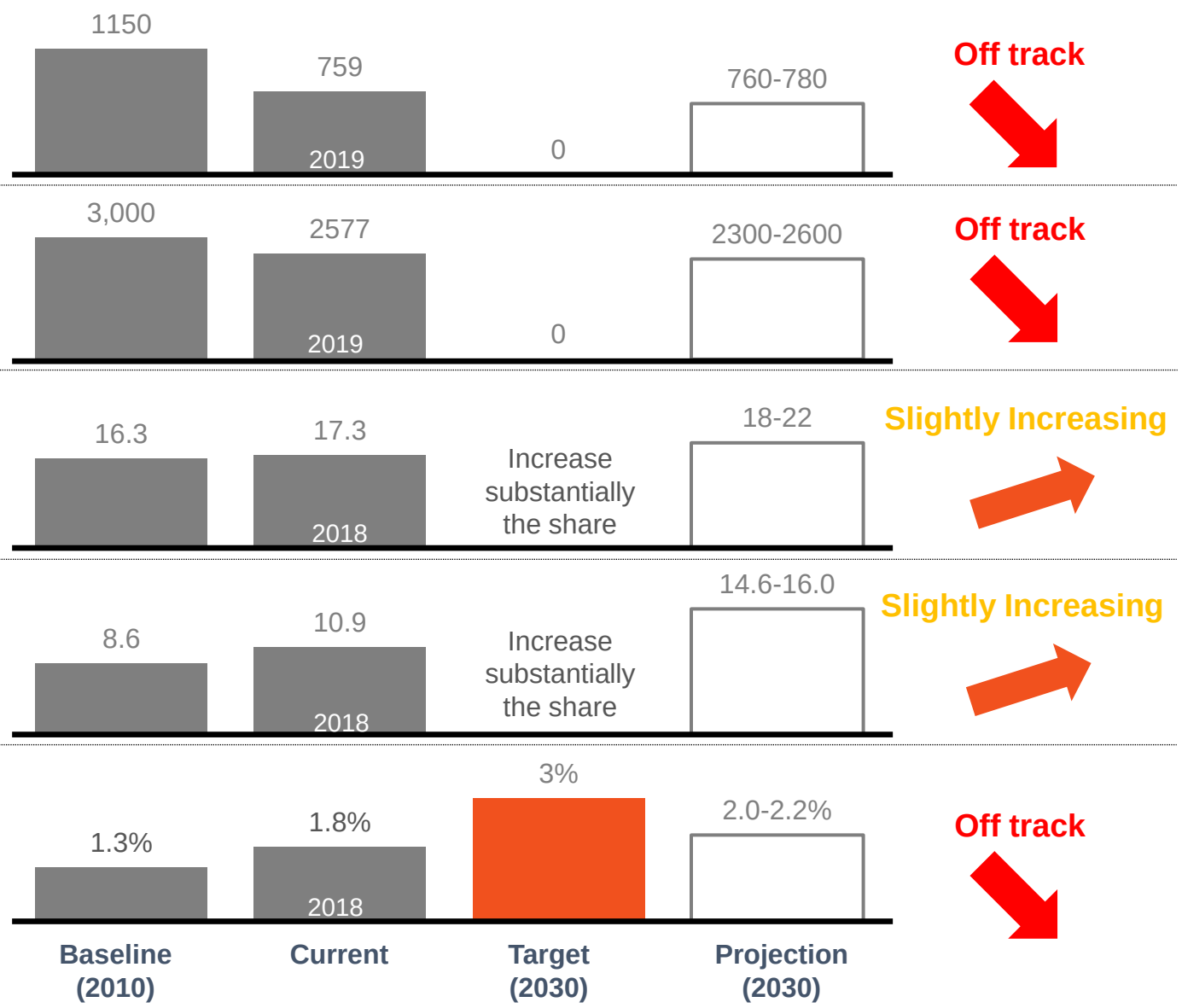
Nigeria Governors' Forum

Presentation by the CEO & Special Representative of the UN Secretary-General (SRSG) for Sustainable Energy for ALL

16th May 2023

Contents

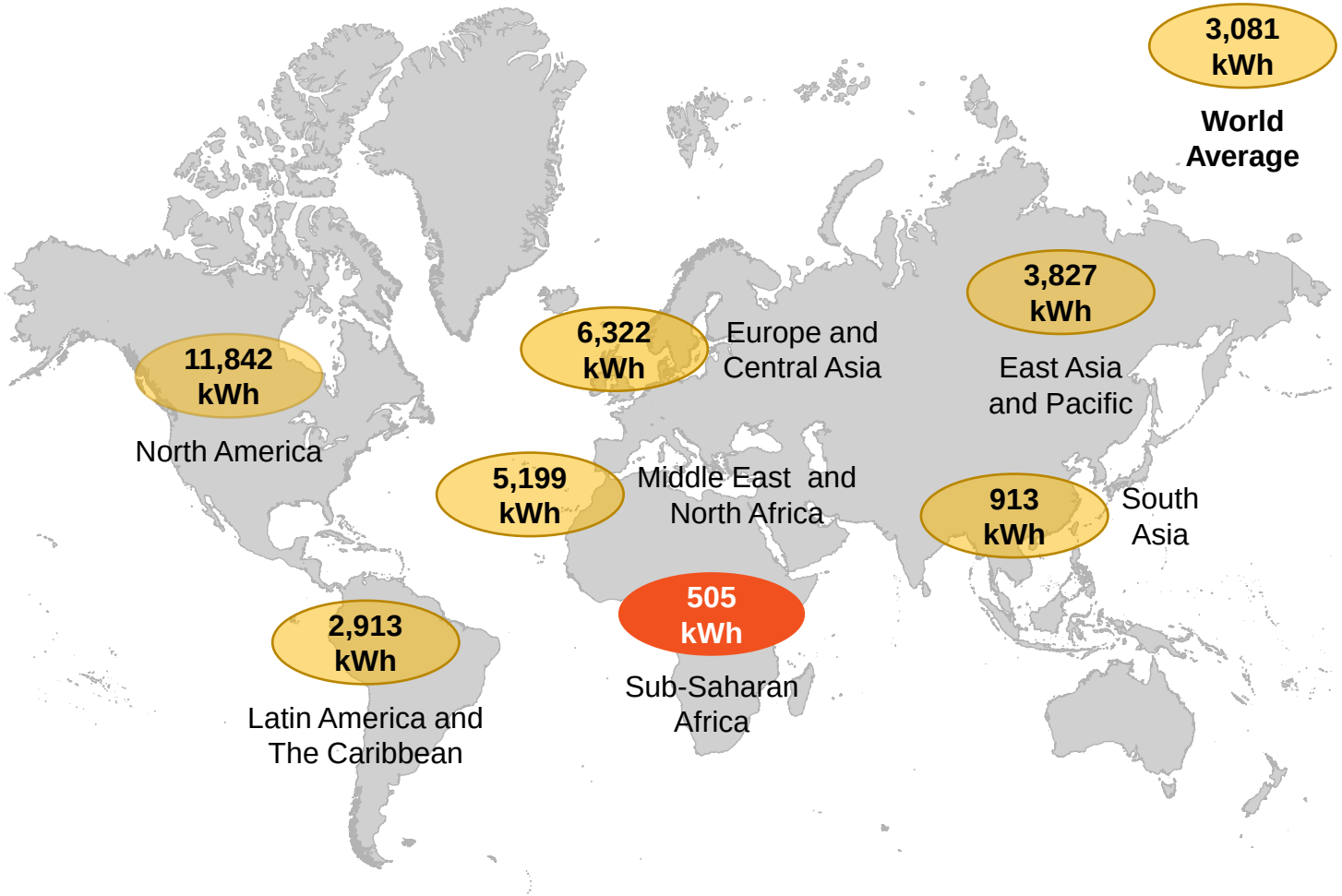
The Challenge – We are lagging in providing access to electricity and clean cooking, and need to increase efficiency and renewable energy consumption



