar mini-grids operational by 2030. Similarly, the CREDIT project is deploying the same technology in rural communities across Kenya, Malawi and Zambia to address challenges such as high energy costs and limited community involvement.

Private-sector initiatives have also played a significant role in advancing off-grid solutions. Companies like M-KOPA, Bboxx and d.light have built thriving businesses around providing off-grid solar to households and small enterprises.

For instance, d.light has brought clean power to 30 million homes in 72 countries, offering pay-as-you-go services. Bboxx, which serves 3.6 million people across Africa, leverages new telecoms technologies and mobile banking to offer affordable daily payments for solar power, batteries and other services.

These off-grid solutions not only provide electricity, but also enable productive uses that drive economic growth. In Mali, the village of Karan has seen significant improvements in electricity access through a new solar power plant managed by the startup WeLight. This development has spurred economic activities such as video-gaming centres and retail stores, as well as drastically reducing operating costs for local businesses.

Despite these advancements, challenges remain. High upfront costs, supply-chain constraints, limited technical expertise and consumer resistance have slowed adoption in some markets. Additionally, concerns over data privacy and the need for robust cybersecurity frameworks to protect metering infrastructure need to be addressed.

To overcome these barriers, many governments are partnering with international development agencies and technology providers. The World Bank, AFD and African Development Bank have supported metering upgrades in several African countries, often as part of broader electrification and utility reform projects. Meanwhile, private-sector players are offering tailored automated metering solutions suited to African grid conditions and markets.

As the demand for electricity grows and the grid becomes more decentralised, smart metering will become increasingly central to Africa's energy transition. It provides the data foundation needed for demand-side management, grid planning, and customer engagement – all critical elements in building a sustainable, responsive power system.

Promoting productive uses of electricity

Beyond lighting homes and powering basic appliances, electricity access in rural sub-Saharan Africa can be a powerful catalyst for economic development. The concept of productive use of electricity (PUE) refers to the application of electrical energy for activities that enhance income generation, productivity and overall economic well-being. Integrating PUE into rural electrification strategies not only boosts the financial viability of energy projects, but also fosters sustainable development by stimulating local economies.

A comprehensive report by the World Bank outlines five critical building blocks for promoting PUE: strategic planning, supportive regulation, accessible financing, appropriate technology and robust market and business development support. These elements collectively create an ecosystem in which micro, small and medium-sized enterprises can thrive.World Bank

Real-world examples illustrate the transformative impact of PUE. A study examining 17 mini-grids in Nigeria revealed that those with a higher proportion of PUE customers experienced a reduction in electricity production costs by up to 25%, compared with grids that are serving predominantly residential users. This cost efficiency benefits not only the operators but also the end-users, as savings can be passed on through lower tariffs.

Meanwhile, in Tanzania's Bulongwa region, a mini-hydropower project has facilitated the growth of local industries, including maize milling and carpentry workshops. This access to reliable electricity has not only improved productivity, but also enhanced the quality of life for residents by enabling better healthcare and education services.

Challenges and the path forward

Despite the progress made, various challenges continue to hamper efforts to expand rural electrification. Financing remains a major obstacle; although off-grid and mini-grid solutions have become more cost-effective, the upfront investment required is still beyond the reach of many communities and local entrepreneurs.

Access to affordable credit and innovative financing mechanisms, such as results-based financing and blended finance models, are critical to scaling rural energy projects. Another significant challenge is the lack of supportive regulatory frameworks in many countries, which can deter private-sector participation and slow the deployment of new technologies.

Technical and operational issues also persist. Supply chains for renewable energy equipment are often underdeveloped, leading to delays and higher costs, while a shortage of skilled technicians limits the installation, maintenance and operation of off-grid systems. Moreover, the integration of PUE is in its early stages in many rural areas, partly due to limited awareness among communities and the absence of business development support services. ●

Electricity access can be a major factor in boosting rural economic development (WELIGHT)

Delivering sustainable energy for all

Progress towards a sustainable energy future for all Africans will rely on financing for major infrastructure developments and a new approach to reducing energy consumption across the continent

Wind turbines at the Oya Hybrid Power Station, near Matjiesfontein in South Africa (OYA ENERGY)

Africa stands at a pivotal juncture in its energy journey. While the continent derives approximately 70% of its energy consumption from renewable sources – primarily traditional biomass like wood and charcoal – this reliance illustrates both a strength and a challenge. On one hand, Africa is a global leader in renewable energy usage; on the other, the inefficiency of traditional biomass contributes to high energy intensity, with Africa requiring twice as much energy as Europe to produce a single dollar of GDP.

Despite these challenges, progress is evident. Between 2010 and 2012, annual energy savings across the continent equalled Ethiopia's annual consumption, with South Africa accounting for about half of these savings, particularly through advancements in the transportation sector.

To address the pressing need for sustainable energy, Africa is witnessing a surge in major energy projects, supported by innovative financing models. Initiatives such as Mission 300 emphasise the importance of alternative financing mechanisms such as pension funds and public-private partnerships (PPPs).

US government-led Power Africa has been instrumental in mobilising private investment across the continent. Since its inception in 2013, it has facilitated over $26 billion in investments, contributing to 164 energy projects that have added approximately 15,498 MW of power-generation capacity. The initiative's focus on public-private partnerships and technical assistance has been pivotal in enhancing energy security and economic growth.

Innovative financing models are also emerging to support Africa's energy transition. The Revego Africa Energy Fund aggregates operational renewable energy assets to attract institutional investors seeking stable, inflation-linked returns. This model reduces risks associated with individual projects and provides a scalable platform for financing new renewable energy assets. In the Democratic Republic of Congo, the African Development Bank is leading the financing for the Moyi Power Metro-Grids project, a $340 million private sector-led electrification programme. This initiative highlights the role of development finance institutions in de-risking investments and catalysing private-sector participation in large-scale energy projects.

Furthermore, strategic partnerships are being forged to support local financial institutions. The Global Energy Alliance for People and Planet and the Agence Française de Développement have joined forces to empower Africa's public and private development banks as key enablers of clean energy access, aligning with the objectives of Mission 300.

These efforts reflect a broader recognition that achieving sustainable energy for all in Africa requires a multifaceted approach, combining substantial investments, innovative financing mechanisms and collaborative partnerships to unlock the continent's vast energy potential.

Attracting private capital

Power purchase agreements (PPAs) have become a cornerstone in Africa's renewable energy landscape, offering a structured framework that mitigates investment risks and attracts private capital. By providing long-term revenue certainty, PPAs enable independent power producers (IPPs) to secure financing and facilitate the development of energy projects across the continent.

In South Africa, the Renewable Energy Independent Power Producer Procurement Programme has successfully utilised PPAs to drive renewable energy investments. Notable projects include the Oya Hybrid Power Station – a 333 MW facility combining solar, wind and battery storage – and the Doornhoek Solar Power Station, a 120 MW solar farm developed by AMEA Power. Both projects have secured 20-year PPAs with Eskom, the national utility, ensuring stable revenue streams and enhancing bankability.

Corporate PPAs are also gaining traction, allowing large energy consumers to procure renewable energy directly from producers. The Msenge Emoyeni wind power station in South Africa exemplifies this trend, with a long-term PPA supplying power to Sasol, a major industrial player. Such arrangements not only provide cost-effective energy solutions for corporations, but also stimulate renewable energy growth.

Storage systems assist in managing the variability of renewable energy sources in order to ensure a stable power supply (SHUTTERSTOCK/)

Among the challenges that remain are high capital costs, often double or triple those in developed countries, which hinder investment in Africa's energy sector. Moreover, the continent accounts for only 1% of global installed renewable capacity and 2% of clean energy spending, despite abundant solar and wind resources. To address these issues, stakeholders are exploring innovative financial instruments and policy frameworks to de-risk investments and attract private capital.

Building a resilient infrastructure

As Africa accelerates its transition to renewable energy, the development of robust transmission and storage infrastructure becomes paramount. The continent's vast renewable resources – solar, wind, hydro and geothermal – are often located far from urban centres and industrial hubs, necessitating extensive transmission networks to deliver power efficiently and reliably.

Africa's current transmission infrastructure is insufficient to meet the growing demand for electricity and to integrate the increasing share of renewable energy. According to McKinsey & Company, an estimated $400 billion is required to upgrade transmission and distribution networks across the continent by 2050.

Initiatives to address these challenges include the Africa Clean Energy Corridor (ACEC). Spearheaded by the International Renewable Energy Agency (IRENA), it aims to optimise the development of renewable power and cross-border electricity trade in eastern and southern Africa. By promoting regional cooperation and integrated resource planning, ACEC seeks to harness economies of scale and diversify energy sources. Also, in southern Africa, the Regional Transmission Infrastructure Financing Facility (RTIFF) was

Mini-grids are often solar-powered and provide reliable generation and storage (SHUTTERSTOCK/ SEBASTIAN NOETHLICHS)

launched in March 2024 by the Southern African Power Pool and investment advisers Climate Fund Managers. With a target fund of $1.3 billion, RTIFF aims to finance high-voltage transmission lines that connect countries such as Angola, Namibia, Malawi, Mozambique, Tanzania and Zambia. These interconnections are vital for enhancing energy security and enabling the integration of renewable energy projects.

Energy storage

Complementing transmission upgrades, energy storage systems are essential for managing the variability of renewable energy sources and ensuring a stable power supply. Africa's energy storage capacity has witnessed significant growth, expanding from 31 MWh in 2017 to 1,600 MWh in 2024. This substantial increase reflects the continent's commitment to adopting technologies that enhance grid resilience.

Hydro-pumped storage remains the dominant form of energy storage in Africa, accounting for 61% of capacity in 2024. However, battery energy storage systems (BESS) are gaining traction due to their scalability and suitability for decentralised applications. Projections indicate that Africa's BESS capacity could reach around 3.4 GW by 2035.

Various innovative projects exemplify the growing integration of storage solutions. In Malawi, the Golomoti Solar project incorporates a 10 MWh battery storage system, stabilising the grid and reducing reliance on diesel generators. Similarly, AMEA Power's development of Africa's largest solar PV project in Egypt includes utility-scale battery storage, emphasising the importance of storage in large-scale renewable energy deployments.

The vital role of mini-grids

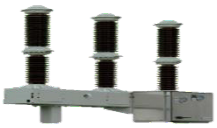
Mini-grids are poised to play a crucial part in achieving universal electricity access in Africa. These systems, often powered by solar PV combined with battery storage, offer reliable and sustainable energy solutions.

The International Energy Agency (IEA) estimates that 40% of the investment needed to realise universal access across the continent by 2030 can most economically be delivered through mini-grids. Meanwhile, IRENA highlights the potential of mini-grids to supply as many as half a billion people with electricity over the same period, emphasising the technology's role in displacing diesel generators and reducing fuel-related costs. ●

EGEMAC Group, EGEMAC the Egyptian German Electrical Manufacturing Company, the mother company, was established in 1979 in Cairo through technical cooperation with the German company Siemens, to manufacture electrical products for medium and high voltage. **We have signed different licenses and agreements with international companies. EGEMAC has huge experience in the construction and the operation of substations as we have constructed and operated more than 480 substations all over Egypt diversified between 66, 220 up to 500 K.V.** **To develop our work, we signed J.V partnership with Huge companies to establish new market & to construct many big companies:** - **XD|EGEMAC, JV to produce transformers, surge arrestor and high voltage switchgears, up to 500 KV gas insulated GIS** - **CHINT|EGEAMC, an Egyptian to produce low voltage products up to 4000 A.** - **ALNAFIE - EGEMAC company to produce M.V concrete pools & other technical equipment.** **Also to have new kind of work, we establish EGEMAC Group for Sustainable Energy to sell energy & connect it to the egyptian electricity grid.** **EGEMAC, has done many rehabilitations in High voltage Substations in Lebanon, Yemen, Gaza. We exported products to Saudi Arabia, Eritrea. We exported measuring transformer & Compact Substations to Congo Democratic. EGEMAC participated in many tenders in many countries in Africa.**	**EGEMAC Group, EGEMAC la société mère égypto-allemande de fabrication de matériels électriques, a été créée en 1979 au Caire grâce à une coopération technique avec l'entreprise allemande Siemens. Elle fabrique des produits électriques moyenne et haute tension.** **Nous avons signé plusieurs licences et accords avec des entreprises internationales. EGEMAC possède une vaste expérience dans la construction et l'exécution des postes électriques, ayant construit et executé plus de 480 postes électriques dans toute l'Égypte, d'une tension de 66, 220 jusqu'à 500 k.V.** **Pour développer nos activités, nous avons signé des partenariats avec de grandes entreprises afin de conquérir de nouveaux marchés et de créer de nombreuses entreprises de premier plan :** - **XD|EGEMAC, coentreprise produisant, des transformateurs, des parafoudres et des appareillages de commutation haute tension jusqu'à 500 kV, des GIS isolés au gaz.** - **CHINT|EGEAMC, coentreprise, pour produire des produits basse tension jusqu'à 4 000 A.** - **ALNAFIE, société EGEMAC, produit des pylônes en béton moyenne tension et d'autres équipements techniques.** **Afin de développer de nouvelles activités, nous avons créé le groupe EGEMAC pour l'énergie durable afin de vendre de l'énergie et de la connecter au réseau électrique égyptien.** **EGEMAC a réalisé de nombreuses réhabilitations de postes haute tension au Liban, au Yémen et à Gaza. Nous avons exporté des produits vers l'Arabie saoudite. Nous avons également exporté des transformateurs de mesure et des cabines compactes vers le Congo Démocratique. EGEMAC a participé dans beaucoup d'appels d'offre en plusieurs pays en Afrique.**

