

# Africa Energy Outlook

A focus on energy prospects  
in sub-Saharan Africa

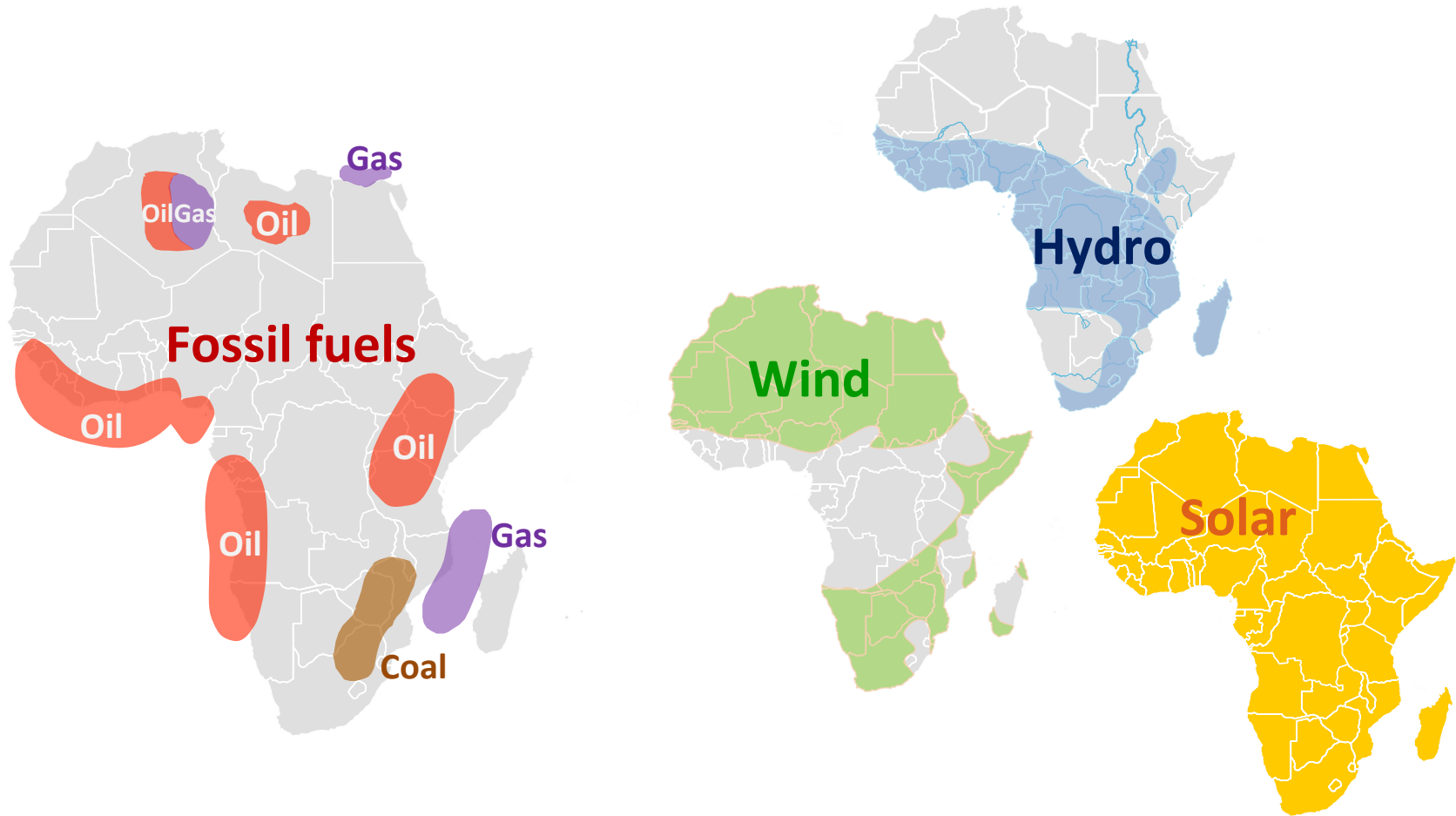
Dan Dorner  
Senior Energy Analyst, IEA  
Madrid, 28 January 2016

World Energy Outlook Special Report

- **GDP is rising – rapidly in some cases – but a large share of a fast-growing population still lives in extreme poverty**
- **Sub-Saharan Africa accounts for around 13% of global population, but only 4% of energy use**
- **Energy is vital to development prospects – poor electricity infrastructure is a key impediment to growth**
- **Large energy resource base has been exploited only in part for oil, gas and coal, and largely untouched in the case of renewables**
- **Domestic energy reforms gaining speed, but two-thirds of energy investment since 2000 went to develop resources for export**