- Progress has been made towards universal electricity access (7.1.1) mainly driven by significant gains in India and Bangladesh
- Access to clean fuels & technologies for cooking (7.1.2) has made modest progress but is still far from universal access
- While the overall share of renewable energy has been increasing, more efforts are needed to increase modern renewable in Asia and Africa and in industry and transport sectors (7.2)
- Achieving the energy efficiency goal will require an energy intensity improvement rate of at least 3 percent per year from now through to 2030, increased from the originally required 2.6 percent (7.3)

SOURCE: ESMAP; 2021 Tracking SDG7, IEA 2020 World Energy Outlook, SEforALL analysis

Energy poverty puts the average black person at a relative disadvantage

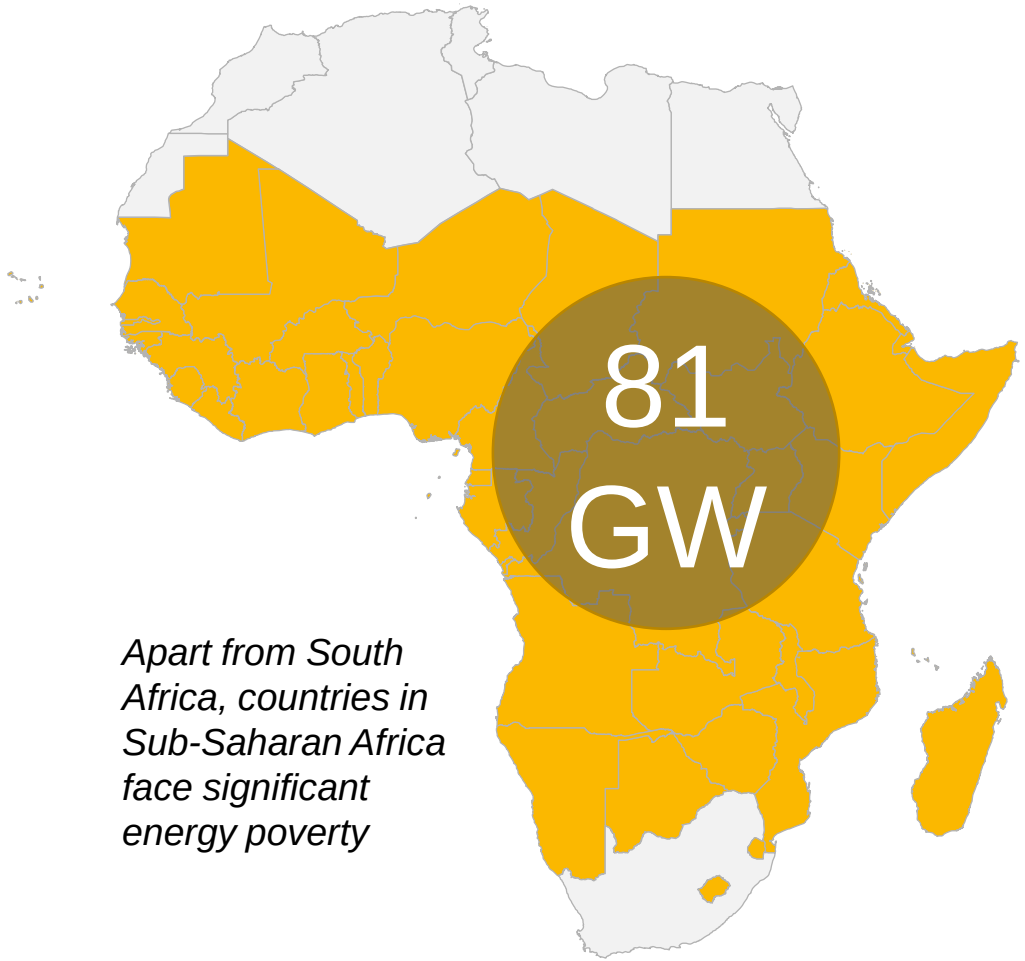


Average electrical energy consumption per capita (kWh per person per year) across regions globally

- Sub-Saharan Africa has the **lowest electrical energy consumption per capita across regions** globally.
- Taking out South Africa, the average for Sub-Saharan Africa drops from 505kWh per person per year to 440kWh per person per year.
  - This suggests that **the average black person is already at a disadvantage from the start** with regards to their income-generating potential given the strong correlation between average **energy consumption** and **income levels**, and with other health and gender outcomes related to energy use.

SOURCE: Sustainable Energy for All Analysis

Energy poverty in Africa is driven by the limited installed generation capacity



Apart from South Africa, countries in Sub-Saharan Africa face significant energy poverty

- Two-thirds of Africa's total electricity generation capacity is in South Africa and North Africa, leaving just **81 GW for the remaining 48 countries and 1 billion people** – the same capacity installed in Germany (population 83 million). The U.S. has an installed generation capacity of 1,117 GW for a population of 328 million.

- This **contributes to the economic poverty levels that are prevalent in the region** as evidence shows a strong correlation between electricity generation/ consumption and income levels across countries.
  - Energy consumption and income levels remain closely linked. Globally, **income generation outside the home accounts for ~70% of total electricity consumption**.

- **Interventions must prioritize providing energy for development** (beyond the minimum amount of power) to enable productive use and reduce poverty in the region.

SOURCE: The Energy for Growth Hub, U.S. Energy Information Administration

An inclusive, equitable and just transition prioritizes access for Africa

The global energy transition agenda must incorporate energy access for Africa to be inclusive, equitable and just.
This means accounting for diverse realities and accommodating various pathways to net-zero by 2050.

Inclusive

- Energy consumption in developing countries has doubled in the last 15 years and will grow another 30% in the next 15 years. The global transition must be inclusive by **prioritizing energy access and making capital available to meet this growing demand with clean energy**.
- A **minimum annual investment of USD 41 billion is required** to achieve the SDG7 targets on energy access in Africa and Asia.

Equitable

- An equitable transition recognizes the **need to adapt solutions to local contexts** and the critical role transition fuels can play.
- Developed nations **have gas as a major pillar in their multi-decade decarbonization.** Regardless, many are **now limiting financing to gas projects for domestic use in Sub-Saharan Africa** – a region responsible for 0.55% of global carbon emissions that still needs to industrialize and grow.

Just

- The global energy transition must also be just, **prioritizing both people and planet**, and considering health and other human outcomes in policy-making in addition to climate outcomes.
- Carbon credits in the African energy transition especially is vital and can play a **crucial role in providing clean cooking solutions and mitigating carbon emissions** because it can displace hazardous charcoal and kerosene cookstoves, while saving millions of lives lost each year.

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Overview: Nigeria's Energy Transition Plan

Overview of Nigeria Net Zero by 2060 Plan

Scenario description

Explores what it would take to **achieve SDG7 by 2030, net-zero by 2050 and industrialization to alleviate poverty**

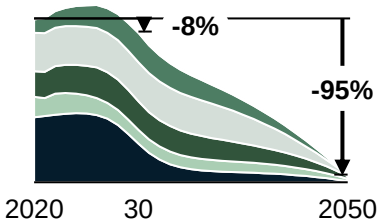
Key features[1]

- Carbon neutral tech used by ~80% of the population for clean cooking (electricity and biogas)
- Switch of 80% of passenger cars to electric vehicles by 2060
- -52% Oil production by 2030 due to global demand decline
- Industrial emission reduction amplified by roll out of carbon capture, utilization and storage in cement

Supporting Power system

- Centralized power capacity increases to 200 GW in 2050 (90% RE) / Decentralized power capacity of ~3GW of Solar PV and ~12GW of mini-grids/SHS

Emissions trajectory



Similar emissions as NDC-guided in 2030 but down 96% by 2060 due to electrification focus in all sectors and renewable based power system

What makes this achievable?