EGEMAC manufacture different kind of products:

- **High voltage circuit breakers & disconnectors switch 66 & 220 licensed with (G.E.).**

- **Medium voltage switchgear type PIX Licensed with Schneider & Simoprime licensed with Siemens 12 & 24 kV.**


- **Ring main unit air, SF6 or GIS type 12 & 24KV licensed with ABB Schneider Murge, Lucy)**


- **Compact substation complete with transformers (dry or oil) up to 2000 K.V.A for outdoor use traditional Electrostatic paint or stone paint or GRB.**



- **Instrumental & Measurement transformers 12, 24 & 66 KV through technical cooperation with Pfiffner Switzerland.**




Solar Project in Benban ASWAN
Projet Solaire a Benban ASWAN

EGEMAC a construit 4 sous stations électriques de transmission de l'énergie engendrée par l' énergie solaire à Benban Aswan (Benban 1,2,3 et 4) 22/22/220 et une autre sous station 500 K.V. **En 2019, le parc solaire de Benban à Assouan en Égypte a remporté le prix annuel du meilleur projet du groupe de la Banque mondiale.**	**EGEMAC has built four solar power transmission substations in Benban Aswan, (Benban 1, 2, 3 et 4) 22/22/220 and another 500 KV Benban (Benban 3) substation.** **In 2019, the Benban Solar Park in Aswan, Egypt, won the World Bank Group's annual Best Project Award.**

The group EGEMAC cover more than 65 % of the needs of electricity sector in Egypt by execution of turnkey high voltage substations and also medium & low voltage infrastructure projects. To get the chance to work in Egypt or outside Egypt, EGEMAC earned certificates for, quality, heath and safety and environmental management system.
Also we receive many delegation for training in our company to see all steps of manufacturing, assembly or testing during the production of our products. We are keen to deal with all big entities or all utility or private sector all over Africa.

Le groupe EGEMAC couvre plus de 65 % des besoins du secteur électrique égyptien en réalisant des postes haute tension clés en main ainsi que des projets d'infrastructure moyenne et basse tension. Pour travailler en Égypte ou à l'étranger, EGEMAC a obtenu des certifications de qualité, de santé, de sécurité et de système de gestion environnementale. Nous recevons également de nombreuses délégations pour des formations afin de suivre toutes les étapes de fabrication, d'assemblage et de test de nos produits. Nous sommes disposés à collaborer avec toutes les grandes entreprises, les secteurs publics ou privés en Afrique.

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Empowering utilities to power Africa

Francesco La Camera
Director General, International Renewable Energy Agency (IRENA)

Renewables are the most cost-effective source of power generation available today. In fact, according to the International Renewable Energy Agency (IRENA), 91% of new renewable power projects commissioned in 2024 were more cost-effective than any new fossil fuel alternative. While this presents a promising opportunity for a resource-rich continent like Africa, translating its potential into progress remains a critical challenge.

In fact, the latest SDG 7 Tracking Report shows that while renewable energy capacity in developed countries reached 1,100 watts per capita, Sub-Saharan Africa lags far behind at just 40 watts per capita hardly enough to power basic services like lighting or even charging mobile phones.

To turn the tide and unlock the continent's vast renewable potential, we must urgently overcome the structural barriers that continue to hinder progress across Africa. While funding individual projects – be they utility-scale or off-grid – is crucial, without the necessary structural changes, this approach is not comprehensive.

The expansion of renewables must be paralleled, if not preceded, by significant strengthening of grid systems. This includes in-country backbone transmission networks and cross-border interconnectors that are necessary for the physical interconnection of Africa's continental energy infrastructure.

It is also crucial to account for the nuanced differences in energy infrastructure, grid maturity and institutional capacities across African countries. While some African countries need to modernise existing grids, others are still working to extend access to the last mile, requiring significant grid expansion. This places utilities squarely at the centre of Africa's energy transition and underscores the importance of the work of the Association of Power Utilities of Africa (APUA).

This is why, on 11 June 2025, IRENA and APUA entered into a partnership agreement to strengthen collaboration among power utilities, promote investment, and facilitate knowledge exchange – particularly through the Utilities for Net Zero Alliance (UNEZA), for which IRENA serves as the Secretariat, and APUA's African Network of Centres of Excellence in Electricity (ANCEE).

The Nairobi Declaration recognises that Africa has the fundamentals, as a cost-competitive industrial hub, to reap the economic and development benefits that renewables offer, with renewable energy playing an essential part in this vision. However, while ambitions aim to increase renewable capacity from 56 GW in 2022 to 300 GW by 2030, Africa's installed renewable power capacity grew by just 7.2% in 2024, less than half the global average of 15%.

As APUA marks its sixth decade, IRENA stands ready to support African countries not only in catching up, but also in leading a renewables-based energy future, working with utilities across the continent to accelerate progress and deliver transformative outcomes. ●

Renewables: powering Africa's future

The enormous potential for renewable energy in sub-Saharan Africa offers a unique opportunity to transform the region's energy supply, strengthen economic development and provide a more environmentally sustainable generation mix

With abundant wind, solar, hydro and geothermal resources, Africa is well positioned to meet its growing energy demands through clean, indigenous power sources. According to the International Renewable Energy Agency (IRENA), the continent could satisfy nearly a quarter of its energy needs through renewable sources by 2030. Modern renewables, amounting to 310 GW of installed capacity, could deliver half of the continent's total electricity generation capacity. This would represent a sevenfold increase on 2017 levels, when renewable capacity stood at around 42 GW.

Progress so far is encouraging. Clean energy corridors are helping to scale up renewable power generation and promote cross-border electricity trade. Ethiopia, Kenya, Nigeria, South Africa and Tanzania have been

Solar resources provide some of the greatest potential for renewable energy generation (SHUTTERSTOCK/ ONPHOTOUA)

LEADING THE WAY IN RENEWABLE ENERGY

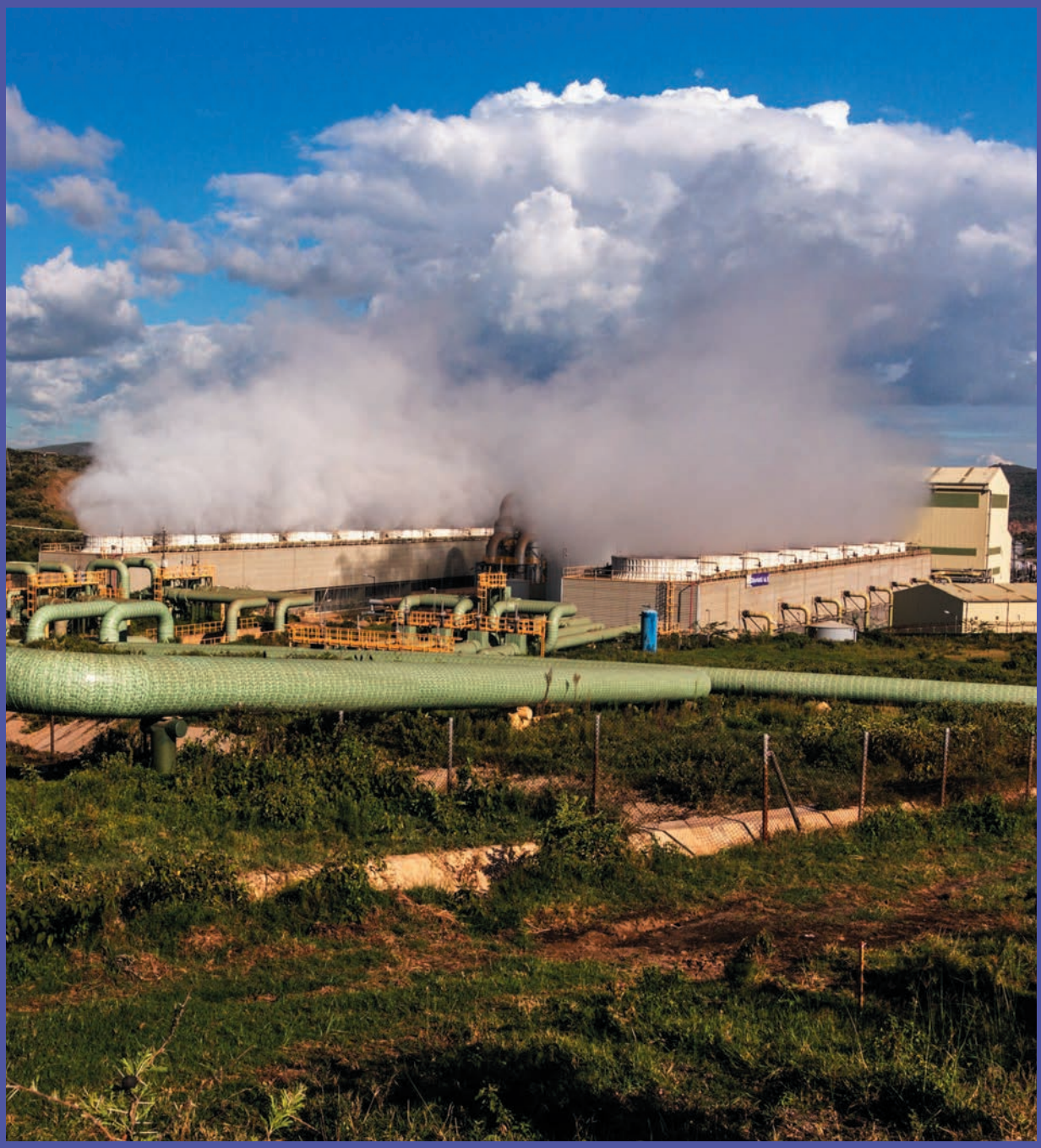
Ethiopia has expanded its renewable capacity, with hydropower providing 90% of its electricity. The 6,450 MW Grand Ethiopian Renaissance Dam, which began power generation in 2022, is Africa's largest hydropower project.

Kenya is a global leader in geothermal energy, sourcing nearly 45% of its electricity from geothermal plants in the Rift Valley. Projects such as the Olkaria Geothermal Plant (below) have helped the country achieve an electricity access rate of over 75%, with ambitions to reach 100% by 2030.

South Africa has significantly expanded its solar and wind capacity, adding over 6,400 MW of clean energy to its grid since 2011.

Nigeria is making strides in its renewables capacity with solar mini-grids, particularly under the Nigeria Electrification Project, supported by the World Bank. Over 100 mini-grids have been deployed, providing clean and sustainable electricity to rural communities.

Tanzania has focused on small hydropower and solar initiatives in order to expand electrification in its rural areas, receiving support from organisations such as the Rural Energy Agency.



SHUTTERSTOCK/MATYAS REHAK

Harnessing local renewable resources, such as wind power, promotes energy independence (SHUTTERSTOCK/ FOGCATCHER)

among the leaders in renewable energy development, demonstrating how indigenous resources can drive energy transition.

The case for renewables

Africa's renewable energy potential is underpinned by an extraordinary abundance of resources. The continent boasts some of the highest solar irradiation levels globally, making solar power an especially promising option. Its coastal and mountainous regions also offer significant wind energy potential, while vast, untapped hydroelectric resources exist in many major river basins. Additionally, East Africa in particular holds extensive geothermal prospects, providing a valuable source of consistent energy.

Renewable energy has also become increasingly attractive from a financial perspective. The global cost of solar and wind power has fallen dramatically over the past decade, making these technologies not only more accessible but also frequently cheaper than fossil-fuel alternatives. This shift enhances their competitiveness and offers African nations a practical and affordable path to energy expansion.

Harnessing local renewable resources also promotes energy independence. By relying on indigenous energy sources, African countries can reduce their dependence on imported fuels, mitigating exposure to volatile global energy markets and enhancing national energy security.

Furthermore, as one of the global regions most vulnerable to the impacts of climate change, Africa stands to benefit immensely from a transition to a low-carbon growth trajectory, strengthening its climate resilience while pursuing sustainable economic development.

Scaling up: clean energy corridors

Clean energy corridors focus on areas with high renewable energy potential and aim to build the infrastructure to connect these resources to centres of demand within and between countries. Projects under these corridors focus on integrating large-scale solar parks, wind farms and hydro projects into regional grids to achieve economies of scale and balance supply and demand across countries. Such corridors are critical because they allow countries with complementary resources to benefit from collective infrastructure, smoothing intermittency issues and improving grid stability.