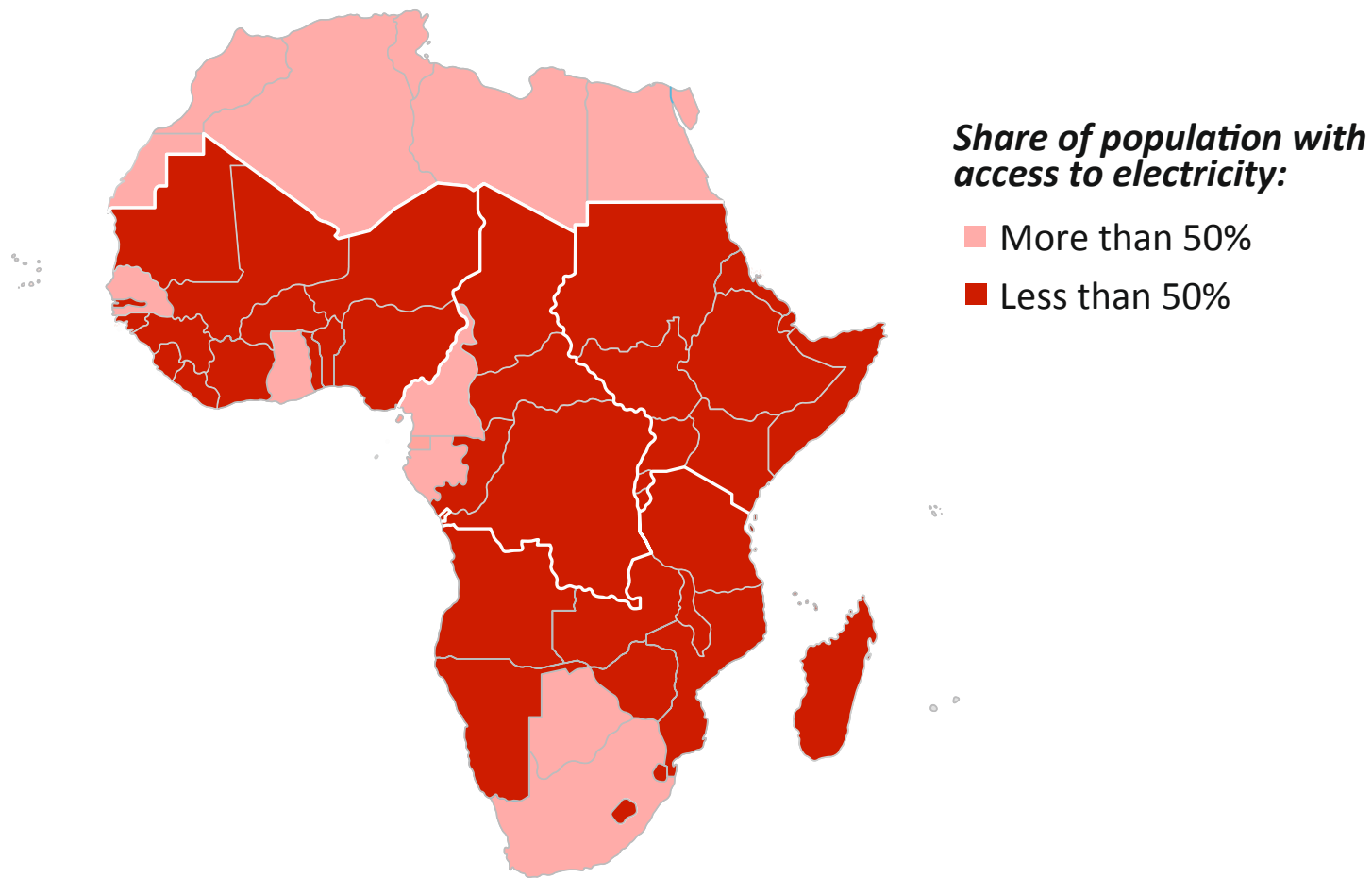


# Rich in resources



***Major oil and discoveries in sub-Saharan Africa in recent years; the region has vast untapped renewables potential, notably hydropower and solar***

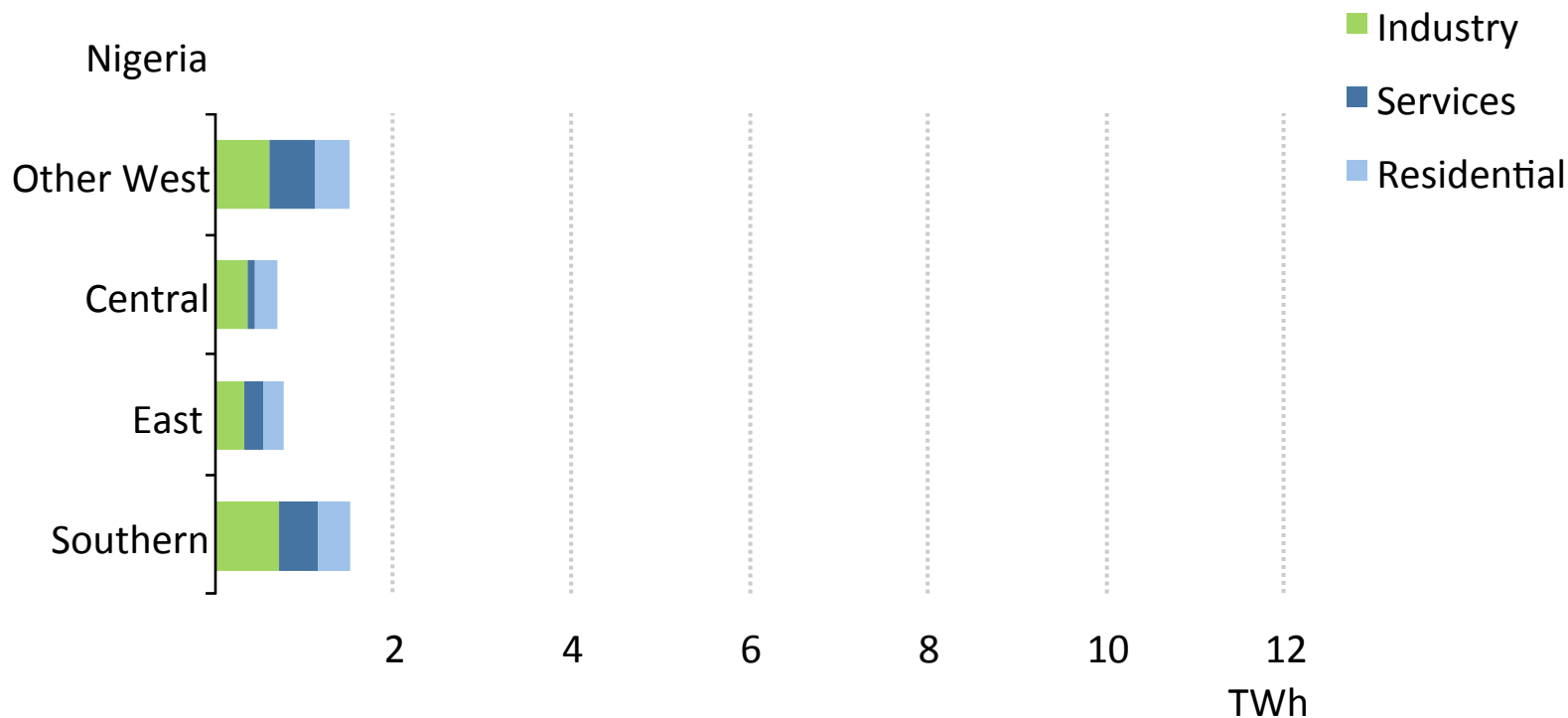
# Rich in resources, but poor in supply



***In sub-Saharan Africa, 630 million people – two-thirds of the population – live without electricity. Only a handful of countries have electrification rates above 50%***