- Achieving this plan will require the **maximum electrification of all the sectors at a challenging scale for a developing country**. This will need (amongst others):
  - Significant expansion of power infrastructure. **Gas use is required for a stable base-load and the flexibility of integrating renewables into the grid**, before being phased out post-2030
  - Deployment of **clean cookstove distribution to households** at scale
  - Addressing just transition challenges of **ensuring oil & gas jobs are replaced**

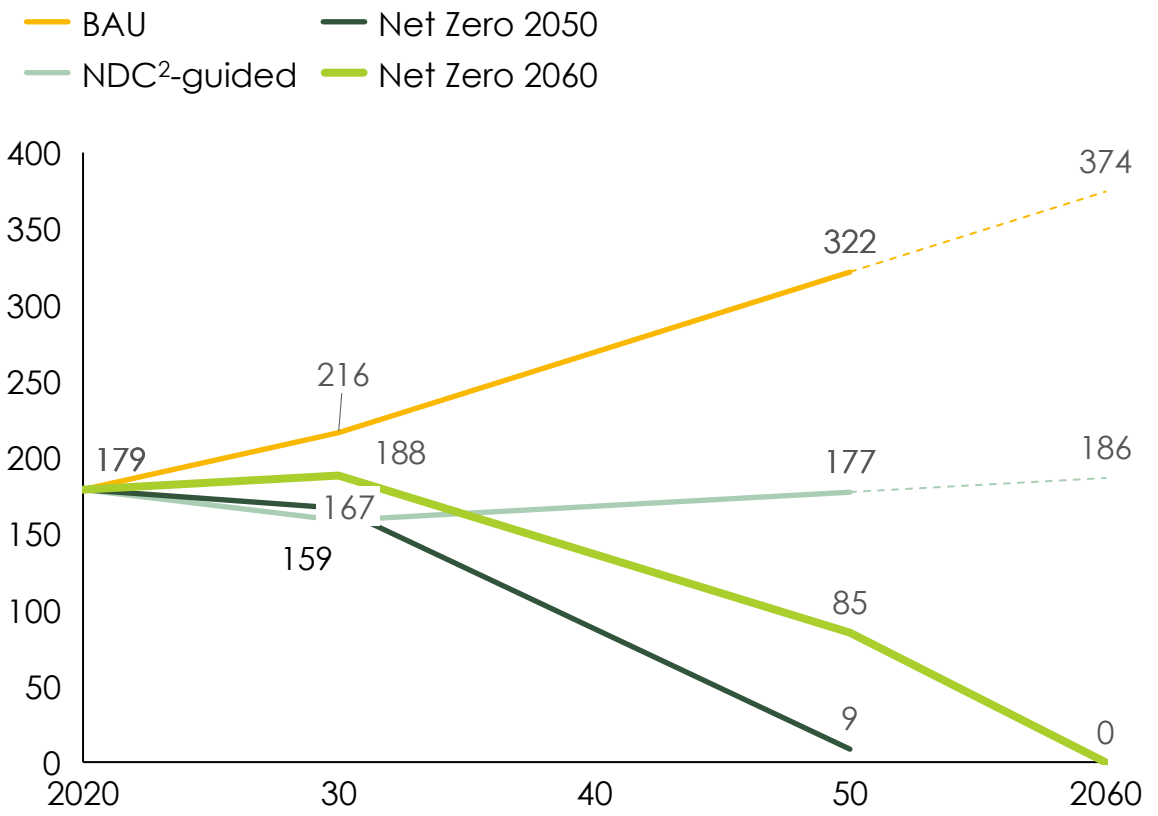
- Enabling a Net Zero 2060 pathway requires investments of **~$400 billion across the Nigerian economy** in excess of business-as-usual spending over 30 years
  - This will require **~$5.4 - 8.5 Bn of extra public funding[1] per year**

1 Public funding is calculated as the amount of financial incentives required to accelerate technologies economic competitiveness

SOURCE: Nigeria Energy Transition Plan

An Energy Transition Pathway has been developed for Nigeria and formed the basis for the Government's commitment to Net Zero by 2060

Energy-related GHG emissions trajectory, $MtCO_2e$



Key features of Nigeria's Net Zero pathway

Buildings	• emissions decrease by ~98%, primarily driven by **shift to bio-gas based and electric cooking** and a **transition away from generator sets**
Transport	• emissions decrease by ~97% due to **uptake of Electric Vehicles in passenger car segment** (80% penetration)
Industry	• emissions decrease by ~97% despite industrial growth due to **decarbonization efforts in cement/ammonia production** and **100% shift to zero emission fuels for heating**
Oil and Gas	• emissions decrease by ~87% primarily driven by **fallen global demand** as well as **reduced flaring and improved electrification and energy efficiency** in upstream activities
Power	• emissions decrease by ~100% as **solar increases as starts to replace gas** in its role as transition fuel

1. Out-of-scope emissions reduction have not been modelled (e.g., agriculture, waste and other LULUCF) and account for 278 Mt CO_2e of residual in 2070
2. Nationally Determined Contribution
3. Incl. LPG, efficient firewood, electric and biogas cook stoves