Examples of such initiatives include the Africa Clean Energy Corridor (ACEC) in Eastern and Southern Africa, launched by IRENA to accelerate the deployment of renewable energy. Spanning 21 countries, ACEC aims to develop a coordinated approach to energy planning, grid infrastructure investment and regulatory harmonisation. Also, in West Africa, the ECOWAS Renewable Energy Corridor similarly seeks to expand regional renewable electricity generation and facilitate cross-border power trading across the region. ●

The case for private-sector participation

The private sector has the opportunity to play a vital role in addressing Africa's growing demand for energy – not only by filling the financing gap, but also by introducing the necessary efficiencies, technologies and management expertise

Public funding and development aid, while critical, have been insufficient to meet the massive investment required to electrify Africa fully. According to the African Development Bank, the continent requires an estimated USD 100 billion annually until 2040 to meet its energy needs, yet current investment levels fall far short. Private-sector participation is crucial in bridging this funding gap. By tapping into private capital, African nations can fast-track the development of generation, transmission and distribution infrastructure.

Public-private partnerships (PPPs) have proven effective in mobilising large-scale investment. For example, Ghana has seen substantial involvement through independent power producer (IPP) projects such as the Amandi Power Plant, which delivered 192 MW of new capacity in 2021 with a mix of private financing and development bank support. A major advantage of private-sector participation is the acceleration of technology transfer. For example, private investment has been pivotal to the development of the renewable energy sector in Kenya. Companies such as Ormat Technologies have brought cutting-edge geothermal technologies to projects like the Olkaria III plant, which now provides over 139 MW of clean energy to the national grid. Similarly, private-sector initiatives in distributed solar power are providing off-grid solutions for businesses and communities alike, boosting access while introducing smart, scalable energy technologies.

Reducing operating costs

By implementing international standards in maintenance, procurement and human resources, private operators can drastically reduce system losses and increase financial viability. For example, South Africa's Renewable Energy Independent Power Producer Procurement Programme has been lauded for achieving some of the lowest

(opposite) **Private-sector involvement brings expertise as well as finance** (SHUTTERSTOCK/ULTRAMANSK)

(below) **Amandi Power Plant in Ghana is a successful example of public-private partnership** (AMANDI ENERGY)

solar and wind prices globally by fostering competitive bidding and requiring high operational performance. This drive toward cost-efficiency not only ensures better returns for investors, but also ultimately benefits consumers through more affordable electricity tariffs and improved service reliability.

Addressing the challenges

Although private-sector participation has many obvious benefits, various obstacles remain that need to be overcome. Regulatory uncertainty continues to deter investors. A stable, transparent and predictable regulatory framework is vital to build and maintain investor confidence.

Currency risk presents another major barrier, as electricity revenues are collected in local currencies in many African countries, while project financing is often in US dollars or euros. Fluctuations in exchange rates can, therefore, severely impact the financial viability of projects. Mitigating such risks will requires innovative financial mechanisms, such as local currency financing or risk-sharing facilities.

Political risk – including changes in government and civil unrest – also breeds uncertainty around private-sector investments. Instruments such as political risk insurance from agencies such as the Multilateral Investment Guarantee Agency (MIGA) are increasingly important in de-risking projects.

Revenue collection issues can further undermine the financial sustainability of energy projects – in many markets, utilities suffer from poor billing practices, high non-technical losses and low collection rates. Mechanisms such as escrow accounts or government-backed payment guarantees can secure predictable revenue streams and reassure investors. ●

PRIVATE-SECTOR SUCCESS STORIES

Kenya is a leader in leveraging private investment for energy expansion. Beyond geothermal, the country's wind sector has thrived with projects like the Lake Turkana Wind Power Project, the largest in Africa, adding 310 MW to the grid through private investment that is backed by international financing partners.

Morocco's Noor Solar Complex, which ranks as one of the largest concentrated solar power projects in the world, was developed through a PPP model. The mammoth project has helped Morocco to achieve generation of more than 40% of its electricity from renewable sources, positioning it as leader in the region.

Senegal's Scaling Solar initiative, developed with support from the World Bank and International Finance Corporation, led to the construction of the 30 MW Senergy solar plant (below), which is delivering some of the lowest solar tariffs in sub-Saharan Africa through a transparent, competitive process.

Country profiles

A focus on individual countries represented in APUA, highlighting local power needs and recent developments to address them ▶

In future, the lights of Algiers will increasngly be powered by renewable energy sources (SHUTTERSTOCK/ GUELLAL YOUCEF)

Algeria

Algeria has achieved near-universal electricity access, with 100% of its urban population and 99% of its rural residents connected to the power grid. This extensive coverage supports both residential needs and a robust industrial sector.

Historically, the country has relied on fossil fuels, particularly natural gas, which accounted for 99% of its electricity production in 2021. However, efforts to diversify its energy mix are in full swing with investment in renewable energy projects.

In March 2024, Algeria embarked on an ambitious initiative to enhance its energy infrastructure with the construction of 15 solar photovoltaic (PV) plants across 12 provinces. This venture, part of Algeria's Renewable Energy Development Programme, aims to generate 3,000 MW of solar PV energy. The project is divided into two primary components: the first involves constructing 15 solar PV plants to generate a total of 2,000 MW, with capacities ranging from 80 MW to 220 MW; secondly, the Solar 1,000 MW Project will build additional plants in five provinces, with capacities between 50 MW and 300 MW.

In January 2025, Algeria's National Development Hydrocarbon Agency (ALNAFT) signed an offshore cooperation agreement with US energy giant Chevron. This deal aims to enhance Algeria's output capabilities to meet increasing gas demand, particularly as it is already a significant gas supplier to Europe. ●

Population	**46.81m (2024)**
Total electricity production	**91,231 GWh**
Electricity consumption (per capita)	**1.779 MWh**
Largest source of electricity generation	**Gas (99%)**

(IEA, 2022)

Angola

Significant progress has been made in electricity access in Angola, with around 48.5% of the population being connected. However, this leaves a substantial, mainly rural, population lacking a reliable supply.

To address these challenges, the Angolan government has implemented several initiatives to boost energy generation and distribution. These include the expansion of the Cambambe Hydroelectric Facility, which added 700 MW to the national grid, while the Lauca Hydroelectric Plant contributed an extra 2,070 MW.

Angola is also making strides in renewables. The Angola Solar Project encompasses seven utility-scale installations, including the largest solar facility in sub-Saharan Africa.

The country is exploring green hydrogen production with a landmark project that will produce green hydrogen for export to Germany, making Angola the first African supplier to Europe. The hydro-powered project is being developed by national oil company Sonangol with German firms Gauff and Conjuncta, and is expected to produce as much as 280,000 tonnes of green ammonia annually.

Elsewhere, the Angola Liquefied Natural Gas (ALNG) Project in Soyo is one of the largest Africa's energy projects and the country's first LNG project. Operated by Angola LNG Limited, ALNG commercialises associated natural gas produced by Chevron and other crude oil operators. ●

Population	**37.89m (2024)**
Total electricity production	**15,763 GWh**
Electricity consumption (per capita)	**0.393 MWh**
Largest source of electricity generation	**Hydro (70%)**

(IEA, 2022)

Soyo is the location for one of the world's most modern LNG processing facilities (ANGOLA LNG)

Cotonou, capital of Benin, West Africa (SHUTTERSTOCK/ MASAKI ABE)

Benin

As of 2022, approximately 56.5% of Benin's population had access to electricity – reflecting a major increase in recent years. But disparities persist, mainly in rural areas. US foreign aid agency the Millennium Challenge Corporation (MCC) noted that only about 18% of rural inhabitants had electricity access, and even those with connections often faced outages and unstable voltage.

Among the country's energy initiatives is the Benin Electricity Access Scale-up (BEAS) Project. Supported by the World Bank, the project is focused on expanding electricity access through grid extension and off-grid solutions, targeting underserved communities.

In the renewables sector, construction has commenced on the 25 MW Forsun photovoltaic (PV) plant. This facility is part of a broader plan to expand the existing Illoulofin Solar Power Station's capacity to 75 MW, diversifying the energy mix and reducing reliance on imported electricity.

Population	**14.46m (2024)**
Total electricity production	**1,001 GWh**
Electricity consumption (per capita)	**0.109 MWh**
Largest source of electricity generation	**Gas (73%)**

(IEA, 2022)

The MCC's $391 million Benin Power Compact, which concluded in June 2023, has tripled grid capacity. The investment is forecast to benefit more than 11 million people over the next 20 years.

Off-grid solutions are also being explored to enhance energy access in remote areas. A partnership between the European Investment Bank (EIB) and ENGIE Energy Access aims to provide reliable and affordable off-grid solar power to approximately 643,000 people across Benin. ●

Botswana

According to 2022 figures, 75.9% of Botswana's population had access to electricity at that time. However, the country is among those with a marked urban-rural divide, with only 37% of rural inhabitants enjoying the privilege.

To tackle the ongoing challenge of achieving universal access, Botswana has instigated various projects. In July 2024, the World Bank approved the country's Renewable Energy Support and Access Accelerator (RESA) Project, which aims to transform Botswana's energy landscape by advancing renewable solutions.

In keeping with its commitment to renewables, Botswana is developing a 200 MW Concentrated Solar Power (CSP) project. The government is seeking an independent power producer to design, finance, construct and operate this greenfield project. This endeavour aligns with Botswana's Integrated Resource Plan, which set a 20-year strategy (2020-40) for electricity development. Norway's Scatec ASA has also secured financing for a 60 MW solar plant in the country's central region, which will form part of a larger 120 MW complex.

Additionally, a Chinese consortium, Sinotswana Green Energy, is constructing a 100 MW solar plant in Jwaneng, a diamond mining town approximately 170km west of the capital, Gaborone. Consortium members China Harbor Co Ltd (CHEC) and China Water and Electric Development Co are working alongside local investors on the project, which is to be commissioned in the second quarter of 2026. The consortium will operate and maintain the facility for 25 years, before it is transferred to Botswana's government.

To further enhance energy access in remote areas, in December 2024 the Botswana Power Corporation (BPC) issued a call for expressions of interest from local companies to design, install and commission small-scale solar projects for off-grid power distribution. ●

Population	**2.521m (2024)**
Total electricity production	**2,548 GWh**
Electricity consumption (per capita)	**1.412 MWh**
Largest source of electricity generation	**Coal (96%)**

(IEA, 2022)

A solar PV farm at Sebele in Gaborone, Botswana (SHUTTERSTOCK/ BASHI KIKIA)

Burkina Faso

Only 19.5% of Burkina Faso's population have access to electricity (as of 2022), and this figure falls to a mere 3% of rural inhabitants, compared to 60% of those residing in urban areas.

The country's energy mix is heavily reliant on biofuels and waste, with oil products accounting for one-third of the total energy supply. In 2020, only 11% of the population had access to clean cooking solutions, underscoring the need for comprehensive energy interventions.

Among the initiatives to tackle these dual issues is the development of an 18 MW solar power plant in Dédougou, located 250km west of the capital, Ouagadougou. The project has received finance from the Sustainable Energy Fund for Africa (SEFA) – a multi-donor fund that is managed by the African Development Bank Group – and forms part of the broader Desert-to-Power programme. This aims to generate 10 GW of solar power across 11 countries in the Sahel region by 2030, thereby encouraging socio-economic development.

In addition, the Yeleen Rural Electrification Project focuses on installing 100 solar mini-grids in rural areas, moving towards low-emissions electricity access by providing an enabling environment for the private sector to operate these facilities. The project, which has an estimated lifespan of seven years, also aims to improve the regulatory framework to mobilise private-sector capital in rural renewable energy investments.

Furthermore, the Solar Energy and Access Project, supported by the World Bank and leveraging private finance, will be developing regional solar parks with a total capacity of 300 MWp, to become operational by 2030. The first phase includes a 75 MWp solar park in Konean and a 45 MWp solar park in Kouritenga. ●

Population	**23.55m (2024)**
Total electricity production	**1,669 GWh**
Electricity consumption (per capita)	**0.13 MWh**
Largest source of electricity generation	**Oil (86%)**

(IEA, 2022)

Residents of capital city Ouagadougou enjoy much better electricity access than their rural compatriots (SHUTTERSTOCK/ DAVE PRIMOV)

Burundi

Burundi faces considerable challenges in providing electricity to its population, with 2022 estimates showing that less than 12% of the population having access to electricity, and with rates much more pronounced in rural areas. Limited energy infrastructure is a severe brake on economic development and restricts the delivery of essential services across the country.

Kabu 16 Hydroelectric Power Station, a 20 MW facility located in Cibitoke Province, is a major element in serving the country's current and future energy needs. Following five years of construction, the plant was officially commissioned in October 2024. Funded by the Government of Burundi with support from the Export-Import Bank of India, this power station is expected to generate approximately 117.7 GWh annually, significantly bolstering the nation's electricity supply.

Burundi's heavy reliance on hydropower makes it susceptible to climate variability, particularly fluctuations in rainfall patterns and prolonged droughts. Periods of reduced rainfall cause river levels to drop, decreasing the efficiency and output of hydroelectric plants, and Burundi has experienced hydropower shortages due to climate-related events in recent years.