# Back-up generators supplement unreliable, insufficient grid-based supply

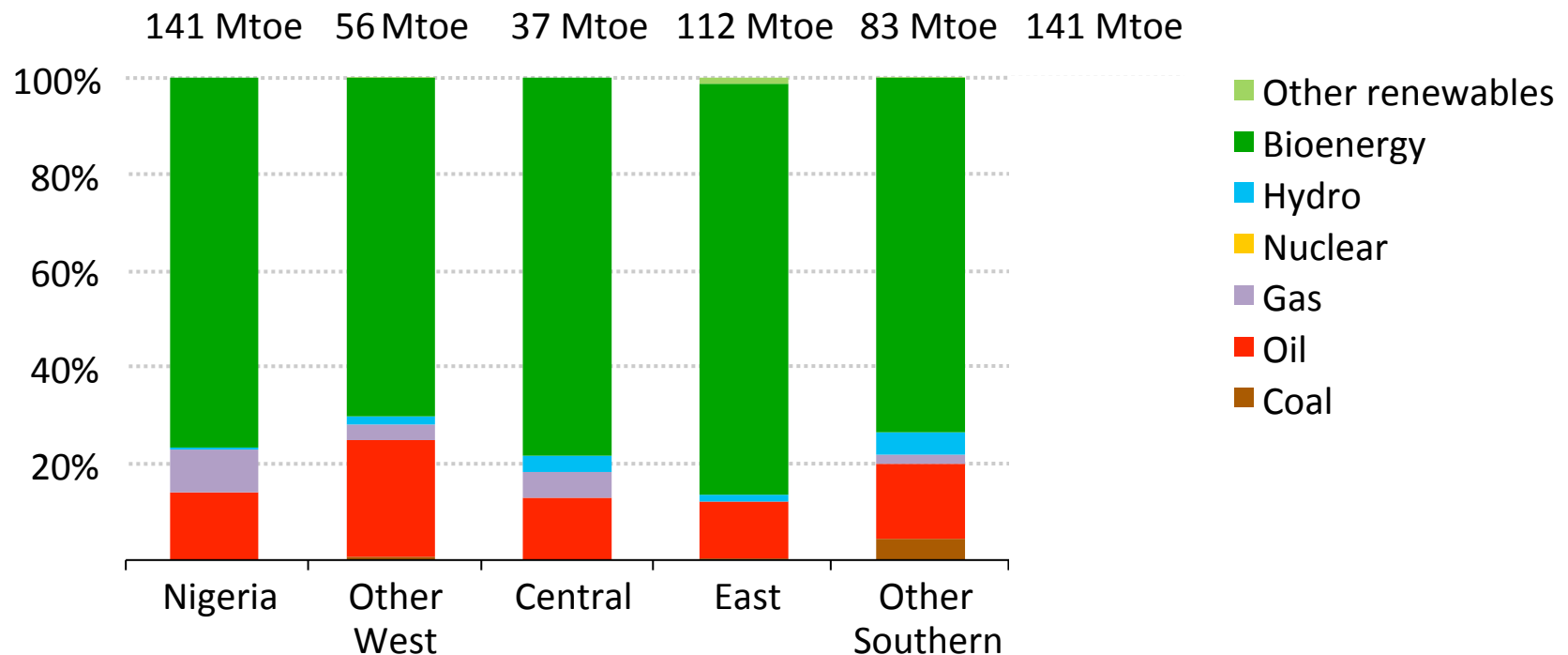
## Electricity demand met by back-up generators in sub-Saharan Africa by sub-region, 2012



***Back-up generators consume around 90 thousand barrels of oil per day to generate electricity, at an estimated cost of over \$5 billion***