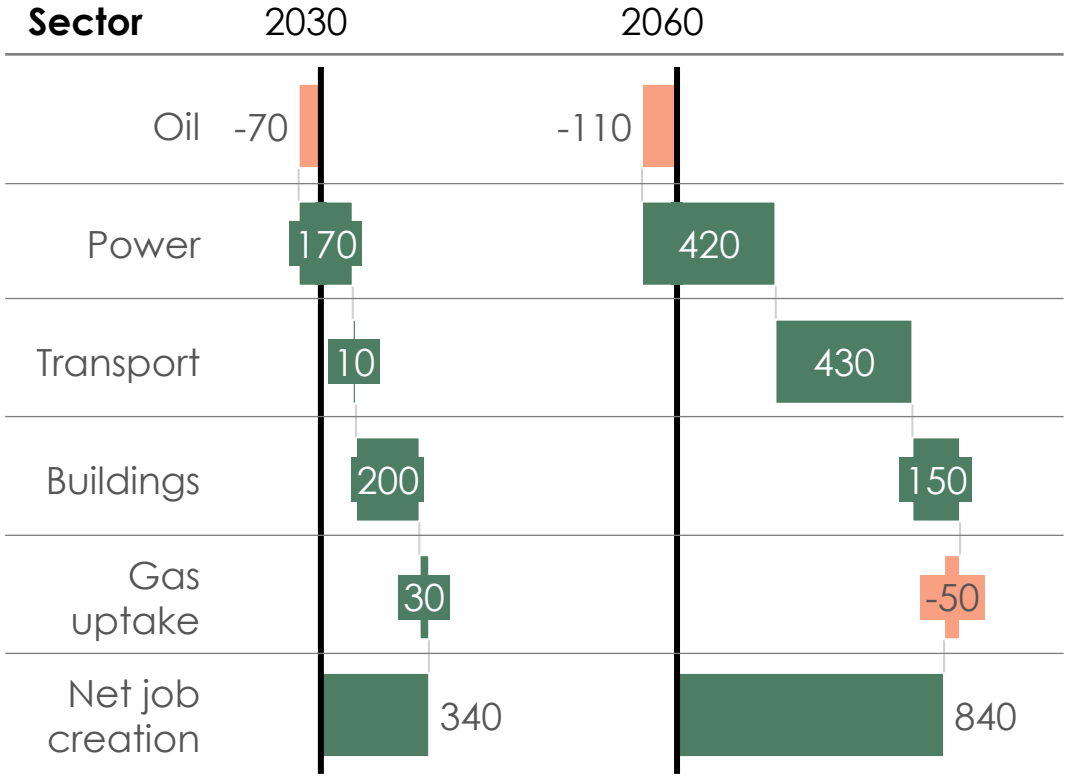
Source: Nigeria Energy Transition Plan

SOURCE: SEforALL Energizing Finance: Understanding the Landscape 2021

The Net Zero scenario will result in significant net job creation by 2060

Net job creation per sector and per scenario

Incremental thousand full-time jobs compared to 2020



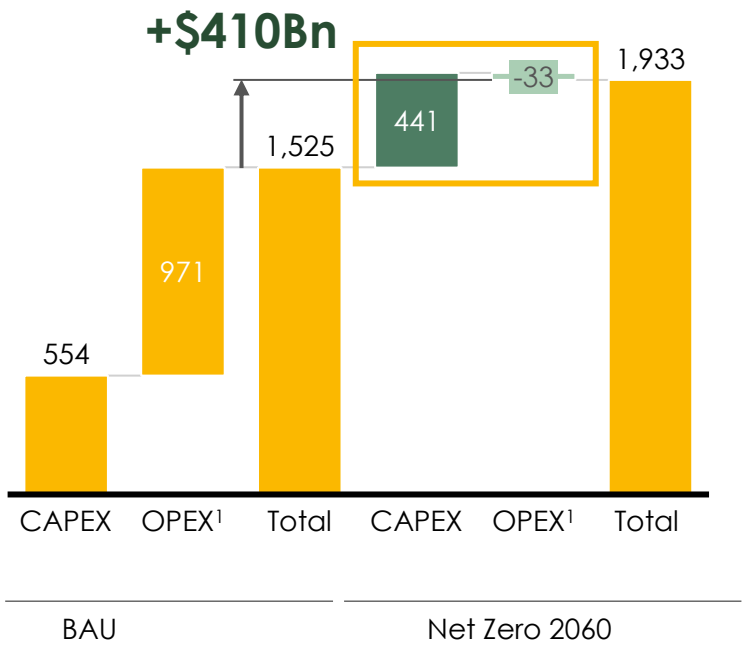
Source: Nigeria Energy Transition Plan

Key messages

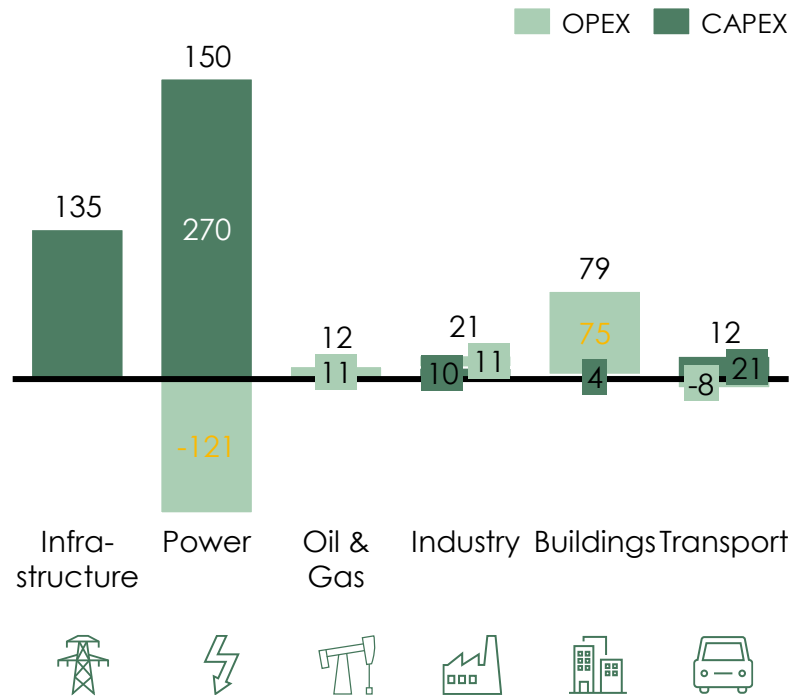
- Job **creation is higher than job losses in both 2030 and 2060** with 340,000 net jobs created in 2030 and 840,000 net jobs created in 2060.
- Job creation in **2030 is mainly driven by deployment of decentralized solar (Power) and clean cook stove distribution (Buildings)** across the power and buildings (households) sectors.
- Most of the new jobs in the **transport sector will be created after 2030** due to estimated growing uptake of electric vehicles.
- The transition away from oil and gas will lead to net job losses in the long term and offers an **opportunity for reskilling and reconversion as jobs decline until 2060.**

The Net Zero scenario will result in significant net job creation by 2060

Incremental cost from BAU to Net Zero 2060, Bn USD



Incremental investments from 2021-60 to reach Net Zero 2060, Bn USD



Key insights

To get to Net Zero by 2060, ~**$410Bn** is required **on top of BAU** spending **over 40 years**

This figure covers counter acting dynamics :

- **Most of the effort will be needed in the power sector**: extra CAPEX is needed to finance the power sector **generation capacity ($270Bn), and the T&D infrastructure ($135Bn)**
- **Significant savings in terms of fuel costs for power** considering the switch to 90% renewables **(-$121 Bn**) compensating for some of the CAPEX increases

1. OPEX includes all fuel and other operational costs
2. Including Power and Gas transmission and distribution as well as refueling infrastructure

Source: Nigeria Energy Transition Plan

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Guiding Framework for an Energy Transition Roadmap in Nigerian States

1. **Pursue universal access to affordable, reliable, sustainable and modern energy (SDG7)** for better livelihoods and economic development.

2. **Position respective States to attract domestic and foreign investments** for the development of low-carbon power, transportation and cooking systems.

3. **Prioritize the creation of millions of local jobs** by leveraging emerging opportunities across renewable energy sectors and initiatives.

4. **Drive an enabling policy environment to eliminate existing bottlenecks** that limit transition-related projects that can meet local development needs and ramp-up domestic resource mobilization.

5. **Align state energy transition plans** with the National energy transition goals.

Opportunities for State Governments

There are clear and immediate opportunities to accelerate the clean energy transition through providing sustainable power supply, clean cooking and mass transportation. This ensures GDP growth, healthier citizens and well functioning transportation sector.

Deployment of Renewable energy
(Solar + Hydro + Storage)

Roll out of clean cooking solutions

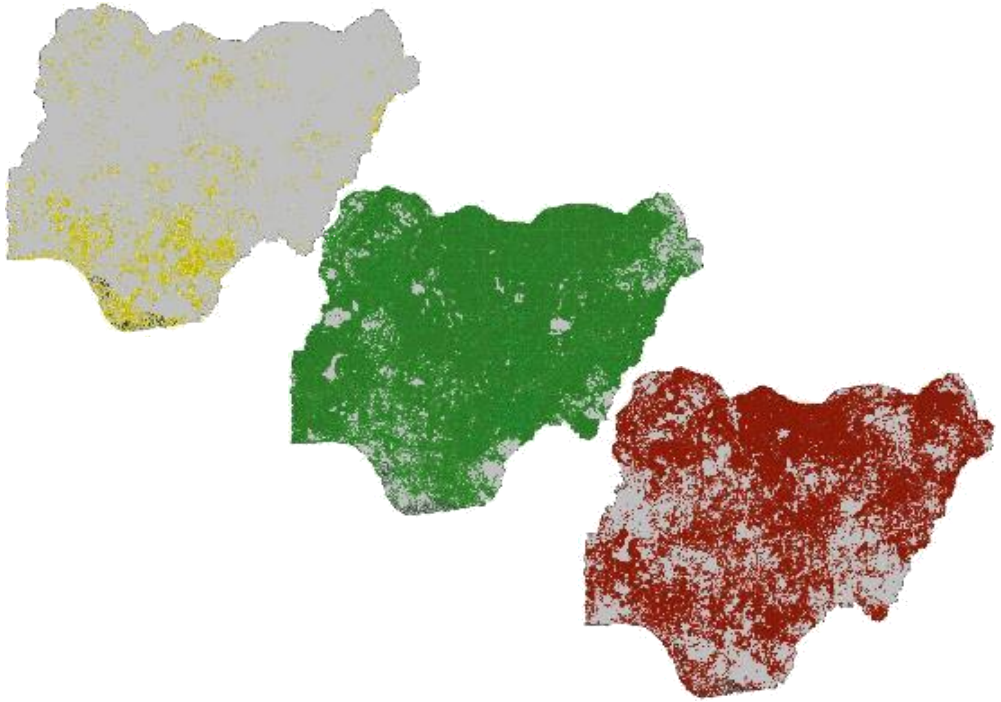
E-buses for Mass Transportation

Deployment of Renewable Energy for Power Supply

The least cost technology mix in Nigeria consists of 29% Grid, 46% Mini-Grid and 26% SHS connections