Population	**14.05m (2024)**
Total electricity production	**N/A**
Electricity consumption (per capita)	**N/A**
Largest source of electricity generation	**N/A**

(IEA, 2022)

In solar energy, the Mubuga Solar Power Station in Gitega Province is a notable project. This 7.5 MW plant was developed by multinational renewable energy company Gigawatt Global Coöperatief and became operational in October 2021. As Burundi's first grid-connected solar project by an independent power producer, it contributes around 10% to the country's generation capacity, supplying electricity to an estimated 90,000 people and businesses. Plans are under way to expand its capacity to 15 MW. ●

Construction work on Kabu 16 Hydroelectric Power Station, which opened in 2024, took five years (VOITH)

Cameroon

Recent developments in Cameroon have increased electricity access to approximately 71% of the population by 2022, although this figure declines to just 25% among rural residents.

Among the projects contributing to this improvement is the Nachtigal Hydropower Plant, which was co-financed by the World Bank Group. As of mid-January 2025, the plant had injected 360 MW into the national grid from six of its seven turbines, representing an almost 30% increase in the country's power generation capacity.

In addition, Cameroon has instigated a programme to construct 50 mini hydroelectric power plants by 2035, utilising the country's vast network of rivers and streams. The estimated total capacity of the sites that have been identified is around 160 MW.

Cameroon is also taking advantage of its significant solar energy potential, with average sunshine of 5.8 kWh/m2/day in the north of the country and 4 kWh/m2/day in southern areas. The Maroua and Guider power plants, Cameroon's first public solar projects with a combined capacity of 30 MW, were commissioned in September 2023. A further 20 MW solar power plant is planned for the city of Garoua.

Population	**29.12m (2024)**
Total electricity production	**9,974 GWh**
Electricity consumption (per capita)	**0.281 MWh**
Largest source of electricity generation	**Hydro (71%)**

(IEA, 2022)

Additionally, Scatec has expanded its solar projects in Cameroon by adding 28.6 MW of solar capacity and 19.2 MWh of storage. The installations employ Scatec's Release solution, which offers flexible rental of pre-assembled, modular solar and battery equipment.

Looking ahead, Cameroon's West Regional Council has set a target of developing 4 GW of renewable energy by 2035. Proposed projects will encompass a mix of solar, wind, hydro, biomass and battery storage solutions, tapping into the region's renewable energy potential of more than 6 GW. ●

Nachtigal Hydropower Plant has been a major contributor to Cameroon's generation capacity since 2024 (IFC)

Central African Republic

The Central African Republic (CAR) faces considerable challenges in providing electricity to its population, with only 15.7% of residents having access (as of 2022). The low electrification rate is even more pronounced in rural areas.

A notable recent development is the Danzi Solar Park – a 25 MW facility located around 18km from the capital, Bangui. Inaugurated in November 2023, the park will be equipped with battery storage and is expected to supply electricity to 250,000 people in the capital, almost doubling the CAR electricity generation capacity in the process.

The CAR is actively pursuing several energy projects to enhance its electricity generation and distribution infrastructure. These include the modernisation of the Boali Hydroelectric Power Station, located near the town of Boali in Ombella-M'Poko Prefecture. The project will increase the combined capacity of its three units from 38.75 MW to 43.75 MW, further improving the reliability of electricity supply to Bangui and surrounding areas.

The Boali modernisation also forms the first phase of a collaboration between the CAR and the Democratic Republic of Congo (DRC), supported by the African Development Bank, to interconnect the power grids of the two countries. The second phase will establish high-voltage transmission lines between the CAR and the DRC to facilitate efficient electricity exchange and electrification of communities along the transmission corridor.

In addition to large-scale projects, efforts are under way to improve energy access in rural and underserved areas. The CAR government, with support from international partners, is promoting the provision of off-grid solar systems for schools, hospitals, administrative centres and agricultural purposes. ●

Population	**5.331m (2024)**
Total electricity production	**N/A**
Electricity consumption (per capita)	**N/A**
Largest source of electricity generation	**Hydro**

(IEA, 2022)

A village on the Ubangi River. Projects are under way to improve rural electricity access (SHUTTERSTOCK/MBRAND85)

Chad

Chad is among the African countries facing the most challenges in its energy sector, with only 8% of the population having access to electricity as of 2020, one of the lowest rates in sub-Saharan Africa.

This limited access hampers both daily life and industrial development, as the country's installed generation capacity stands at approximately 125 MW for a population of around 18.3 million.

Among initiatives to boost electricity access is the Cameroon-Chad Interconnection Project, which was officially launched in November 2023 and involves the installation of 1,556 km of new transmission lines between the two countries.

Chad has also initiated several projects to enhance energy generation and distribution. In March 2022, the World Bank approved a $295 million grant to expand electricity access in N'Djamena and 12 secondary cities. This initiative, known as the Chad Energy Access Scale-Up Project, aims to increase electricity access from about 6% to 30% by 2027, benefiting over six million people.

Further bolstering these efforts, in December 2024, the African Development Bank approved €28 million in funding to construct two solar power plants in Gassi and Lamadji, near N'Djamena. Each plant is expected to produce 15 MW of electricity, collectively increasing Chad's power supply by 20%. The project also includes new power stations, connection lines, and a 6 MWh battery storage system, contributing to a reduction of 49,000 tons of CO_2 emissions annually.

Additionally, in September 2024, Chad signed multiple agreements with China to improve access to electricity and drinking water in N'Djamena, construct an international airport and enhance sanitation networks. These collaborations aim to address critical infrastructure needs and support economic development.

Through these combined efforts, Chad is working towards achieving a 53% electricity access rate by 2030, marking a significant step forward in meeting the country's energy needs and fostering sustainable development. ●

Population	**20.3m (2024)**
Total electricity production	**376 GWh**
Electricity consumption (per capita)	**0.015 MWh**
Largest source of electricity generation	**Oil (98%)**

(IEA, 2022)

N'Djamena, capital of Chad, will benefit from grants to boost electrcity access (SHUTTERSTOCK/ HOMO COSMICOS)

Côte d'Ivoire

Electricity access levels in Côte d'Ivoire reached approximately 94% in 2022, reflecting substantial progress in recent years. This improvement is attributed to government initiatives and investments in energy infrastructure, including projects such as the Soubré Hydroelectric Power Station on the Sassandra river, which was commissioned in late 2017 and added 10% to the country's generation capacity.

On top of this, the Gribo-Popoli Hydroelectric Power Station, located downstream of the Soubre plant and commissioned in July 2023, is expected to generate around 554 GWh of electricity upon completion in 2027.

Population	**31.93m (2024)**
Total electricity production	**12,460 GWh**
Electricity consumption (per capita)	**0.349 MWh**
Largest source of electricity generation	**Gas (73%)**

(IEA, 2022)

Activity to meet the population's growing energy demands include the inauguration in April 2023 of the country's first solar power plant in Boundiali. The 37.5 MW facility supplies clean electricity to around 35,000 households, reducing greenhouse gas emissions by an estimated 60,000 tons of CO_2 each year. The second phase of this project is expected to reach commercial operation by April 2025, with total production costs estimated at $81.5 million.

Côte d'Ivoire is also investing in biomass energy with the construction of its first large-scale facility – a 46 MW power plant in Aboisso that will utilise palm-tree residues – that will also become West Africa's largest power plant fuelled by agricultural waste. The project will include a substation and a 350-metre transmission line for connection to the national grid.

To strengthen the electricity grid, the US Trade and Development Agency (USTDA) has partnered with the country on a project aimed at enhancing reliable energy access. The agency has provided a grant for a feasibility study to help state-owned Côte d'Ivoire Energies deploy a power grid emergency control system. The system, expected to be the first of its kind in Africa, will increase access to electricity and help mitigate and prevent blackouts across the country. ●

The Gribo-Popoli Hydroelectric Power Station on the Sassandra river (POWERCHINA)

Democratic Republic of the Congo

The Democratic Republic of the Congo (DRC) has one of the world's lowest electrification rates, with just 21–22% of the population connected to electricity – roughly 41% in urban areas and only 1% in rural regions (according to 2022 data). This gap restricts public services and undermines broader economic activity.

Industry, particularly mining, consumes a major share of power. Over half of electricity generated in the DRC is used to support mining operations, limiting household and small business access. Nearly all its electricity comes from hydropower. But ageing infrastructure and transmission losses of up to 50% significantly reduce delivery efficiency.

Efforts to expand generation capacity and diversify the energy mix include the rehabilitation of Mwadingusha Hydropower Station, completed in 2021 with the replacement of six turbines and increased capacity of 78.3 MW; the construction of the 64 MW Katende Hydroelectric Power Station, which will serve communities around Kananga and Mbuji Mayi; the Green Giant Solar Power Station, a planned 1,000 MW solar farm led by SkyPower Global and the Africa Finance Corporation; and Nuru Energy's 1.3 MW solar mini grid in Goma, launched in 2020 and interconnected with hydropower from Virunga National Park.

By the end of 2024, electricity customers reached nearly 1.5 million low-voltage subscribers, representing a 38.9% increase since 2020. Total installed capacity climbed from 2,972 MW to 3,647 MW, while annual production rose from 12,460 GWh to 13,625 GWh. ●

Mwadingusha Hydropower Station was upgraded in 2021 to increase capacity (ANDRITZ)

Population	**109.3m (2024)**
Total electricity production	**13,250 GWh**
Electricity consumption (per capita)	**0.135 MWh**
Largest source of electricity generation	**Hydro (100%)**

(IEA, 2022)

Djibouti

As of 2022, only about 65% of Djibouti's population had electricity access – urban coverage was around 73%, but just 37% in rural areas. Less than 5% of rural households were connected to the national grid in 2021.

Djibouti's on-site generation capacity remains modest – around 150 MW, almost all powered by thermal plants fuelled by imported oil and diesel. Less than half of that capacity is operational at any time. Industrial activity, port operations and urban consumers together drive peak demand above 150 MW, but constrained capacity and expensive tariffs have slowed industrial growth.

New energy projects include the 60 MW Ghoubet (Red Sea) Wind Farm, which was inaugurated in September 2023 and is Djibouti's first renewable independent power producer (IPP). Developed by Red Sea Power with backing from the Africa Finance Corporation, it has added around 50% to national capacity and reduced CO_2 emissions by around 252,000 tonnes annually.

Currently under construction, Amea Grand Bara Solar Power Station will have a capacity 25 MW with battery storage and will be the country's first grid-connected solar IPP. Djibouti is also adding a second 230 kV power line linking Galafi to Nagad, which will boost imports from Ethiopian hydropower by about 30% and improve grid resilience.

The government's Vision 2035 aims for 100% renewable electricity across the country by 2035, with forecasts for 2025 estimating that 80% of electricity would come from renewables by this time. Djibouti is also exploring geothermal potential, estimated at 1,000 MW, and studying tidal, biomass and green hydrogen projects. ●

Population	**1.169m (2023)**
Total electricity production	**N/A**
Electricity consumption (per capita)	**N/A**
Largest source of electricity generation	**Oil**

(IEA, 2022)

The Ghoubet Wind Farm is located on the coast in the Arta region (SHUTTERSTOCK/ VADIM_N)

Aswan High Dam contributes to Egypt's energy mix with 2,100MW of hydropower (SHUTTERSTOCK/ ALEXANTON)

Egypt

Egypt achieved universal household electricity access by around 2016, ensuring 100% of the population is connected to the grid. Demand for electricity, driven by a population exceeding 100 million and industrial expansion, has grown by about 4% annually, with consumption reaching 189 TWh in 2024.

The country's electricity generation mix remains heavily dependent on fossil fuels. In 2023, natural gas plants supplied about 88% of electricity, with hydropower at roughly 7% and solar and wind around 5%. The reliance on gas exposes industry and households to volatility, especially as domestic gas production declines.

Stationary generation capacity has expanded rapidly: between 2015 and 2023, Egypt added 31 GW of generation capacity across steam, combined cycle gas and diesel plants, bringing total capacity to roughly 59 GW – more than enough to meet peak demand near 32 GW. However, outdated transmission infrastructure and localised grid weaknesses continue to cause intermittent outages.

Egypt has stepped up renewable energy development. The Benban Solar Park in Aswan, completed in 2019 at 1.65 GW capacity, ranks among the world's largest solar projects and produces around 3.8 TWh annually. Major utility-scale projects are in development, with firms such as ACWA Power and Scatec planning wind farms of 8-10 GW, and solar parks and battery storage totalling several GW capacity slated for completion by 2027.

Nuclear power is also emerging, with the construction of the El Dabaa plant, where four VVER 1200 reactors are being built. Work began in mid-2022, and commercial operation for the first reactor is targeted for 2026, with full capacity (4.8 GW) scheduled by around 2030. ●

Population	**116.5m (2024)**
Total electricity production	**215,130 GWh**
Electricity consumption (per capita)	**1.517 MWh**
Largest source of electricity generation	**Gas (76%)**

(IEA, 2022)

Ethiopia

Ethiopia continues to face challenges in providing electricity access, with only about half of its population connected to the grid as of 2023, and fewer than 10% having access to clean cooking solutions. Rural coverage remains low, despite ongoing efforts under the National Electrification Plan II, which aims to reach full access with a blend of on-grid and off-grid solutions.