# Energy demand by sub-region

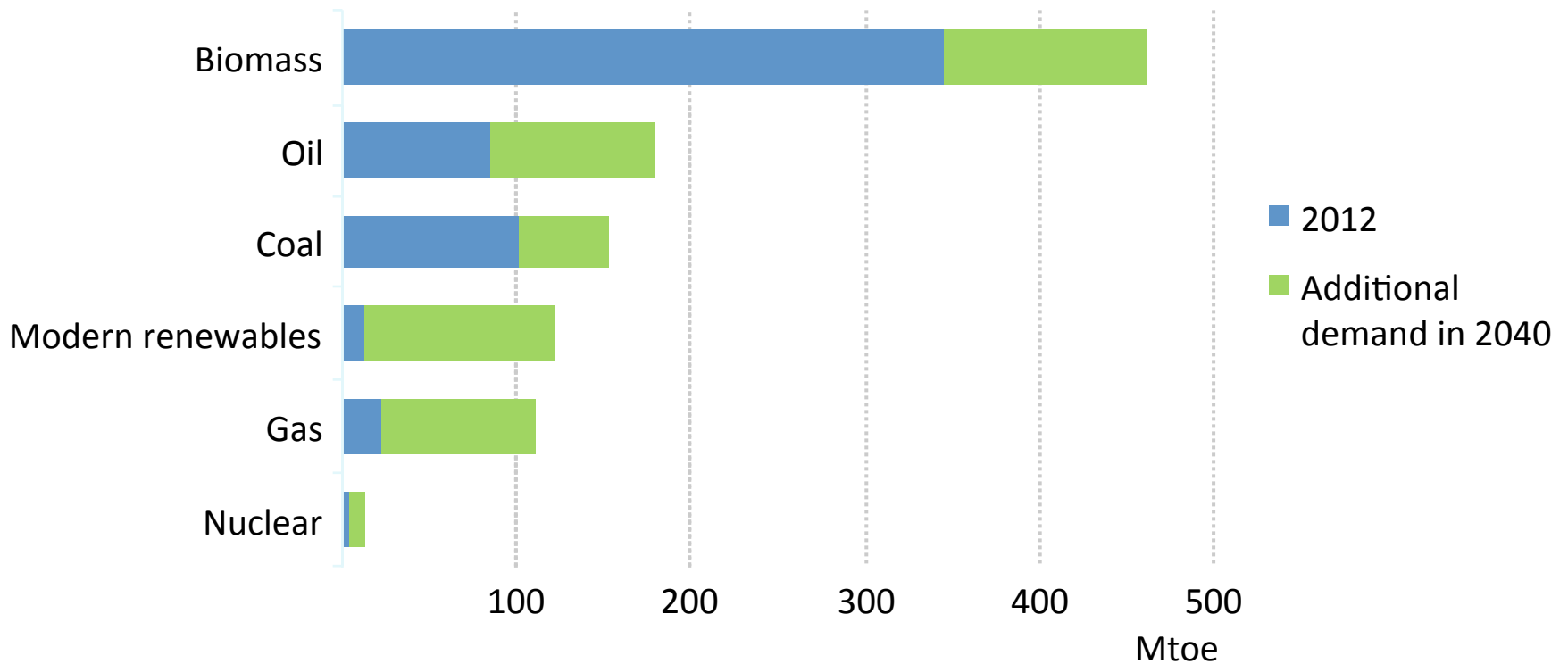
## Sub-Saharan Africa primary energy mix by sub-region, 2012



***Nigeria and South Africa are sub-Saharan Africa's largest energy demand centres, accounting collectively for half of total demand***

# Biomass remains at the centre of the sub-Saharan energy mix

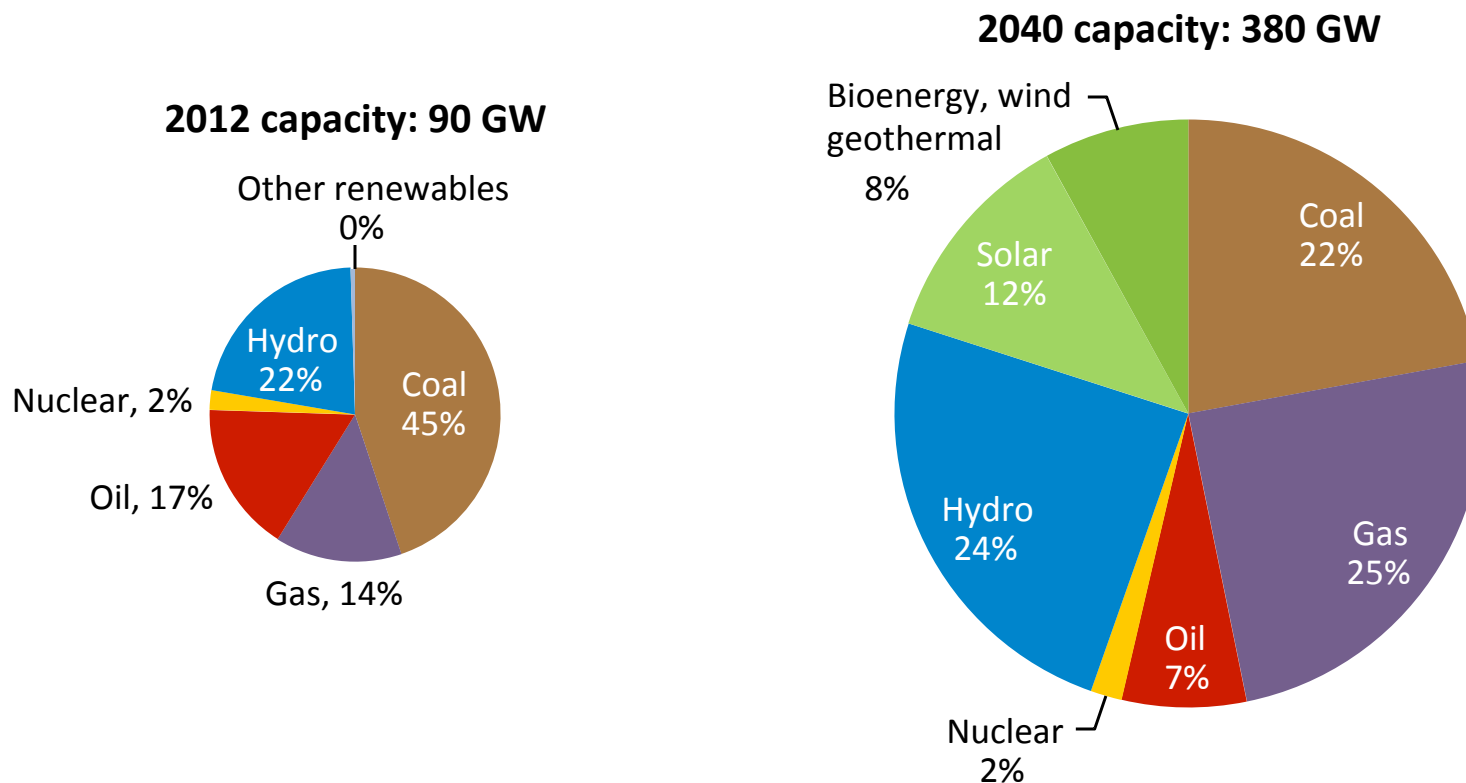
## Total primary energy demand in sub-Saharan Africa