2030 least-cost technology mix

SHS Grid Mini-grid Electrified or unpopulated



	Grid	Mini-grid	SHS	Total
# of connections	5.4mn	8.9Mn	5Mn	19.3Mn
% of residential connections	27.9%	46.0%	26.1%	100%
# of settlements	9k	105k	516k	630k
Electricity demand (GWh)	3.2k	4k	1.2k	8.4k
Total Cost, (USD)	6.3Bn	10.4Bn	6.2Bn	22.9Bn
Population (# of people)	25.7Mn	51Mn	29.4Mn	106.2Mn

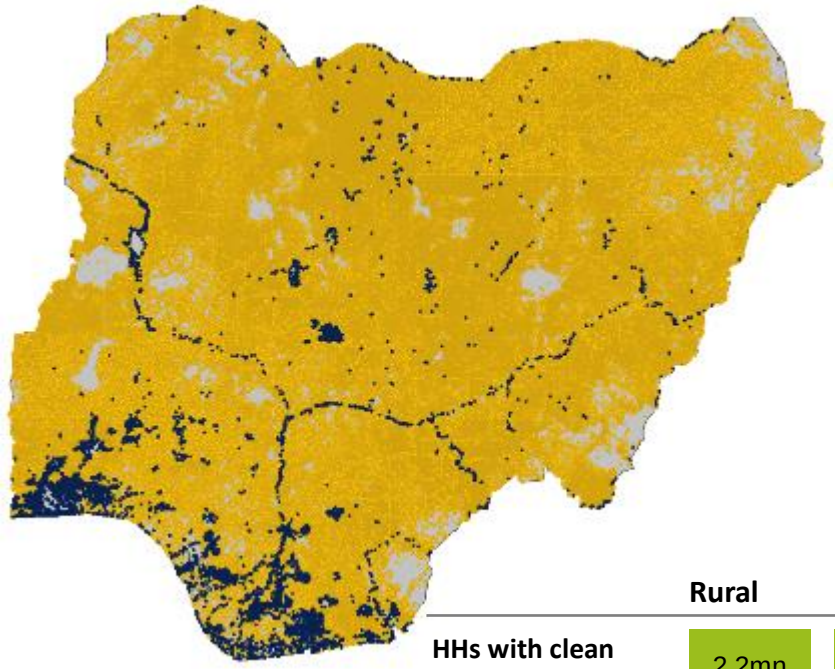
Source: Geospatial model 2021

Roll out of clean cooking solutions

The model identifies households with emissions-intensive cooking to determine the opportunity for clean cooking solutions

BAU scenario: Distribution of cooking fuel use (2030)

Emissions-intensive cooking | Clean cooking | Unpopulated



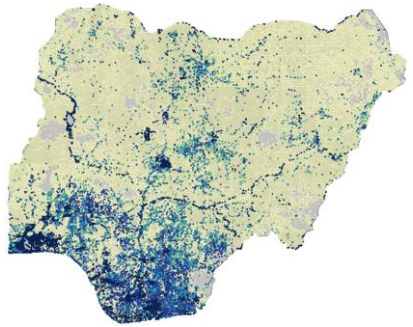
	Rural	Urban	Total
HHs with clean cooking	2.2mn	12.5mn	14.8mn
HHs with emissions-intensive cooking	23.8mn	16.3mn	40.1mn

Geospatial model output: Clean cooking opportunity (2030)

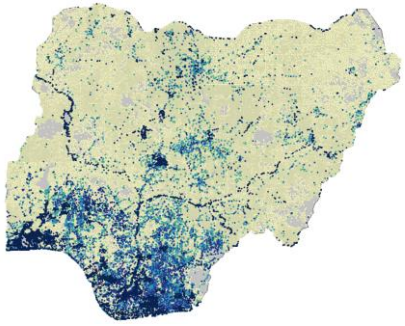
% of HHs in settlement

0-25 | 25-50 | 50-100 | >100 | Clean cooking | Unpopulated

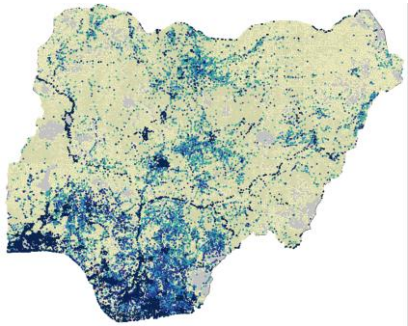
LPG



E-cooking



Biogas



	Rural	Urban	Total
HHs access-constrained from CC[1]	23.6mn	13.1mn	36.6mn
HHs with LPG opportunity	1.5mn	2.2mn	3.7mn
HHs with e-cooking opportunity	1.3mn	2.1mn	3.5mn
HHs with biogas opportunity	2.0mn	2.3mn	4.3mn

1. Defined as households located in settlements where >/=51% of its population cooks with emissions-intensive fuels

Growing deployments of electric mass transit systems highlight important economic, health and climate benefits.

There are several advantages of electric buses over traditional diesel or petrol-powered buses, including:

1.Lower operating costs: Electric buses have lower operating costs than traditional buses because they use electricity instead of diesel or gasoline, which is cheaper and more efficient.

2.Reduced emissions: Electric buses produce no tailpipe emissions, which helps to reduce air pollution and greenhouse gas emissions.

3.Quieter operation: Electric buses are much quieter than traditional buses, which can help to reduce noise pollution in urban areas.

4.Improved passenger experience: Electric buses offer a smoother and more comfortable ride than traditional buses because they have fewer moving parts and generate less vibration and noise.

5.Better for the environment: Electric buses are much better for the environment than traditional buses because they produce no emissions and are powered by renewable energy sources.

6.Lower maintenance costs: Electric buses have fewer moving parts than traditional buses, which means they require less maintenance and have lower maintenance costs over time.

7.Increased energy security: Electric buses can be powered by renewable energy sources like solar or wind power, which reduces dependence on foreign oil and improves energy security.

8.Improved public health: Electric buses help to improve public health by reducing air pollution, which can lead to a range of health problems, including asthma and heart disease.

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SEforALL Support: Overview

ENERGY TRANSTION OFFICE

The Energy Transition Office, is a team of Nigerian energy and climate finance experts supporting Nigerian Government to drive the Implementation of the Energy Transition Plan (ETP). Energy Transition Office supports the plan's integration into the national policy and regulatory framework, promoting the ETP broadly, establishing a pipeline of investable projects, and attracting international investors to these projects.

NIGERIA Integrated Energy Planning Tool

The Nigeria Integrated Energy Planning Tool is an online, interactive data visualization platform that brings together several layers of data to help Nigerian policy makers and practitioners make more informed decisions about their strategies and operations to advance energy access in the country.

UNIVERSAL ENERGY FACILITY

The Universal Energy Facility (UEF) is a multi-donor results-based finance (RBF) facility established to significantly speed up and scale up energy access across Sub-Saharan Africa, in line with SDG7 and the Paris Agreement. The UEF provides incentive payments to eligible organizations deploying energy solutions and providing verified end-user electricity connections (including mini-grids and stand-alone solar systems) and clean cooking solutions based on pre-determined standards.