Industry consumes a large share of available electricity, particularly as hydropower plants serve mining, manufacturing and urban utilities. Total installed capacity reached roughly 5.6 GW by 2023, a nearly threefold increase since 2010. Hydropower accounted for nearly 97% of this capacity, making the energy system vulnerable to water shortages during droughts and fluctuations in river flow.

The Grand Ethiopian Renaissance Dam (GERD), Africa's largest, has been generating electricity since 2022 and was expected to reach its full capacity of over 6 GW in 2025, roughly doubling national output and enabling export of power to neighbouring countries. Another major facility, the 2.16 GW Koysha Dam on the Omo River, is under construction.

Ethiopia is also investing in wind, solar and geothermal. The Assela Wind Farm, under construction near Iteya, is expected to contribute 100 MW. Geothermal efforts are advancing through projects such as the Tulu Moye plant, under development since 2021. Tenders have also been issued for two new solar PV schemes – the 125 MW GAD II in Somali region and the 100 MW Weranso in Afar.

Waste-to-energy is emerging with Addis Ababa's Reppie plant, which captures municipal solid waste and converts it into 25 MW of electricity – the first facility of its kind in Africa. ●

Population	**132.1m (2024)**
Total electricity production	**17,338 GWh**
Electricity consumption (per capita)	**0.094 MWh**
Largest source of electricity generation	**Hydro (97%)**

(IEA, 2022)

National Electrification Plan II aims to provide full electricity access to all of Ethiopia (SHUTTERSTOCK/ HYBRID PRODUCTION ETHIOPIA)

Electricity access is near universal in Gabon's urban centres, such as its capital, Libreville (SHUTTERSTOCK/ PETER BUXBAUM)

Gabon

As of 2022, roughly two-thirds of Gabon's population had access to electricity. Urban coverage was nearly universal at about 98.5%, while rural access lagged at around 29%. Industry – particularly timber, manganese and oil processing – relies heavily on this relatively stable electricity supply, although power outages and limited reach in remote areas remain challenging.

Electricity generation in Gabon includes a mix of hydropower and thermal. Hydropower made up about 41% of installed capacity in 2022, notably from the 160 MW Grand Poubara Dam. Thermal plants that run on natural gas supply a large share of urban demand, especially in Libreville and Port Gentil, where gas generators operated by Perenco meet the majority of needs.

Population	**2.539m (2024)**
Total electricity production	**3,192 GWh**
Electricity consumption (per capita)	**1.084 MWh**
Largest source of electricity generation	**Hydro (48%)**

(IEA, 2022)

The Kinguélé Aval Hydroelectric Power Station, currently under construction, is the first privately developed hydroelectric dam in the country and is expected to deliver over 200 GWh annually. Construction of the Ngoulmendjim Dam, with an estimated capacity of 82 MW and annual generation of around 500 GWh, began in 2023 and is planned for commissioning by 2028.

In addition, Gabon's first large-scale solar project, the 120 MW Ayémé Solar Power Station, came online in 2024. Meanwhile, ENGIE's earlier pilot effort installed eight hybrid solar diesel mini grids in remote communities in north-west Gabon, supplying nearly 1,600 homes and cutting fuel oil use by an estimated one million litres per year.

Gabon also recently launched electricity interconnection with Equatorial Guinea, with the first phase of about 3 MW of exports beginning in early 2025. With government targets to reach universal electricity access by 2030 and a shift toward 80% renewable share, these projects reflect a drive to modernise infrastructure, support industrial growth and close urban rural energy gaps. ●

The Gambia

Just under two-thirds of Gambians have an electricity connection. Around 60–65% of households can access the grid, but that figure drops to roughly 28% in rural areas, where most rely on traditional biomass, especially firewood, to meet daily energy needs. Industrial demand – especially from small-scale processing, services and urban utilities – often puts strain on the grid, as national electricity generation falls short of peak demand.

Until recently, most of The Gambia's power came from costly imported heavy fuel oil and diesel-fired generators. In April 2023, the inauguration of the first utility-scale solar plant in Jambur marked a pivotal shift. The 23 MW solar PV array, paired with an 8 MWh battery storage system, now supplies around 20% of national generation capacity and serves approximately 18,500 households. This project is part of The Gambia Electricity Restoration and Modernization Project (GERMP), supported by the World Bank, EIB and the EU.

To expand coverage, the government inaugurated a 225 kV transmission line linking Brikama to Jabang in early 2025, along with a new National Control Centre and upgrades to substations. Currently in the pipeline is the 150 MW Soma Solar Power Station. Under tender in late 2024, its first 50 MW phase is set for delivery via public–private partnership, expanding solar capacity and reinforcing domestic generation.

Plans for a 200 MW onshore and 350 MW offshore wind farm, via a memorandum with Swiss firm NEK Umwelttechnik, target full deployment by 2027 and could underpin future green hydrogen. ●

Population	**2.76m (2024)**
Total electricity production	**N/A**
Electricity consumption (per capita)	**N/A**
Largest source of electricity generation	**N/A**

(IEA, 2022)

Most residents of The Gambia's capital, Banjul, enjoy access to electricity, but rural areas are less well covered (SHUTTERSTOCK/EYETRAVELPHOTOS)

Ghana

In Ghana, electricity access has risen steadily, reaching more than 89% of the population by early 2025, with universal urban access set against markedly lower rates in rural regions of around 77%. Industrial and commercial users consume a high share of power – industry alone accounted for 42% of total electricity consumption in 2022, slightly ahead of residential use. Despite total installed capacity nearing 5,000 MW by late 2022 and net dependable capacity around 4,390 MW, Ghana has struggled to fully meet peak demand due to ageing infrastructure, transmission losses and fuel supply disruptions, especially affecting thermal generators.

Expansion and diversification projects include the Kaleo solar PV plant, developed by the Volta River Authority, with came online in 2022-23 and now supplies 28 MW to the grid. A floating solar PV array on the Bui reservoir, commissioned in 2024, contributes another 5 MW and complements an onshore solar facility to push Ghana closer to its 10% renewable target. Construction is under way on the larger Nzema Solar Power Station, which is expected to reach 155 MW by 2026, potentially becoming Ghana's largest solar installation.

Population	**34.43m (2024)**
Total electricity production	**23,167 GWh**
Electricity consumption (per capita)	**0.547 MWh**
Largest source of electricity generation	**Gas (63%)**

(IEA, 2022)

Additionally, the Pwalugu multipurpose dam project, including a 60 MW hydro plant integrated with a 50 MW solar park, brings modern hybrid power to the Upper East Region. On the thermal side, Ghana added 720 MW of gas-fired generation in 2023 – 370 MW in Tema and 350 MW in Kumasi – to bolster reliability and support exports. The Kpone Thermal Power Station II, commissioned in 2019 with 340 MW capacity, continues to play a central role in stabilising supply.

Ghana is also exploring nuclear power, having signed an agreement in 2024 to deploy a US-designed NuScale small modular reactor to help add around 1,000 MW by 2034. ●

Akosombo Dam on the Volta River is one of Ghana's sources of hydropower (SHUTTERSTOCK/ NATALY REINCH)

Guinea

According to 2022 figures, just less than half of Guinea's population had access to electricity, with urban coverage reaching approximately 91%,while rural access remained low at around 21%.

Industry – especially mining, which accounts for over 30% of electricity use – relies heavily on hydropower output, while many households and small businesses still depend on unreliable generators or lack access entirely.

Guinea's power system is built largely around hydropower. The Kaléta hydropower plant, completed in 2015, added 240 MW of capacity, followed by the Souapiti Hydropower Station, which reached its full output of approximately 450–550 MW in 2021. However, reliance on seasonal rainfall exposes the system to supply disruption during dry periods.

To widen access, Guinea launched the Electricity Access Scale Up Project in 2019, backed by a $108 million World Bank initiative. It financed the expansion of distribution infrastructure that enabled around 90,000 new or improved household connections, benefiting over 600,000 people. The project also piloted solar mini grids in remote areas.

Population	**14.75m (2024)**
Total electricity production	**N/A**
Electricity consumption (per capita)	**N/A**
Largest source of electricity generation	**N/A**

(IEA, 2022)

Solar energy is emerging via the Khoumagueli solar PV plant, which when completed will generate 40 MW, making it Guinea's first grid-connected solar independent power project. Developed near Linsan by InfraCo Africa and partners, it is designed to complement the nearby Garafiri hydro plant.

New micro hydro schemes are also in progress. Guinea has secured $112 million from ECOWAS Bank to build three small dams in the Mamou region to deliver a combined 30 MW capacity and directly power off-grid communities. Looking ahead, the Koukoutamba Hydropower Station, with planned capacity of 294 MW, is being developed via the Senegal River Basin Development Authority. ●

Kaléta hydropower plant is situated 120 km north-east of Guinea's capital city, Conakry (GAUFF ENGINEERING)

Guinea-Bissau

Access to electricity in Guinea-Bissau remains among the lowest levels in West Africa, with around one-third of the population connected. Electrification reaches around half of the urban population, while rural access is at little more than 10%. Most households rely on biomass, particularly firewood, accounting for over 95% of household energy use.

Guinea-Bissau's grid historically depended on an ageing oil fired thermal plant in Bissau, supplemented by a floating barge-mounted generator leased from Turkey. Together, these sources met barely half the roughly 30 MW peak demand, resulting in frequent blackouts. The situation shifted in April this year when Guinea-Bissau was integrated into the OMVG regional network via transmission lines linking the Kaleta hydropower station in neighbouring Guinea. This allows drawing up to 80 MW during wet seasons, giving the capital access to mostly renewable power rather than diesel generation.

In June 2024, the World Bank approved $35 million funding for a Solar Energy Scale Up and Access Project to establish utility scale solar parks and expand grid infrastructure across Bissau and secondary cities. It includes installation of around 22 MW of solar PV, battery storage, smart meters and new or upgraded lines and transformers. The project builds on a Sinohydro-led contract signed in April to install five solar plants totalling 15–20 MW and a battery storage system, expected to serve roughly 30,000 households.

Current developments aim to raise total supply through a mix of grid connected solar, hybrid mini grids and regional imports, alongside institutional strengthening of EAGB, the national utility. Other projects under way include the electrification of 14 locations, financed by BOAD, and the electrification of 64 locations, financed by the World Bank ●

Population	**2.201m (2024)**
Total electricity production	**N/A**
Electricity consumption (per capita)	**N/A**
Largest source of electricity generation	**Hydro**

(IEA, 2022)

Electrification reaches only half the population in urban areas such as the capital, Bissau (SHUTTERSTOCK/ JASILVEIRA)

Kenya

Kenya has made impressive progress in expanding electricity access, reaching almost 100% in urban areas and around 65% in rural regions by early 2024. The country's ongoing Last Mile Connectivity Project is playing a significant role in expanding rural connections.

Industry leads electricity consumption in Kenya, using over half the total power generated. Major sectors include manufacturing, agriculture and mining, all of which rely on a stable supply. Installed generation capacity reached about 3.3 GW by late 2023, dominated by renewables: approximately 47% geothermal, 21% hydro, 16% wind and 4% solar. Diesel generators and bioenergy provided the remainder.

Kenya continues to expand its renewable energy infrastructure. The latest geothermal plant, Menengai III, added 35 MW to the grid in August 2023, and Menengai II is expected online during 2025 as part of a plan to double geothermal capacity by the end of the decade.

Wind power is anchored by the 310 MW Lake Turkana project and the 100 MW Kipeto facility; solar contributions include the 52 MW Malindi solar park, commissioned in 2022. Electricity generating company KenGen is developing a floating solar station over Kamburu Dam (42.5 MW), expected online around mid-2026 to help smooth seasonal hydropower fluctuations.

Innovations beyond renewables include the Dandora waste to energy plant in Nairobi, planned to generate up to 45 MW when commissioned, turning municipal waste into electricity. Grid modernisation is also under way with a $205 million investment in the Last Mile Connectivity Project's fourth phase to connect rural regions and upgrade over 3,000 transformers, along with plans to replace 20,000 transformers to cut outages and reduce losses estimated at 23% in 2023. ●

Population	**56.43m (2024)**
Total electricity production	**12,703 GWh**
Electricity consumption (per capita)	**0.191 MWh**
Largest source of electricity generation	**Geothermal (47%)**

(IEA, 2023)

The Lake Turkana wind power project plays a major role in Kenya's energy generation (EIB)

Liberia

Liberia's electricity sector remains one of the least developed in Africa, with about 33% of the population able to access electricity in 2024. Urban areas, particularly around capital city Monrovia, saw higher connection rates of around 50%, while access in rural areas was almost 8%.

Most households rely on biomass for cooking and small private generators for electricity, while Liberia Electricity Corporation (LEC) serves the Greater Monrovia area. Installed capacity was approximately 126 MW by mid-2024, composed of an 88 MW Mount Coffee hydropower plant, 38 MW in thermal heavy fuel oil generators and imports from Côte d'Ivoire supplying about 50 MW during dry months. Despite this, peak demand reached roughly 90 MW, revealing continued under-supply and occasional load shedding.