***Reliance on fuelwood and charcoal remains high, even as incomes grow; 650 million people still cook with biomass in an inefficient, hazardous way in 2040***



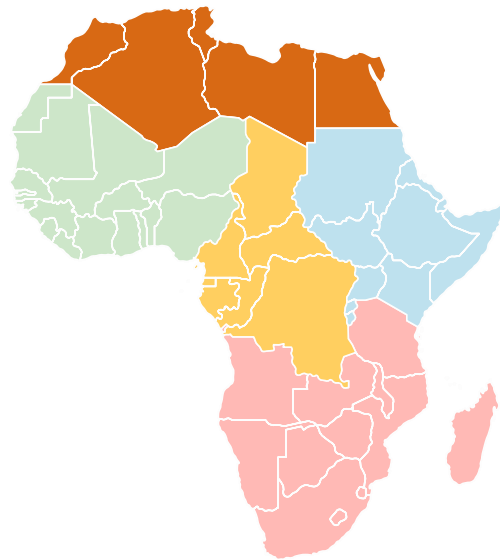
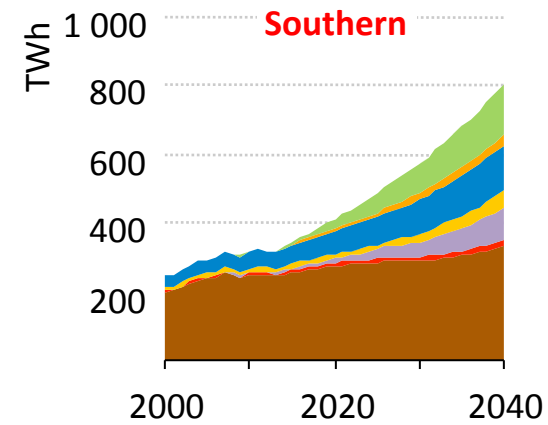
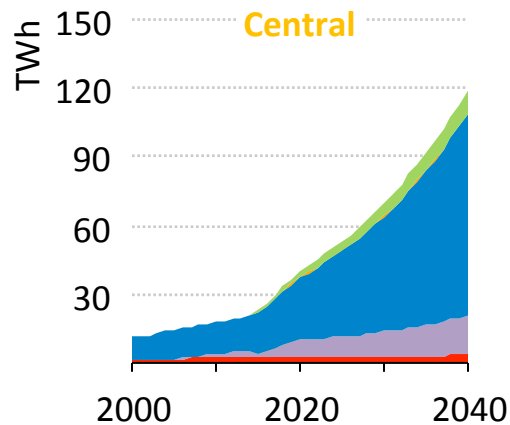
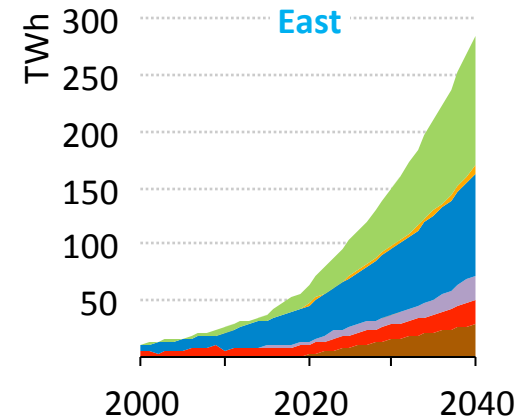
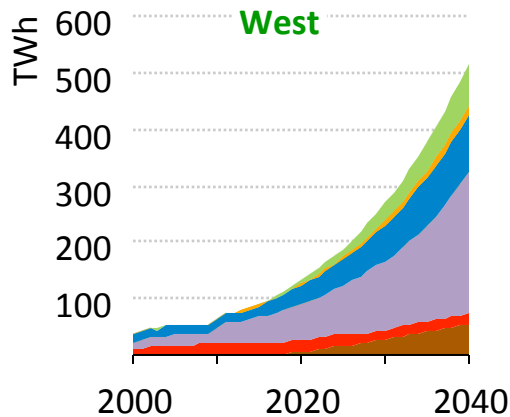
### Installed power generation capacity by fuel in sub-Saharan Africa



***Renewables account for almost half the growth in overall power supply, but fossil fuels are prominent in some countries***



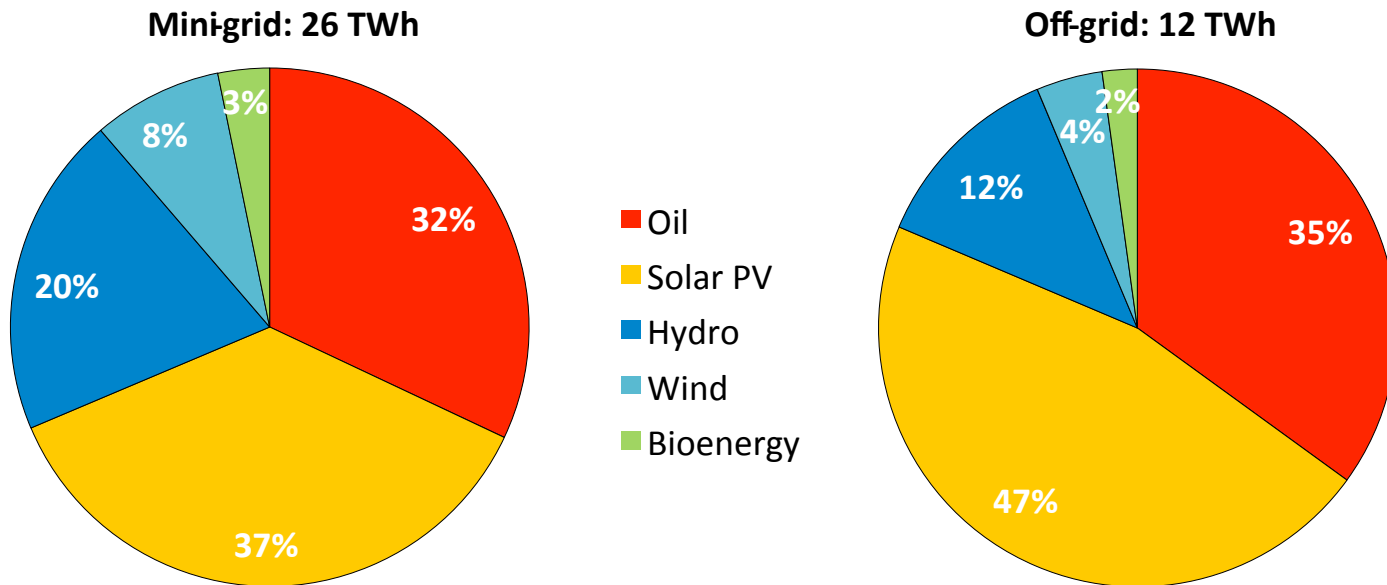
# Different paths to power across the continent