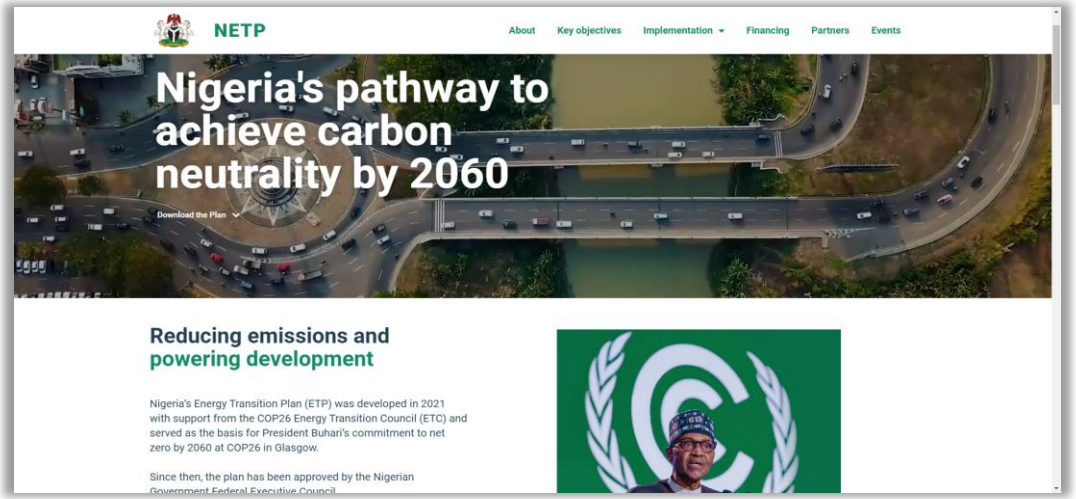
ACMI AFRICA CARBON MARKETS INITIATIVE

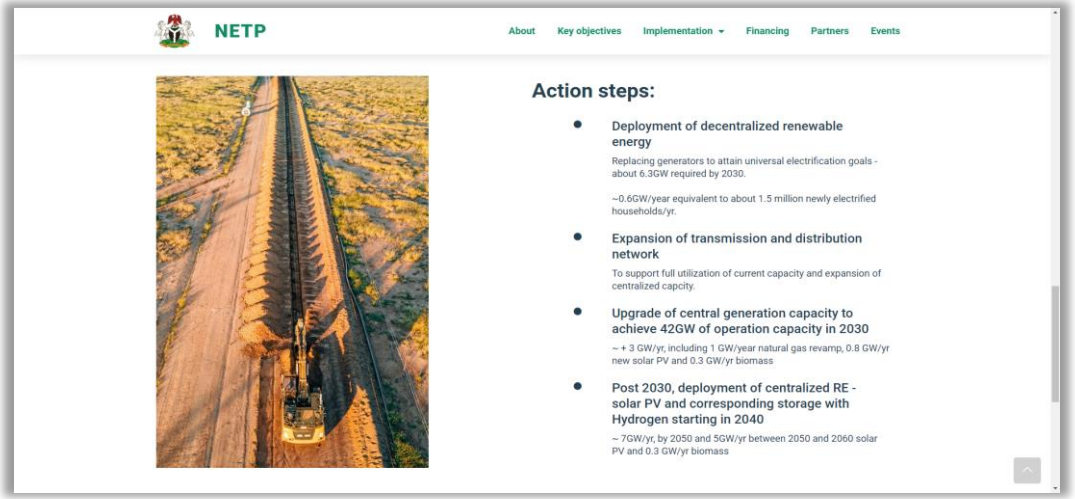
The Africa Carbon Markets Initiative (ACMI) seeks to unlock the potential of voluntary carbon markets for financing Africa's energy, climate and development goals. The Nigeria carbon market activation plan is currently in development.

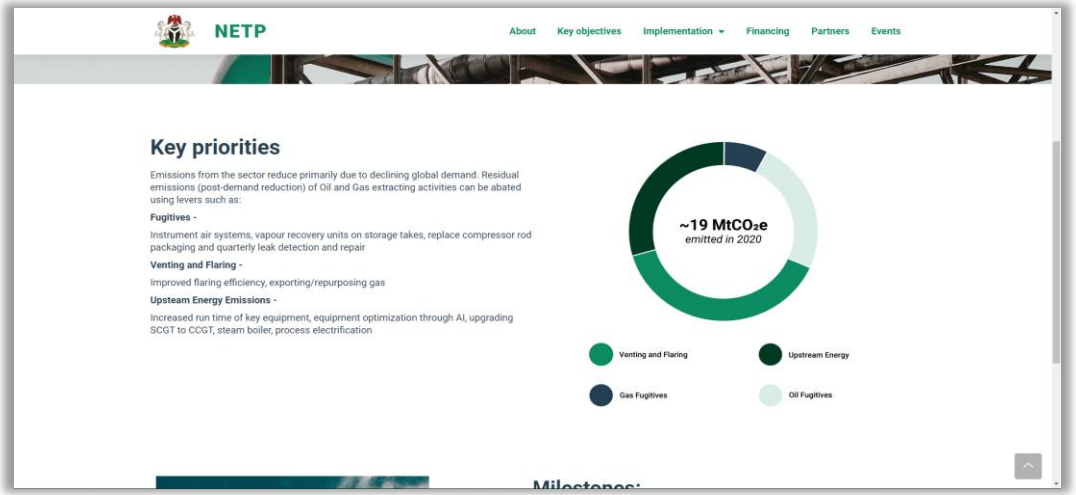
Africa Renewable Energy Manufacturing

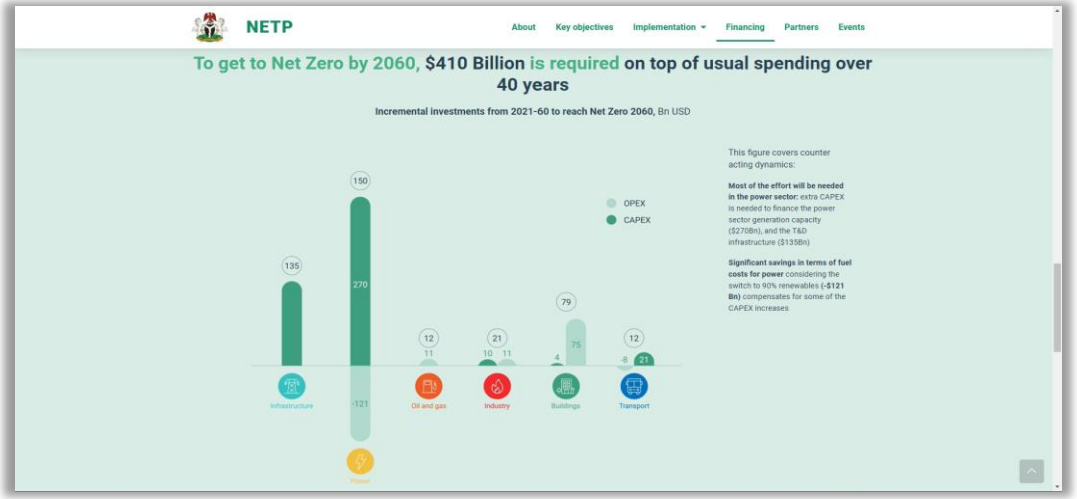
The Africa Renewable Energy Manufacturing Initiative (AREMI) – launched at Abu Dhabi Sustainability Week 2023 (ADSW) – aims to drive investment and mobilize action in countries to scale up renewable energy manufacturing capabilities. This international Initiative will help drive the financial, technical, and socioeconomic investments required to unlock the continent's potential for up to 1.2 Terawatts of clean energy, 14 million new jobs and 6.4% growth in GDP by 2050. Nigeria is one of the countries in the initiative.

SEforALL Support: The website for the Energy Transition Plan has been developed to disseminate and mobilize global financial and technical support