Between 2010 and 2023, household connections more than doubled, from around 143,000 in 2021 to 282,505 in 2023, as LEC expanded distribution lines and adopted prepaid meters. Distribution losses decreased from 48% in 2021 to 27% by mid-2024.

To improve generation and reliability, the World Bank disbursed $45 million in 2024 for the Renewable Energy Solar Power Intervention Project (RESPITE), enabling expansion of Mount Coffee to 126 MW and construction of Liberia's first utility-scale solar farm at the same site, expected to deliver around 20 MW. Earlier this year, feasibility work began on the 150 MW St Paul River SP2 hydropower project, poised to deliver more consistent power through seasonal variation.

Liberia's National Energy Compact outlines goals to connect 100,000 households annually and reach 75% national access by 2030, while raising the share of renewable generation to the same percentage. Rural energy programmes and solar mini grids are being piloted to support dispersed communities, though scaling remains slow amid infrastructure and financial challenges. ●

Mount Coffee hydropower plant will soon be expanded as a result of World Bank funding (LEC)

Population	**5.613m (2024)**
Total electricity production	**N/A**
Electricity consumption (per capita)	**N/A**
Largest source of electricity generation	**N/A**

(IEA, 2022)

Libya

Electricity access in Libya is virtually universal, with nearly 100% of the population connected to the national grid. However, outages remain frequent and unpredictable, reflecting ageing infrastructure and fuel supply disruptions. Many households and businesses rely on personal diesel generators to ensure reliability, especially during peak summer months when demand surges.

Libya's electricity generation is overwhelmingly based on fossil fuels. Natural gas provides about three-quarters of the mix, while oil accounts for the remainder. There is currently no significant contribution from renewables, with small-scale solar and pilot projects accounting for less than 0.1% of generation.

Total generation reached roughly 30 TWh in 2022 and climbed slightly in 2023 as operational capacity improved to about 8.2 GW – up from around 5.8 GW a year earlier – marking a service improvement after years of underperformance. Libya has begun to restore fuel supply reliability and reduce outages through rehabilitation of ageing power plants and technical assistance from agencies such as USAID, directed at grid operations and efficiency improvements.

Population	**7.381m (2024)**
Total electricity production	**35,106 GWh**
Electricity consumption (per capita)	**4.22 MWh**
Largest source of electricity generation	**Gas (76%)**

(IEA, 2022)

Efforts to diversify the energy mix have started gaining traction. In 2023-24, Libya released a Renewable and Energy Efficiency Plan targeting 20% of electricity from renewables by 2035, which will require adding up to 4 GW of solar and wind capacity and deploying 500 MW of rooftop solar panels. TotalEnergies, Repsol, PowerChina and others have discussed or signed agreements to develop solar projects totalling nearly 500 MW.

On the gas front, early 2025 saw production begin at the Chadar field in Sirte Basin, with broader upstream deals under way to attract international firms such as BP and Shell to revive legacy fields. ●

Renewable energy will form part of the future for powering Libya and its capital, Tripoli (SHUTTERSTOCK/ HUSSEIN EDDEB)

Madagascar

Madagascar's electricity landscape remains limited, with about 36% of the population connected to electricity as of 2022. Urban electrification stands at approximately 57%, while access in rural zones falls to roughly 7%. Indoor air pollution and reliance on biomass for cooking affect nearly all households outside cities, with only about 1.5 % using clean cooking solutions. The national utility company, Jirama, faces high system losses due to ageing infrastructure, poor billing recovery and dependence on imported fuel.

While industry accounts for nearly 39% of electricity consumption, many enterprises rely on costly generators or solar kits because of poor supply reliability.

Under the National Energy Compact unveiled in early 2025, Madagascar aims to raise its access rate to 80% by 2030, and efforts to expand capacity and modernise networks are under way. The Sahofika hydropower station, under construction since 2019, aims to deliver 205 MW and serve up to eight million people while reducing CO_2 emissions by nearly 900,000 tonnes annually. The Volobe project, a 120 MW run of river dam near Toamasina, is scheduled to come online in 2030 to support grid expansion and electrification targets. In solar, the Ambatolampy Solar Power Station was commissioned in 2018 and expanded to 40 MW in 2021-22, becoming the first grid-connected private solar facility with battery storage.

To accelerate off-grid access, the government launched the DECIM (Digital and Energy Connectivity for Inclusion in Madagascar) initiative in 2023 under a $400 million World Bank credit, targeting close to 10 million new users, mainly through mini-grids and solar kits, especially in vulnerable and rural areas. SEforALL-backed projects have also installed over 50,000 solar home systems and mini-grids in remote communities. ●

Population	**31.96m (2024)**
Total electricity production	**2,613 GWh**
Electricity consumption (per capita)	**0.084 MWh**
Largest source of electricity generation	**Oil (46%)**

(IEA, 2022)

Urban electrification in Madagascar's urban areas is around 57% (SHUTTERSTOCK/ JAKUB ZAJIC)

Malawi

Malawi is endowed with a wide range of energy resources, including coal, fuel wood, solar, hydro, and wind. Despite this natural wealth, access to electricity remains low. Only 25.9% of the population is connected, with 11.3% accessing electricity through the national grid and 14.6% through off-grid solutions.

Malawi plans to raise electricity access from the current 25.9% to 70% by 2030. To meet the projected annual demand of at least 5,166 GWh, the country plans to install 848 MW of additional generation capacity. Parallel investments will include 22,417 km of new distribution lines, 1,940 km of transmission lines and substantial substation upgrades. These projects are intended to improve reliability, expand rural access and provide new opportunities for power producers.

Malawi is strengthening its regional energy integration through interconnectors with Mozambique, Zambia, and Tanzania. These projects will facilitate cross-border trade, enhance grid stability and integrate Malawi into the Southern African Power Pool (SAPP). This strategic positioning opens opportunities for both domestic supply and regional electricity exports.

The country is currently constructing a 10 MW photovoltaic solar project at Salima, demonstrating its commitment to diversifying the energy mix. The Malawi Mozambique Interconnector is nearing completion. Additionally, advanced preparations are under way for the 358 MW Mpatamanga Hydropower Project under public–private partnership..

With abundant renewable resources, rising demand, and government-backed reforms, Malawi's energy sector offers significant potential for sustainable investment. The country is positioning itself as an attractive hub for renewable energy projects, regional power trade and long-term growth. ●

Population	**21.66m (2024)**
Total electricity production	**2,151.3 GWh**
Electricity consumption (per capita)	**0.107 MWh**
Largest source of electricity generation	**Hydro**

(IEA, 2022)

An artist's impression of the Mpatamanga Hydropower Storage Project, which is currently under construction (MHSP)

An aerial view of Kita Solar Power Station, which came online in 2020 (APUO ENERGY)

Mali

By 2021, around 53% of Mali's population had access to electricity, with urban coverage near 87% contrasting with roughly 25% in rural areas. Most rural households rely on biomass or diesel for basic energy needs, while local micro-enterprises and agriculture remain constrained by high cost and poor reliability.

Industry, especially mining and agro-processing, consumes a large share of available power. National generation capacity of approximately 900 MW is split between diesel-fired plants (54%) and hydroelectric sources (34%), with solar contributing only 3% as of 2023. Frequent outages and high transmission losses mean many businesses depend on costly backup generators.

Population	**24.48m (2024)**
Total electricity production	**N/A**
Electricity consumption (per capita)	**N/A**
Largest source of electricity generation	**Diesel (54%)**

Recent projects aim to close access gaps and improve supply. The World Bank's Yelen Sira programme, launched in mid-2023, allocated $157 million to boost grid efficiency in capital city Bamako, add 100 MW of transmission capacity, reduce losses and connect 60,000 households and more than 1,000 public facilities in secondary cities and rural zones.

Utility-scale solar projects are advancing. The 50 MW Kita Solar Power Station came online in 2020. In addition, the proposed Fana solar farm is under development through PPP frameworks, with plans to supply new towns along transmission lines into Bamako. Small solar mini-grids have extended off-grid access to over two million people across Mali's south and south-west regions since 2021, enhancing productivity in rural villages.

Regional integration forms another pillar. The developing interconnection with Mauritania includes a 50 MW solar plant and enables delivery of power to new localities in Mali as part of the Desert to Power corridor. ●

Mauritania

Mauritania's electricity access is uneven, with urban electrification at almost 84% by 2022, while rural coverage stood at just less than 4%. This imbalance leaves around half of the country's population without reliable electricity, hampering development in the more remote areas.

Historically, electricity generation has relied heavily on diesel-powered networks, but progress in renewables has begun to shift this balance. By 2022, renewable sources – comprising solar, wind and hydro – contributed about a third of the country's energy. The completion of a 30 MW wind farm near the capital, Nouakchott, in 2018 demonstrated the feasibility of wind energy. The Boulenouar Wind Power Plant, with capacity of 102 MW, was commissioned in December 2023 after five years of development and became the largest wind installation in Mauritania.

Solar capacity has also grown. The Sheikh Zayed Solar Power Plant (15 MW) in Nouakchott and eight rural solar installations (16.6 MW) built by Masdar brought solar generation online in both urban and dispersed rural areas.

Population	**5.169m (2024)**
Total electricity production	**N/A**
Electricity consumption (per capita)	**N/A**
Largest source of electricity generation	**N/A**

(IEA, 2022)

The government, with support from the African Development Bank, is advancing infrastructure to improve access. Key financing of $289.5 million supports the Mauritania-Mali interconnection and associated solar power plants, along with mini-grid hybrid systems to electrify 40 south-eastern localities. Mauritania's energy law reforms are enabling private-sector participation through independent power producers and targeting renewables for 50% of its energy mix by 2030.

Parallel to renewable expansion, the Greater Tortue Ahmeyim offshore gas project began producing liquefied natural gas early in 2025, with capacity to supply a combined-cycle power plant. ●

Boulenouar Wind Power Plant is the largest wind power installation in Mauritania (AERA)

Morocco

Morocco has achieved near-universal electricity access, with almost the entire population – urban and rural – connected to the grid. This level of coverage supports both residential needs and a thriving industrial sector, despite occasional outages and peak-demand pressures.

Industry in Morocco consumes a notable portion of electricity, with industry and households each accounting for 35% of total consumption as of 2023. Although fossil fuels – particularly coal and oil – still power most of the energy system, renewables are steadily gaining ground. In 2024, solar, wind and hydropower supplied around 44% of electricity, with a goal to reach 52% by 2030.

The Noor Ouarzazate Solar Complex – a concentrated solar power facility of over 500 MW – has become a cornerstone of this transition, delivering clean, stored energy to the national grid. Wind energy is also expanding rapidly: wind farms across southern provinces now contribute hundreds of megawatts, raising wind's share in the energy mix to over 21% by the end of 2024.

Morocco is also investing in modernising its grid and infrastructure. A high-voltage transmission line linking southern renewable hubs to the north is under development, enhancing integration of green energy into major demand centres. In parallel, the country is exploring shifting from coal and gas with its first LNG terminal near Nador, supporting industrial zones and complementing renewable efforts. ●

Population	**38.08m (2024)**
Total electricity production	**43,711 GWh**
Electricity consumption (per capita)	**0.994 MWh**
Largest source of electricity generation	**Coal (62%)**

(IEA, 2023)

Noor III solar plant in Ouarzazate forms part of one of the largest solar power projects in the world (SHUTTERSTOCK/ EVGENII MILANOV)

Mozambique

Mozambique has made steady progress in expanding electricity access, climbing to about 60% of the population by 2024. This progress was largely spurred by 564,000 new household connections – 396,000 via the national grid and 170,000 through off-grid systems – under the Energy for All programme led by Electricidade de Moçambique (EDM) and FUNAE. Despite these gains, coverage in rural areas is a challenge, with only around 22% within reach of the grid, compared to 88% of urban residents.

Mozambique's industry – particularly gas processing, mining and agricultural exports – relies heavily on hydropower from the Cahora Bassa dam, which produced a five-year peak of 16 TWh in 2023. To diversify and bolster generation, the 1.5 GW Mphanda Nkuwa hydropower plant is being developed with EDF, TotalEnergies and others, and is expected to add 8.6 TWh annually when operational in 2031.

In renewables, Mozambique is expanding solar and wind capacity: solar plants such as the 40 MW Mocuba and 41 MW Metoro stations are already feeding the grid, while projects such as the 20 MW Cuamba and the planned 100 MW Chimuara solar farms are advancing. The Namaacha wind farm, with 120 MW capacity, is also under construction to bring wind energy into the mix.

Population	**34.63m (2023)**
Total electricity production	**19,558 GWh**
Electricity consumption (per capita)	**0.394 MWh**
Largest source of electricity generation	**Hydro (83%)**

(IEA, 2022)

Gas is another critical element of the energy transition. The Coral Norte FLNG project by Eni was approved in 2025 and is expected to produce 3.55 million tonnes of LNG annually starting around 2028 Reuters, while TotalEnergies' $20 billion LNG venture at Afungi is being readied for restart.