***The power mix by sub-region reflects local resource endowments; well-functioning regional power pools help to unlock new projects, lower costs & improve reliability***

# Important role for renewables beyond the grid

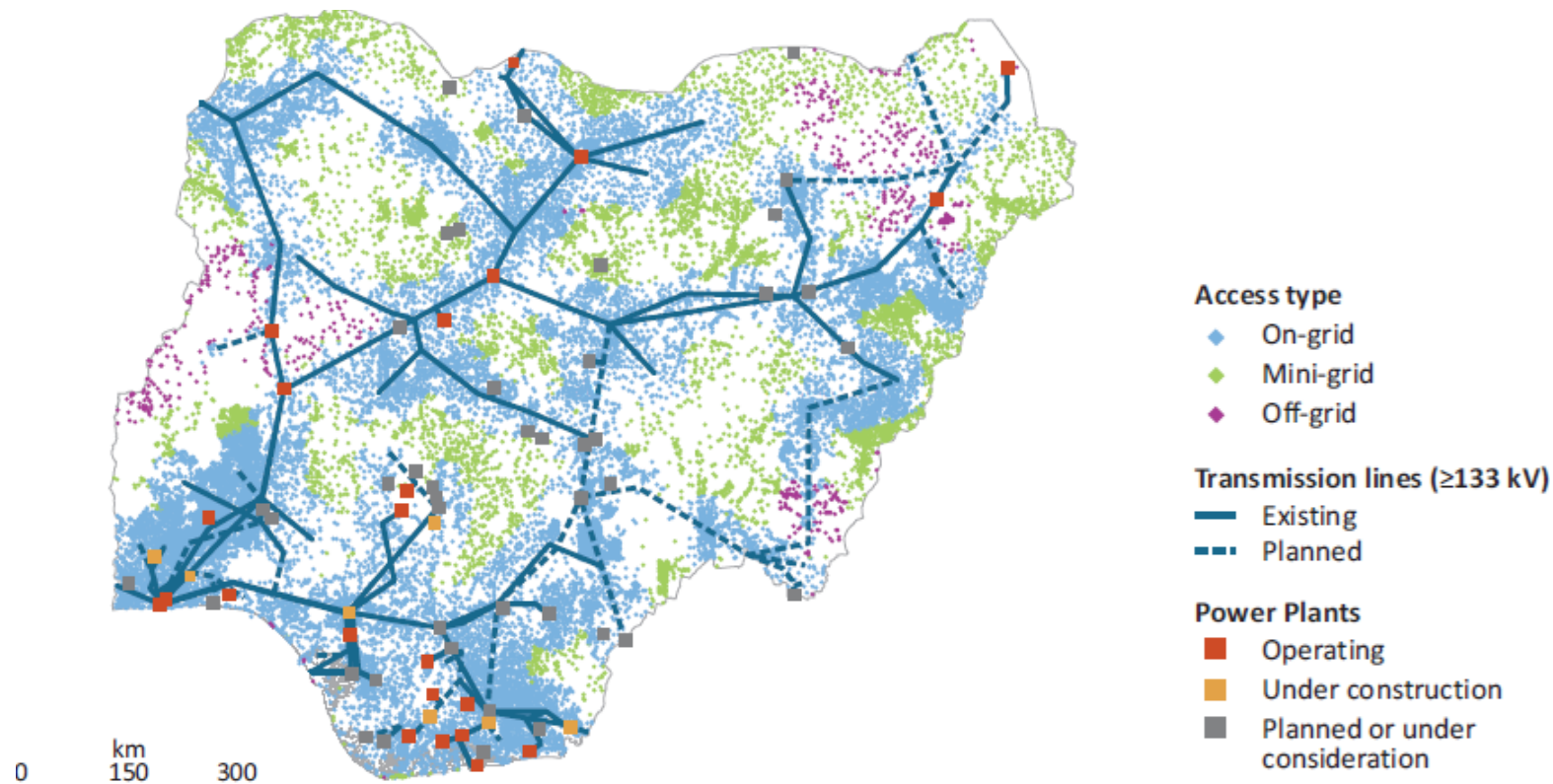
## Technology mix for mini-grids and off grids in sub-Saharan Africa, 2040



***Renewables – led by solar and hydro – account for two-thirds of the electricity supplied by mini-grid and off-grid systems***