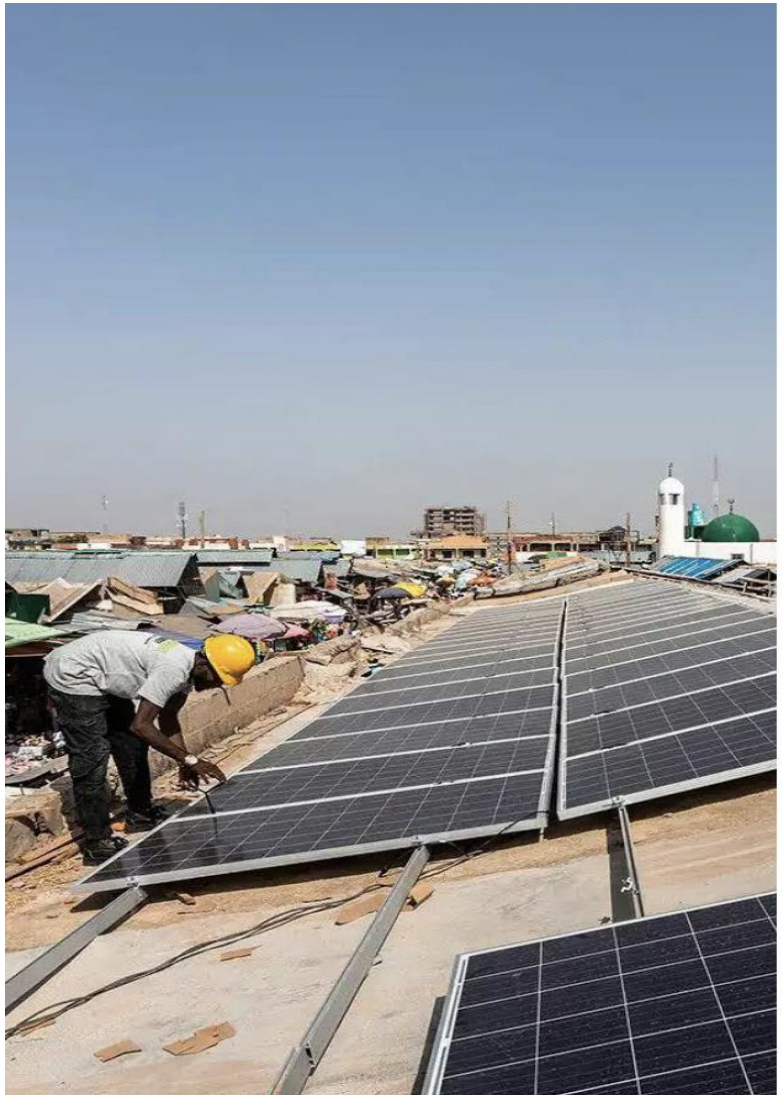






URL: energytransition.gov.ng

SEforALL Support: Universal Energy Facility (1/2)



OBJECTIVE

Across Sub-Saharan Africa, the national electricity grid delivers power supply to a fraction of its population, with frequent power blackouts. Most households and businesses are forced to rely on expensive and polluting petrol and diesel generators as backup to an unreliable grid. Nigeria alone relies on tens of millions of generators for this purpose.

In 2022, Sustainable Energy for All (SEforALL) launched a funding round in Nigeria to help displace these generators with equivalent solar-battery systems, through the Universal Energy Facility (UEF), the multi-donor results-based financing (RBF) facility that we manage on behalf of a coalition of partners. The 'Stand-Alone Solar for Productive Use' (SSPU) programme pursues aligned objectives on energy access, climate change and development, providing clean and affordable energy to households and small businesses whilst also fast-tracking the displacement of gasoline and diesel generators, and promoting job creation and economic productivity.

PARTNERS

The Universal Energy Facility was established by SEforALL with a coalition of partners including The Rockefeller Foundation, UKaid, USAID, GIZ, Shell Foundation, Good Energies Foundation, the Carbon Trust, and the Africa Minigrid Developers Association. The Facility's SSPU programme is supported by the Global Energy Alliance for People and Planet (GEAPP), IKEA Foundation and Rockefeller Foundation. The fund relies on a digital payments platform that was developed in partnership with Odyssey Energy Solutions. For SSPU funding, the Facility works with a range of qualified renewable energy companies active in the Nigerian market.

SEforALL Support: Universal Energy Facility (2/2)

TECHNOLOGIES SUPPORTED

Our project supports 100% solar and battery energy storage solutions with the capacity to replace gasoline and diesel generators on a one-for-one basis.

OUR ROLE

SEforALL acts as the programme and fund manager for the UEF. We worked to develop the standard operating procedures for the fund, and to build partnerships with renewable energy associations in Nigeria and across Africa (the UEF is active in five countries at the time of writing). We coordinated with a community of donors and practitioners of results-based financing through an 'RBF Leadership Group' and consulted on the design and development of the fund's implementation framework. Together with our partners, SEforALL mobilized a first round of funding of USD 10 million to support ten renewable energy companies to deploy over 3,500 electricity connections in Nigeria.

RESULTS

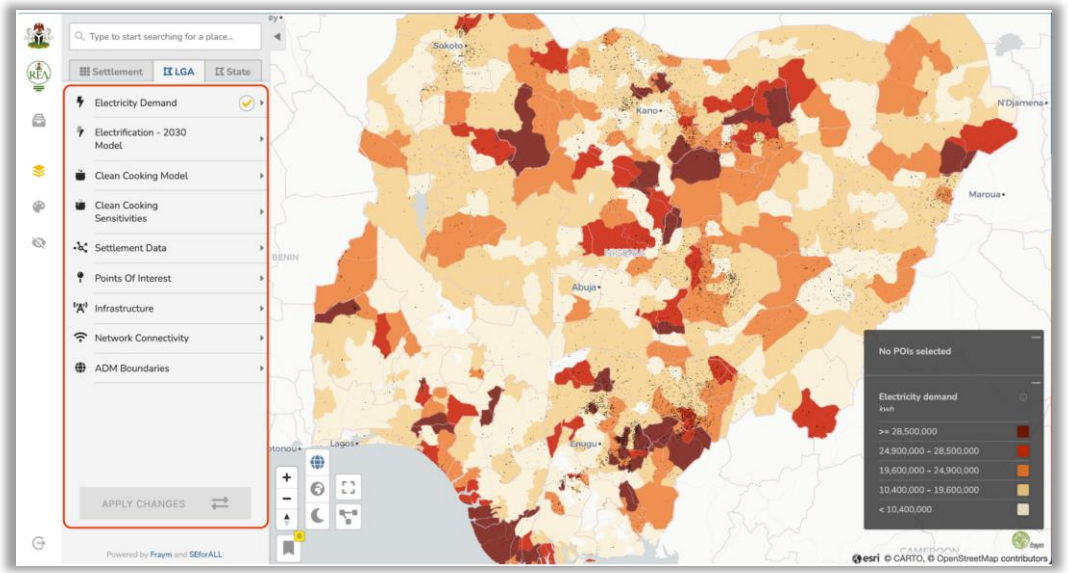
The SSPU programme's 2022 launch in Nigeria immediately received applications from qualified project developers to deliver over 25,000 solar battery connections to customers, displacing thousands of backup generators and avoiding over 33,000 tonnes of carbon dioxide equivalent (tCO_2e) greenhouse gas emissions per annum.

In February 2023, we signed grant agreements with ten of these companies for a total of USD 10 million in grant funding available, leaving an immediate opportunity to fund a further twenty qualified companies on a 'wait-list' with viable solar projects that could deliver an additional 22,000 new electricity connections within the next two years.

> **Nigeria is a clear example of success and commitment. We managed to put together local authorities, donors, investors and developers working together to displace petrol and diesel generators with reliable and clean solar energy technologies, all of this with the ultimate goal of improving people's lives**

ANITA OTUBU
Senior Director, Universal Energy Facility, SEforALL

SEforALL Support: Nigeria Integrated Energy Planning Tool



- **Link to Integrated Energy Planning Tool/Summary:** http://nigeria-iep.sdg7energyplanning.org/
- **Link to Demo Video**: https://www.youtube.com/watch?v=D2ApkVkEov0

- The Integrated Energy Planning tool incorporates **electrification, clean cooking and productive use** analyses, with community-level data on **household energy needs, ability and willingness to pay, proximity to infrastructure/services** etc.