A new US$131 million project, ASCENT in Mozambique – co-funded by the World Bank and Energy for All – will further increase access for one million people, providing both on-grid and off-grid electrification, clean cooking options and utility performance upgrades. ●

Progress is being made on connecting more of Mozambique's population to the electricity grid (SHUTTERSTOCK/ IVAN BRUNO DE M)

Namibia

Namibia's energy sector is in transition, with efforts under way to enhance access, boost generation and reduce dependence on imports. Around 55% of the population is connected to the national grid, while rural areas lag far behind with only 20-30% electrification in many remote villages. Much of Namibia's industry – mining, processing and manufacturing – depends on this infrastructure, but challenges of loadshedding, high cost and imported power still affect reliability and competitiveness.

Namibia currently imports 60-70 % of its electricity from neighbours such as South Africa and Zambia. Domestic generation capacity has grown, and the share of renewables has risen to 21%, with a national target of 70% renewables by 2030. One of the newest additions is the Anixas II Power Station in Walvis Bay, which contributes 54 MW and will help to reduce dependence on imports. Namibia's first grid-connected solar PV plant fully owned by the state, the 20 MW Omburu Solar Power Station, began operations in mid-2022, generating about 67.8 GWh annually.

Further projects are helping to diversify the mix. The Otjikoto Biomass Power Station, with 40 MW capacity, is under construction and is expected to add domestic dispatchable power via biomass feedstock (wood chips) near Tsumeb. A wind farm of 44 MW near Lüderitz has also been financed to bolster local generation.

Namibia is pushing forward with regulatory reforms and transmission upgrades. A World Bank-backed project is supporting development of the Auas-Kokerboom transmission line, a utility-scale battery energy storage system and enabling more renewables to enter the grid. The government is aiming for 80% energy self-sufficiency by 2028 through domestic renewable generation, including solar, wind, biomass and hybrid projects. ●

Population	**3.03m (2024)**
Total electricity production	**1,331 GWh**
Electricity consumption (per capita)	**1.386 MWh**
Largest source of electricity generation	**Hydro (59%)**

(IEA, 2022)

Nambia's capital, Windhoek, enjoys electricity access that most rural residents are yet to receive (SHUTTERSTOCK/ MAURIZIO DE MATTEI)

Niger

Niger remains one of the countries in West Africa with very low electricity access. As of 2022, only about 19.5% of the population had access to electricity. Urban residents are much more likely to be connected (around 66%), while in rural areas the rate falls to less than 8%. This gap limits industrial expansion, especially outside major cities, because many factories and firms must rely on costly diesel generators when grid supply is unreliable or absent.

Population	**27.03m (2024)**
Total electricity production	**782 GWh**
Electricity consumption (per capita)	**0.06 MWh**
Largest source of electricity generation	**Oil (69%)**

(IEA, 2022)

The country depends heavily on imports and fossil fuels for its generation. In 2022, over 80% of Niger's electricity supply was imported from neighbouring countries, particularly Nigeria. Diesel and coal are also used in local generation. Solar forms a very small share of capacity at under 3%.

Niger's plans – including its National Strategy of Energy Access (SNAE) and policies to expand renewables – signal its intent to tackle supply shortages and improve reliability for both households and industry. To increase generation and improve access, the government has launched and is planning several projects. In mid-2023, a 200 MW solar PV agreement was signed between Savannah Energy and the government for two plants near Maradi and Zinder. These plants are expected to go online by 2026 and raise Niger's grid-connected generation by 20%. Construction of a 30 MW solar plant was also completed in Gorou Banda in 2023 to help address supply shortfalls.

Another large infrastructure project in progress is the Kandadji Dam, under construction on the Niger River in the Tillabéri region. When completed, it should provide 130 MW of hydropower, as well as storage for dry-season flow regulation. ●

Two-thirds of those living in Niger's cities have electricity access in a country of very low connectivity (SHUTTERSTOCK/ CHINEDU CHIME)

Nigeria's capital, Abuja. The country faces the challenges of ensuring both energy access and reliability of supply (SHUTTERSTOCK/ TAYVAY)

Nigeria

In 2023, 61% of Nigerians had access to electricity, leaving approximately 86.8 million people without grid connections. Nigeria faces a dual challenge: increasing access for the many who remain without electricity, and making supply dependable for industry and homes already connected. Large-scale solar projects, off-grid solutions and reforms across generation, transmission and distribution are central to its strategy going forward.

Industry in Nigeria – manufacturing, oil & gas and services – consumes a large share of electricity production, but suffers when supply is erratic. While the country has an installed capacity exceeding 12,000 MW, actual output often falls short of this due to operational constraints, maintenance issues and fuel supply interruptions.

Recent initiatives aim to both boost generation and improve access. In 2024, Nigeria's sovereign wealth fund launched a pilot 20 MW solar plant in Shiroro, Niger State, as part of a broader plan for a 300 MW solar-hydro hybrid development. Another initiative backed by the World Bank and African Development Bank will fund 400 renewables mini-grids and 50 MetroGrids to reach 1.5 million to 2 million people in rural and peri-urban areas.

The government also signed an agreement with LONGi in early 2025 to supply 2,600 MW of solar modules for a Green Hydrogen Hub in Akwa Ibom, aiming to attract industrial growth and reduce fossil fuel dependence. To support manufacture of solar equipment locally, Nigeria agreed to build a 1.2 GW solar module assembly plant with Oando Clean Energy under the Rural Electrification Agency, part of broader efforts to expand both grid-tied and off-grid solar deployment.

Reforms to distribution are also in progress, with government funding and policy being used to improve the performance of distribution companies, expand network infrastructure and enhance metering. ●

Population	**232.7m (2024)**
Total electricity production	**37,915 GWh**
Electricity consumption (per capita)	**0.138 MWh**
Largest source of electricity generation	**Gas (75%)**

(IEA, 2022)

Republic of the Congo

In the Republic of the Congo, access to electricity has been gradually rising, although though many people remain off-grid. In 2022, 50.6% of the population had access to electricity, a slight rise from just under half in 2021. Disparities are large between urban and rural areas: the urban access rate is around two-thirds, while in rural zones it falls to less than 13%. Industrial sectors – including oil & gas extraction, processing industries and service sectors – depend heavily on grid supply, yet frequent outages and insufficient capacity limit consistent operations.

Installed generation capacity in the country is approximately 842 MW (as of 2023), with almost 80% from fossil fuel sources. Hydroelectric power accounts for about 20%, and solar and biomass contribute only a very small share.

Government-backed projects include the Liouesso Hydroelectric Power Station, with 19.2 MW capacity, commissioned in 2017 near Ouesso on the Sangha River, which contributes to local grid reinforcement and rural access. More recently, in December 2024 the government agreed to build a 50 MW photovoltaic plant under the Ignié 2021-46 project in the Ignié Special Economic Zone. This hybrid solar-biomass facility aims to power local industry and attract investment.

Population	**109.3m (2024)**
Total electricity production	**5,013 GWh**
Electricity consumption (per capita)	**0.464 MWh**
Largest source of electricity generation	**Gas (72%)**

(IEA, 2022)

The government has set an ambitious target of increasing generation capacity to 1,500 MW by 2030, with a focus on renewables and modernising transmission infrastructure. Projects under development include a 400 MW gas-fired power plant and exploration of a 50 MW solar farm in the Brazzaville region.

The country is also building its LNG export and processing capacity. The Nguya FLNG facility will raise Congo's liquefaction to about three million tons per annum, supporting both domestic power use and exports. ●

The Republic of the Congo's capital, Brazzaville. Two-thirds of residents in urban areas have electricity access (SHUTTERSTOCK/ ISSA KASHALA)

Rwanda

Rwanda has made steady progress in improving electricity access, with 82.2% of households connected by the end of February 2025. Of those, 57.4% are tied to the national grid, while 24.8% rely on off-grid solutions, particularly solar systems. This marks a major leap from earlier in the decade, when access was far lower in rural areas.

Total installed generation capacity in Rwanda expanded to approximately 406.4 MW by early 2025. Hydropower provides roughly 27% of this total, with methane gas from Lake Kivu contributing about 21%, supplemented by smaller shares from solar and diesel generation.

Among projects aimed at boosting capacity, Rwanda has advanced the Nyabarongo II Hydropower Plant (43.5 MW), currently under construction with funding from China Exim Bank, to increase output and diversify sources. The Shema Power Lake Kivu project began operations in early 2024, adding 56 MW of methane-powered generation to the grid.

Rwanda's strategy also includes off-grid efforts. With almost 25% of households using solar energy or mini-grids, the government is pushing subsidy programmes to expand solar home systems among rural and remote communities. Transmission and distribution network updates are under way, including new substations to reduce energy losses and improve stability.

Manufacturing, agro-processing and services industries all depend heavily on reliable electricity, but supply instability often constrains industrial expansion or adds overheads, particularly for small and medium-sized enterprises. Tariff levels remain a concern, with small-scale industries paying higher per-kWh rates than larger users, prompting government initiatives to revise the tariff framework. ●

Population	**14.26m (2024)**
Total electricity production	**1,101 GWh**
Electricity consumption (per capita)	**0.068 MWh**
Largest source of electricity generation	**Hydro (50%)**

(IEA, 2022)

The methane-powered Shema Power Lake Kivu project started operations in early 2024 (RWANDA ENERGY GROUP)

Senegal

As of 2023, 84% of Senegal's population has access to electricity, but while access in urban areas is universal, it stands at 64% in rural areas. Many rural households still rely on alternative sources or live without reliable power. Among the industries depending on reliable power supply are agribusiness, mining and manufacturing.

The national energy mix is becoming more renewable. About 460 MW of capacity is dedicated to renewable sources – including solar, wind, and hydro – with solar accounting for almost half the total. Under its Just Energy Transition Partnership, Senegal has committed to raise the renewable share in generation to 40% by 2030 and to expand total generation capacity by about 70% relative to current levels.

Recent and current projects reflect this push. The NEA Kolda solar and battery-storage facility under construction in southern Senegal will deliver 60 MW of solar power with 72 MWh battery backup, serving over 235,000 people and enhancing grid stability. The Niakhar solar plant, backed by a $23 million loan from the BOAD, is planned at 30 MW plus storage (15 MW/45 MWh) and is intended to supply 150,000 households.

Additionally, the Parc Éolien Taiba N'Diaye, the first utility-scale wind farm in Senegal, is the largest wind power station in West Africa, by generation capacity. Generating 158.7 MW of power for more than two million people, it helps Senegal's diversification from diesel-dependent generation.

Senegal also faces challenges around clean cooking, as only 30% of the population has access to clean cooking fuels and equipment, mostly in urban areas, while rural areas lag far behind. The cost of extending grid infrastructure into remote areas remains high, but ongoing expansion of transmission lines, off-grid mini-grids and storage projects are part of an evolving strategy to improve reliability and expand access. ●

Population	**18.5m (2024)**
Total electricity production	**7,908 GWh**
Electricity consumption (per capita)	**0.417 MWh**
Largest source of electricity generation	**Oil (85%)**

(IEA, 2023)

Senegal's cities – including its capital, Dakar – enjoy universal access to electricity (SHUTTERSTOCK/ DEREJE)

A solar power plant in Northern Cape. Solar PV capacity has expanded rapidly in South Africa (SHUTTERSTOCK/ SAFFA_O)

South Africa

As of 2022, 86.5% of people in South Africa had electricity access, with near universal urban access. However, many rural areas struggle with weaker connections and frequent outages. Industry accounts for over half of electricity consumption, with sectors such as mining, manufacturing, chemicals and services being the heaviest users.

Installed generation capacity in South Africa is over 60 GW, with coal still the backbone of its energy mix, responsible for approximately 82% of electricity generation in 2022. Renewables have begun to alter this balance: solar, wind and concentrated solar power have grown, particularly under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which has added more than 6,200 MW of renewable generation through private-sector projects.

Population	**64.01m (2024)**
Total electricity production	**229,309 GWh**
Electricity consumption (per capita)	**3.398 MWh**
Largest source of electricity generation	**Coal (82%)**

(IEA, 2022)

Solar PV capacity has expanded rapidly, with 1.1 GW of new solar installed in 2024. Growth has been especially strong in commercial and industrial embedded generation, which helps businesses reduce exposure to loadshedding.

Several large-scale projects are in progress to improve the generation mix and grid resilience. The Impofu Wind Power Farms Complex, expected online in 2026, will deliver 330 MW in the Eastern Cape under a wheeling agreement to support industrial demand. The Seriti Wind Power Station (155 MW) in Mpumalanga will add renewable supply capacity, while the Bolobedu Solar Power Station (149 MW), under development in Limpopo, is planned to feed directly into mining operations – helping diversify supply sources and reduce reliance on coal or imports for those sectors. ●

Tanzania

Tanzania has been making steady advances in increasing electricity access. As of mid-2025, around 46% of the population has formal electricity access, with urban areas much better served than rural ones. Nearly all of Tanzania's villages have been connected to the grid, leaving less than 1% without a connection.

However, many households even in connected villages remain without service as a consequence of internal network reach and affordability issues. Industrial users – such as those in the mining, cement and manufacturing sectors – often face instability in supply, price fluctuations and occasional rationing.