# The most cost-effective way to expand electrification varies

## Optimal split by grid type in Nigeria, given expected expansion of transmission lines



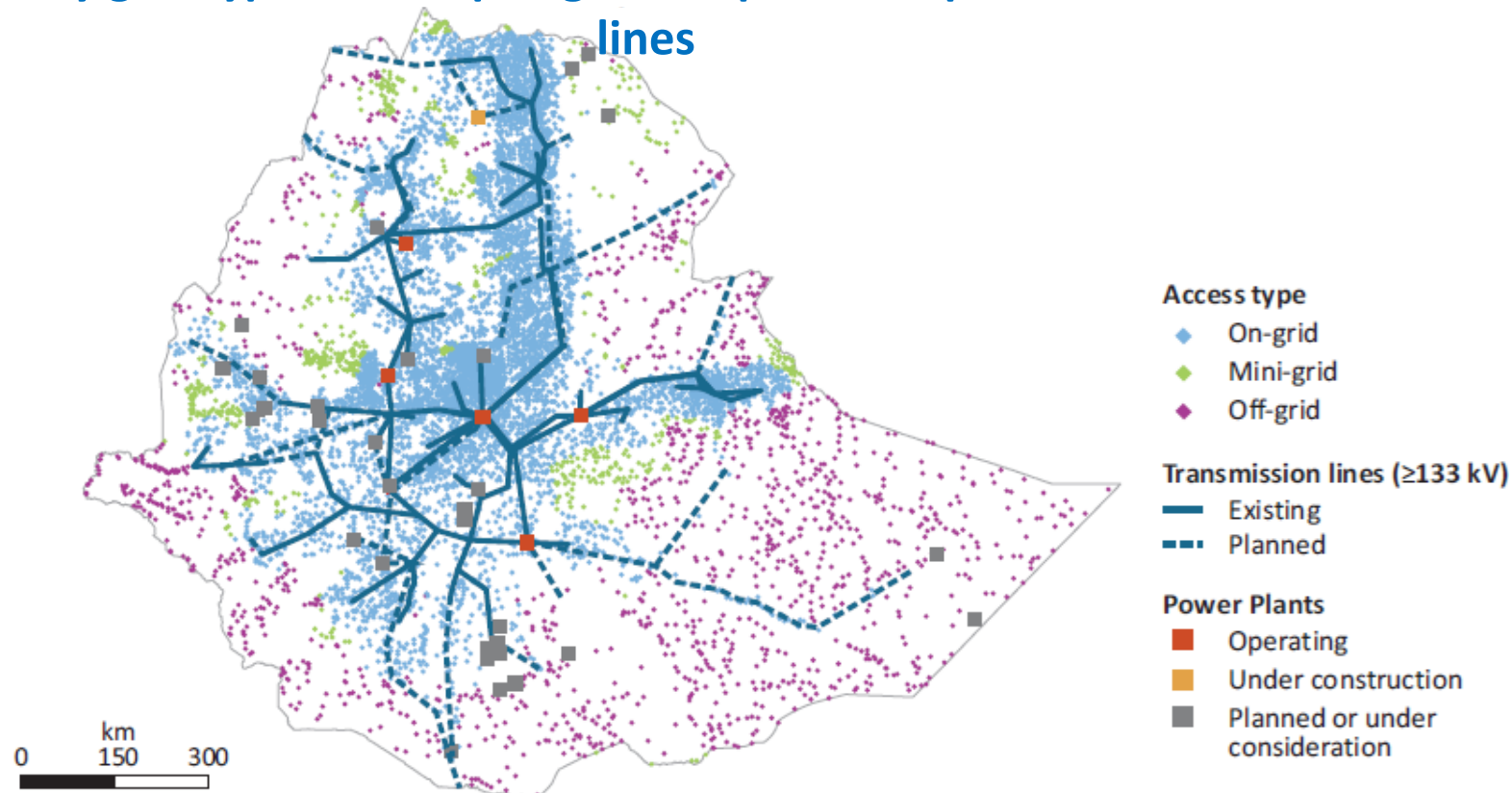
Source: IEA in collaboration with the KTH Royal Institute of Technology, division of Energy Systems Analysis.

***In Nigeria, higher population density and wider grid coverage favour on-grid supply; where grid extensions are not cost-effective, mini-grids tend to be preferred***



# The most cost-effective way to expand electrification varies

## Optimal split by grid type in Ethiopia, given expected expansion of transmission lines



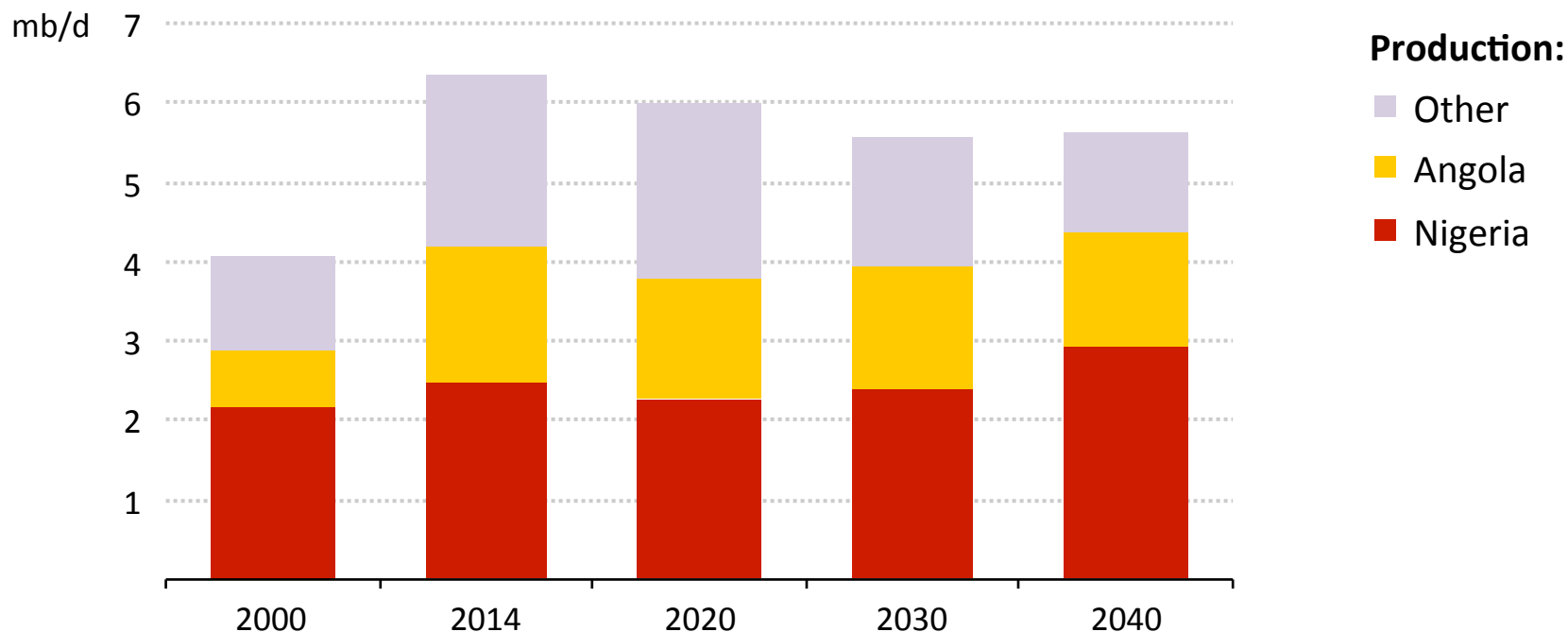
Source: IEA in collaboration with the KTH Royal Institute of Technology, division of Energy Systems Analysis.