- Aggregated investment opportunities include:
  - Optimal universal electrification will cost **$22.9 Bn from 19.3Mn new household electric connections** from 5Mn solar homes systems, 8.9Mn mini-grid and 5.4Mngrid connections

SEforALL Support: The Africa Carbon Markets Initiative (ACMI) (1/2)

ACMI is a collaborative effort supported by Sustainable Energy for All, the Global Energy Alliance for People and Planet (GEAPP), and the Rockefeller Foundation and rolled out in partnership with UNECA and UN High-Level Champions

Launched at COP27, ACMI aims to dramatically expand Africa's participation in voluntary carbon markets, supporting stakeholders in the entire value chain, thereby boosting carbon reduction and clean energy production

ACMI has published a **Roadmap Report** in November 2022, proposing 13 Action programmes to support the development of VCMs on the continent

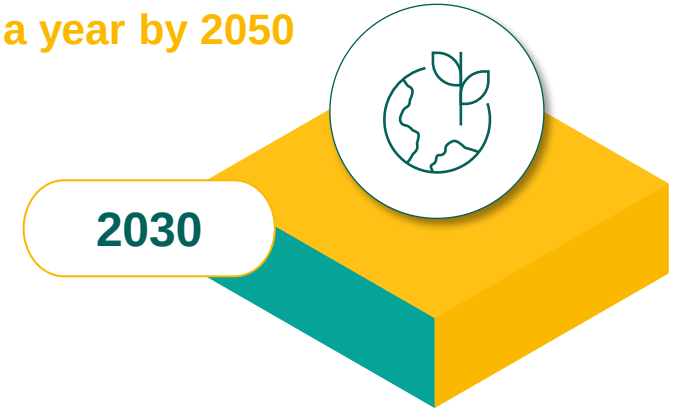
ACMI is led by a fifteen-member steering committee of African leaders, CEOs, and carbon credit experts

SEforALL Support: The Africa Carbon Markets Initiative (ACMI) (2/2)

ACMI aspires to grow Africa's carbon market to 1.5+ GtCO2e and mobilize ~$120+ billion a year by 2050

- Per year

22 MtCO2e retired

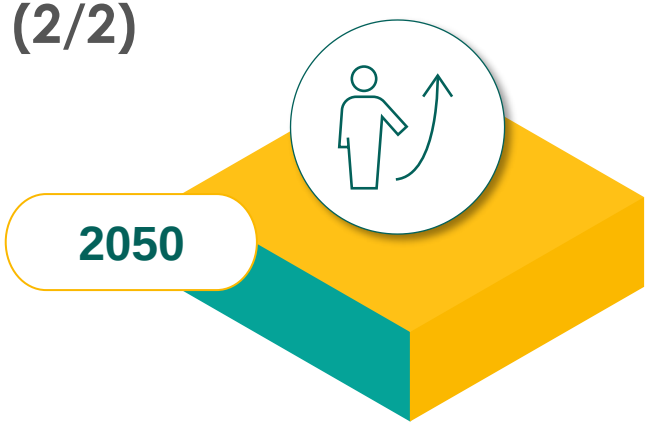


Build market foundation and scale supply

300 MtCO2e retired

$6 Bn capital mobilized

30 Mn jobs created &supported



Develop high-value export commodity

1.5 to 2.5 GtCO2e retired

$120 to $200 Bn capital mobilized

110 to 190 Mn jobs created & supported

Ensure **equitable and transparent** distribution of carbon credit revenue and funnel a significant portion back into **communities**

Source: CAP-A nature-based climate change mitigation model, TSVCM, Bloomberg, Reuters, McKinsey Vivid Economics, Mckinsey MGI Economic Research, International Labor Organization (ILO), Global Trade Analysis Project (GTAP)

SEforALL Support: Africa Renewable Energy Manufacturing Initiative (1/2)

There are a range of trends encouraging the development of renewable energy manufacturing in Africa

Increasing usage of renewable energy

A. Increase in demand for renewable energy and energy storage systems driven by rapidly declining cost and growing environmental impact consciousness

B. Distributed energy generation is nearly doubling annually across African markets

Africa's push for industrialization

C. Rising calls (and resulting policies) to localize processes along the manufacturing value chain

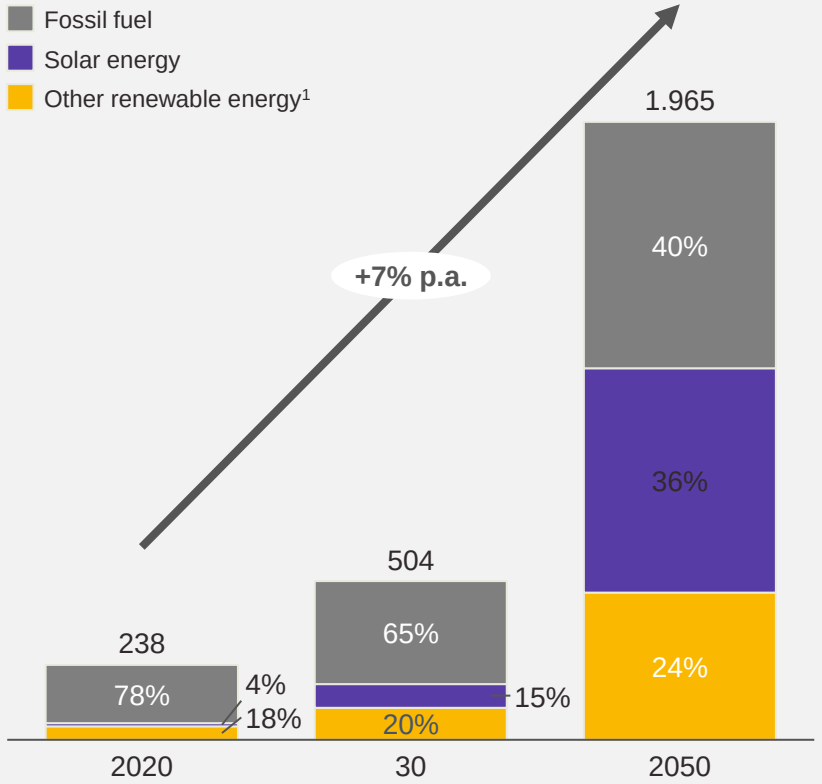
D. Africa has large reserves of renewable energy raw materials (including cobalt, manganese, and lithium)

Evolving geopolitical dynamics

E. Favorable relationship developing between Africa and China, with China as Africa's leading individual trade partner with ~14%

F. US, EU, and UK emerging as key demand centers for renewable energy components, pushing to diversify the supply chain outside of China

Estimated energy capacity in Africa
GW



1. Other renewable energy sources include wind, hydropower and biogas

Source: Lazard; Enerdata; METGroup; International Energy Agency

SEforALL Support: Africa Renewable Energy Manufacturing Initiative (2/2)

We analyzed the value chains of both solar PV and battery manufacturing to identify opportunities across the African continent

Solar PV manufacturing value chain

Upstream: Chemicals, polysilicon production	Manufacturing: Wafer production	Manufacturing: Cell manufacturing	Manufacturing: Module assembly
				
Crush and melt **polysilicon**, and grow into crystal ingot	Cut, square, slice and polish the **ingot** into hexagonal wafers	Treat and texture the **wafers**, and then etch and coat them to form solar cells	Connect **solar cells** in series to form strings

Battery manufacturing value chain

Mining	Refining	Cell components	Cell manufacturing	Packaging & integration	Recycling
Extract raw minerals	Refine and process raw materials into usable products	Chemically activate the raw materials, and produce cathode, anode, electrolyte and separator materials	Manufacture battery cells Stack/roll cells in form factor (e.g., pouch, cylindrical, prismatic)	Assemble cells into modules, and modules into packs Connect HW and SW into complete package	Reuse batteries for new purposes (second-life) or recycle components and materials in batteries

Source: GreenMatch; Sinovoltaics Group Limited; Expert interviews

ABOUT SEFORALL

Sustainable Energy for All (SEforALL) is an international organization that works in partnership with the United Nations and leaders in government, the private sector, financial institutions, civil society and philanthropies to drive faster action towards the achievement of Sustainable Development Goal 7 (SDG7) – access to affordable, reliable, sustainable and modern energy for all by 2030 – in line with the Paris Agreement on climate. We work to ensure a clean energy transition that leaves no one behind and brings new opportunities for everyone to fulfil their potential.

Former UN Secretary-General Ban Ki-moon launched the Sustainable Energy for All initiative in 2011. Now an independent organization, we maintain close links with the UN, including through a relationship agreement, partnerships with UN agencies and with our CEO acting as the UN Secretary-General's Special Representative for Sustainable Energy for All and Co-Chair of UN-Energy.

Our team of passionate professionals are located in our headquarters in Vienna, Austria and our satellite offices in Washington DC, New York City and Abuja, Nigeria. Some team members are also based in various countries across Africa and Asia to facilitate collaboration with key partners.

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Contact
Damilola Ogunbiyi
CEO and SRSG, Sustainable Energy for All
damilola.ogunbiyi@seforall.org