The country's generation mix leans heavily on hydropower and natural gas, while solar and biomass play minor roles. The government, via its National Energy Compact, is aiming to lift electricity connectivity to 75% by 2030 and clean cooking access to 80% by 2034, while increasing the renewable share in power generation to 75%, up from current levels near 62%.

Coverage and stability will be boosted by new projects including the Julius Nyerere Hydropower Project (JNHPP), which is under construction and will add 2,115 MW to Tanzania's system, easing seasonal shortfalls and helping to reduce reliance on imports and thermal back-up. Other power plants under development include the 88 MW Kakono Hydroelectric Power Station in Kagera region. The Kishapu Solar Power Station has been completed (50 MW, with potential expansion to 150 MW), helping to further diversify the power mix.

In island regions Unguja, Pemba and Mafia, a project to install high- and medium-voltage submarine power cables, funded by the African Development Bank, will expand capacity from 143 MW to 440 MW, pushing last-mile connections to reach nearly 465,000 people. ●

Population	**68.56m (2024)**
Total electricity production	**9,625 GWh**
Electricity consumption (per capita)	**0.122 MWh**
Largest source of electricity generation	**Gas (69%)**

(IEA, 2022)

Residents are well connected in cities such as Dodoma, Tanzania's capital (SHUTTERSTOCK/ QIM MANIFESTER)

Togo

Togo has set a goal of universal electricity access by 2030. While progress has been made, many rural communities remain without reliable grid connections, generation capacity sometimes struggles to meet peak demand and costs for both supply and connection remain barriers for poorer households.

According to 2023 figures, 59.2% of Togolese had access to electricity, but an urban-rural divide exists – urban access rates are close to 97%, while rural areas lag behind at around 25%. The national installed generation capacity is modest and fossil fuels dominate, although renewables are growing in role.

Recent and current projects are aimed at closing the access gap and improving the energy mix. Blitta Solar Power Station, also known as the Mohamed Bin Zayed Power Station, came online in 2021 with 50 MW, and is being expanded to 70 MW. In mid-2025 the African Development Bank approved €26.5 million to support a 62 MW-peak solar PV plant in Sokodé, which aims to bring electricity to more than 700,000 people in Sokodé and surrounding rural towns. The Dapaong Solar Power Station project will combine 25 MW of peak solar with 36 MWh of battery energy storage and is expected to serve 145,000 people in the region. These projects are part of Togo's renewable energy strategy, which has set a target of 200 MW of solar generation, also to be achieved by 2030. ●

Population	**9.515m (2024)**
Total electricity production	**820 GWh**
Electricity consumption (per capita)	**0.197 MWh**
Largest source of electricity generation	**Gas (79%)**

(IEA, 2022)

Blitta Solar Power Station is being expanded to help close the access gap and improve Togo's energy mix (APEA POWER)

Tunisia

Tunisia has achieved near-universal electricity access. However, the country faces challenges in ensuring a reliable and sustainable energy supply, particularly for its industrial sectors, including manufacturing and mining.

As of 2023, Tunisia's total installed electricity generation capacity was approximately 6,639 MW, with a generation of 21,286 GWh. The energy mix is predominantly fossil fuel-based, with natural gas accounting for approximately 94% of electricity generation. Renewable energy sources contribute a modest share, with wind power at 240 MW, solar power at 263 MW and hydroelectric power at 62 MW, collectively representing about 8% of the national energy production capacity.

To diversify its energy sources and enhance sustainability, Tunisia has initiated several renewable energy projects. In June 2023, the World Bank approved $268.4 million in financing for the Tunisia-Italy interconnector (ELMED) project, which aims to link Tunisia's energy grid with European markets and facilitate renewable energy exports.

Population	**12.28m (2024)**
Total electricity production	**21,422 GWh**
Electricity consumption (per capita)	**1,565 MWh**
Largest source of electricity generation	**Gas (96%)**

(IEA, 2022)

Additionally, the government has granted development licences for four solar photovoltaic projects totalling 500 MW – a 100 MW solar plant in the Kasr region, a 200 MW project in the Al-Khabna region, a 100 MW solar park in Gabès and a 100 MW solar power plant near Mazouna – marking a significant step towards increasing the share of renewables in the energy mix.

Looking ahead, Tunisia aims to achieve 35% of its electricity generation from renewable sources by 2030, with a target of 8,530 MW of renewable capacity by 2035. ●

Renewable sources currently make up only a small part of Tunisia's energy production (SHUTTERSTOCK/ HICHEM KAOUANE)

Uganda

Uganda's energy sector has made notable strides in expanding electricity access. As of 2023, 51.5% of the population had access to electricity, marking a 4.4% increase from the previous year. However, rural regions have electrification rates as low as 10%.

The country's electricity generation capacity has seen substantial growth, continuing on an upward path for over a decade. By 2024, Uganda's installed capacity reached 2,048 MW – a 63.7% increase from 1,251 MW in 2020. This expansion is largely attributed to the commissioning of major hydroelectric projects such as the Isimba (183 MW) and Karuma (600 MW) dams, the latter being the country's largest power plant.

Uganda's energy mix is predominantly renewable, with hydropower accounting for almost 80% of electricity generation. Other renewable sources include bagasse (waste material remaining after sugarcane stalks are pressed – 8.2%) and solar power (4.6%).

Several initiatives are under way to address sustainability and reliability challenges and bolster the energy sector. In December 2024, the Emerging Africa & Asia Infrastructure Fund (EAAIF) reached financial close for a 20 MW solar photovoltaic plant in north-western Uganda, investing approximately $18 million in the project.

Additionally, a 100 MW solar project coupled with a 250 MWh battery storage system has been approved to enhance grid stability and accelerate the country's transition to renewable energy.

These efforts align with Uganda's broader energy policy goals, which include achieving over 98% electrification by 2030 and increasing the share of renewable energy to over 90%. ●

Population	**50.02m (2024)**
Total electricity production	**5,775 GWh**
Electricity consumption (per capita)	**0.09 MWh**
Largest source of electricity generation	**Hydro (86%)**

(IEA, 2022)

Isimba Hydropower Plant is located 4km downstream of Simba Falls on the River Nile (UEGCL)

Zambia

As of 2023, approximately 51% of Zambia's population had access to electricity, reflecting a modest increase from previous years. However, rural electrification rates remain notably low, with 34% of the rural population having access to electricity, compared to more than 80% in urban regions.

The country's energy infrastructure is predominantly based on hydropower, which, while renewable, has proven vulnerable to climatic variations. In 2023, Zambia's electricity generation reached 19,373 GWh, with a generation capacity of 3,990 MW. However, the nation has faced power deficits due to drought-induced low water levels in reservoirs, leading to electricity rationing and highlighting the need for a diversified energy mix.

Population	**21.31m (2024)**
Total electricity production	**19,475 GWh**
Electricity consumption (per capita)	**0.709 MWh**
Largest source of electricity generation	**Hydro (88%)**

(IEA, 2022)

In response to these challenges, Zambia is actively pursuing renewable energy projects to bolster its energy security. Notably, in June 2025, the country inaugurated the 100 MW Chisamba solar power plant, developed by PowerChina, which supplies electricity to First Quantum Minerals. This project aims to reduce dependence on electricity imports from its neighbours and free up domestic power for local consumers.

Additionally, the Kalulushi Concentrated Solar Power Station, a proposed 200 MW facility, is under development by a consortium of independent power producers. Located in the Copperbelt Province, this project aims to integrate solar energy into the national grid.

The government has also initiated the Renewable Energy Financing Framework, targeting the development of 100 MW of renewable projects, primarily solar, to support rural electrification efforts and promote sustainable energy access.

Looking ahead, Zambia's Integrated Resource Plan for 2023-50 outlines a roadmap to meet future energy demands by optimising the energy mix, scaling up renewables and achieving a green transition aligned with climate goals. ●

An aerial view of Kariba hydroelectric power plant on the Zambezi river between Zambia and Zimbabwe (SHUTTERSTOCK/ DMITRIY KANDINSKIY)

Zimbabwe

Night time in Harare, capital of Zimbabwe, where rapid progress is being made towards universal electricity access (SHUTTERSTOCK/ TAWANDA KAPIKINYU)

Zimbabwe's energy sector is undergoing a transformative phase, marked by strides in renewable energy adoption and efforts to address long-standing challenges in electricity access. The country aims to achieve universal electricity access by 2030 – as of 2023, approximately 62% of the population had access to electricity, a notable increase from 50.1% in 2022. This progress reflects the government's commitment to expanding electrification, particularly in rural areas. In these regions, the proportion of the population with access to electricity rose to 51.4% in 2023, an increase from 33.7% in 2022.

The country's energy infrastructure is predominantly reliant on coal and hydropower. In 2023, coal accounted for 55.75% of electricity generation, a substantial increase from 33.08% in 2022. Hydropower, while still significant, faces challenges due to fluctuating water levels in reservoirs such as Lake Kariba. Zimbabwe's installed electricity generation capacity stood at approximately 2,491 MW in 2023, with actual generation reaching 8,308 GWh. However, due to factors such as ageing infrastructure and climatic conditions, actual electricity generation often falls short of installed capacity.

To diversify its energy mix and enhance sustainability, Zimbabwe has embarked on several renewable energy projects. The Guruve Solar Power Plant, a 10 MW facility, is set to generate 22,000 MWh of clean electricity annually, reducing the need for electricity imports by over $2 million each year and cutting approximately 24,000 tonnes of carbon emissions. Additionally, the Pomona Waste-to-Energy Power Station in Harare, with a capacity of 22 MW, is designed to convert solid waste into electricity, contributing to both waste management and energy generation. ●

Population	**16.63m (2023)**
Total electricity production	**8,706 GWh**
Electricity consumption (per capita)	**0.53 MWh**
Largest source of electricity generation	**Hydro (68%)**

(IEA, 2022)

	POPULATION	INSTALLED POWER (MW)	SUBSCRIBERS BT	SUBSCRIBERS MT	SUBSCRIBERS HT	TOTAL SUBSCRIBERS
ALGERIA	48,098,209	25,341.00	11,801,447	70,019	134	11,871,600
ANGOLA	38,458,208	5,907.99				1,600,000
BENIN	14,111,034	182.00	916,222	1,132	2	917,356
BOTSWANA	2,586,585	892.00				251,773
BURKINA FASO	24,058,736	595.00	1,051,185	4,807	4	1,055,996
BURUNDI	13,952,476	98.70				100,000
CAMEROON	29,922,312	1,742.22				2,168,000
CAPE VERDE	600,000					120,000
CENTRAL AFRICAN REPUBLIC	5,307,990	75.00	54203	113		54,316
CHAD	19,257,954	186.14				300,000
COTE D'IVOIRE	31,896,556	3,019.00	4,580,256	7,689	7	4,587,952
DR CONGO	104,161,557	2,879.52				2,000,000
DJIBOUTI	1,052,517					80,000
EGYPT	113,762,430	59,442.18				36,000,000
EQUATORIAL GUINEA	1,848,000					100,000
ERITREA	3,535,603	157.00				
ESWATINI	1,242,822	70.60				285,838
ETHIOPIA	129,749,945	5,656.30				3,500,000
GABON	2,476,264	452.00				316,168
GAMBIA	2,824,407					250,000
GHANA	34,886,297					3,700,000
GUINEA	14,937,799	1,260.00				681,179
GUINEA-BISSAU	2,153,000					0
KENYA	61,154,997	1,725.00				9,212,754
LESOTHO	2,274,368	74.00				58,900
LIBERIA	5,250,187	171.80	314,150	8,609	3	322,762
LIBYA	6,839,222					2,300,000
MADAGASCAR	31,656,727					700,000
MALAWI	22,179,418	441.55				500,000
MALI	23,335,745	866.20				714,358
MAURITANIA	5,231,527	490.00				407,368
MAURITIUS	1,261,000					
MOROCCO	36,828,330	12,017.00	3,190,434	11,918	308	3,202,660
MOZAMBIQUE	35,707,118					2,300,000
NAMIBIA	2,840,122	509.50				3,024,000
NIGER	26,160,000	42.00			2	450,000
NIGERIA	234,318,393					12,500,000
REPUBLIC OF THE CONGO	6,235,468	600.00				300,000
RWANDA	14,521,379					1,800,000
SAO TOME & PRINCIPE	230,871					
SENEGAL	18,593,258	1,903.81	2,367,257	3,655	13	2,370,925
SEYCHELLES	100,000					30,000
SIERRA LEONE	8,642,022	105.00				2,462,000
SINELAC		43.80				0
SOUTH AFRICA	62,420,768	60,326.00				9,500,000
SOUTH SUDAN	11,984,888					3,500,000
SUDAN	48,574,798					3,500,000
TANZANIA	69,513,212	1,727.60				3,788,207
TOGO	8,095,498	292.71	819,061	925	3	819,989
TUNISIA	11,887,412	5,982.00	4,472,737	21,256	20	4,494,013
UGANDA	45,935,046	1,213.00				2,430,489
ZAMBIA	21,277,143	2,891.00				901,047
ZIMBABWE	16,578,196					700,000
TOTAL	**1,480,507,814**	**199,379**	**29,566,952**	**130,123**	**496**	**142,229,650**

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