***The overall population density of Ethiopia is half that of Nigeria meaning that mini- and, especially, off-grid solutions play a much more prominent role***



# A changing balance to oil production

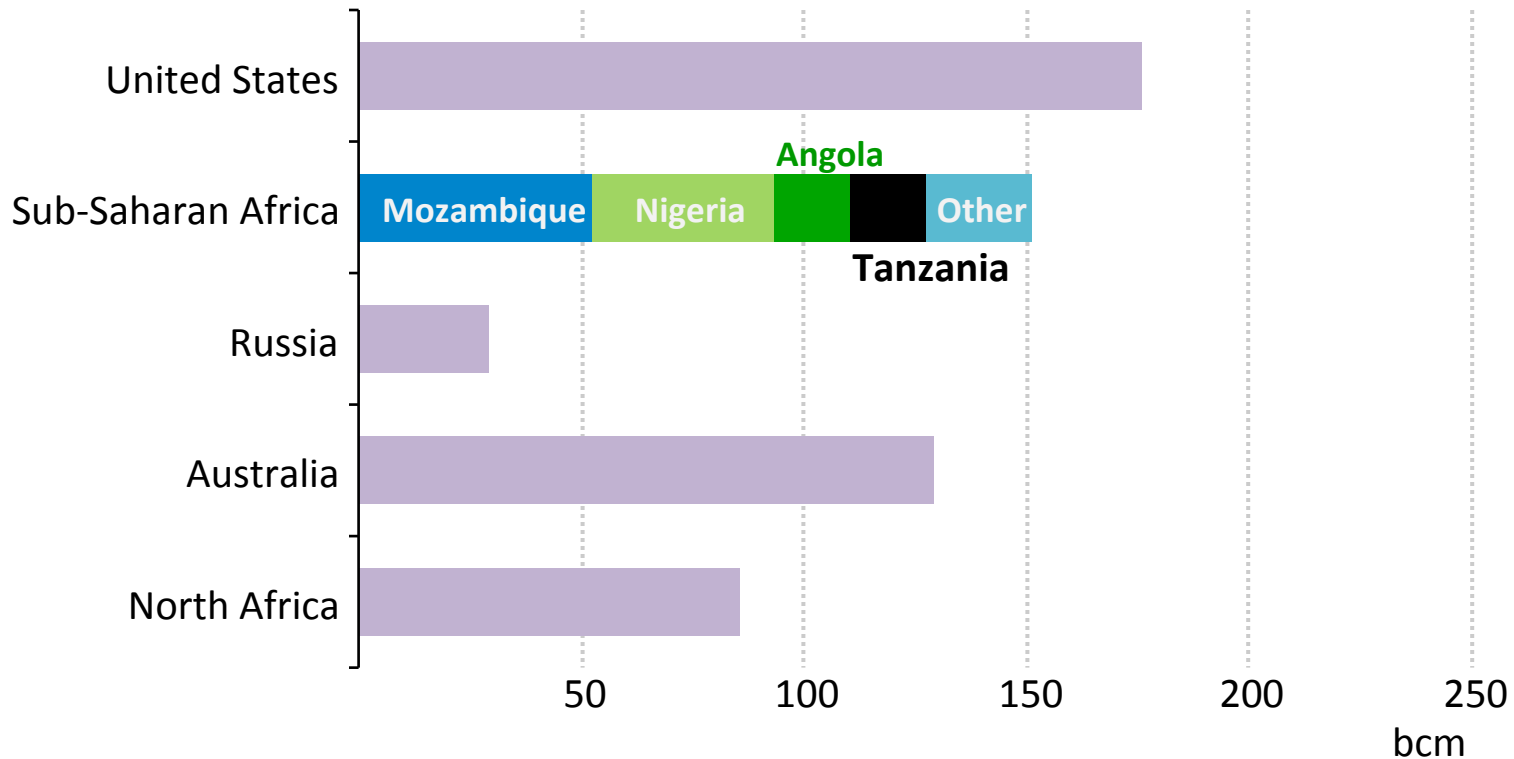
## Oil production in sub-Saharan Africa



*The region remains a major global supplier, although the role of the two biggest producers (Nigeria and Angola) ebbs and flows*

# A new global gas player

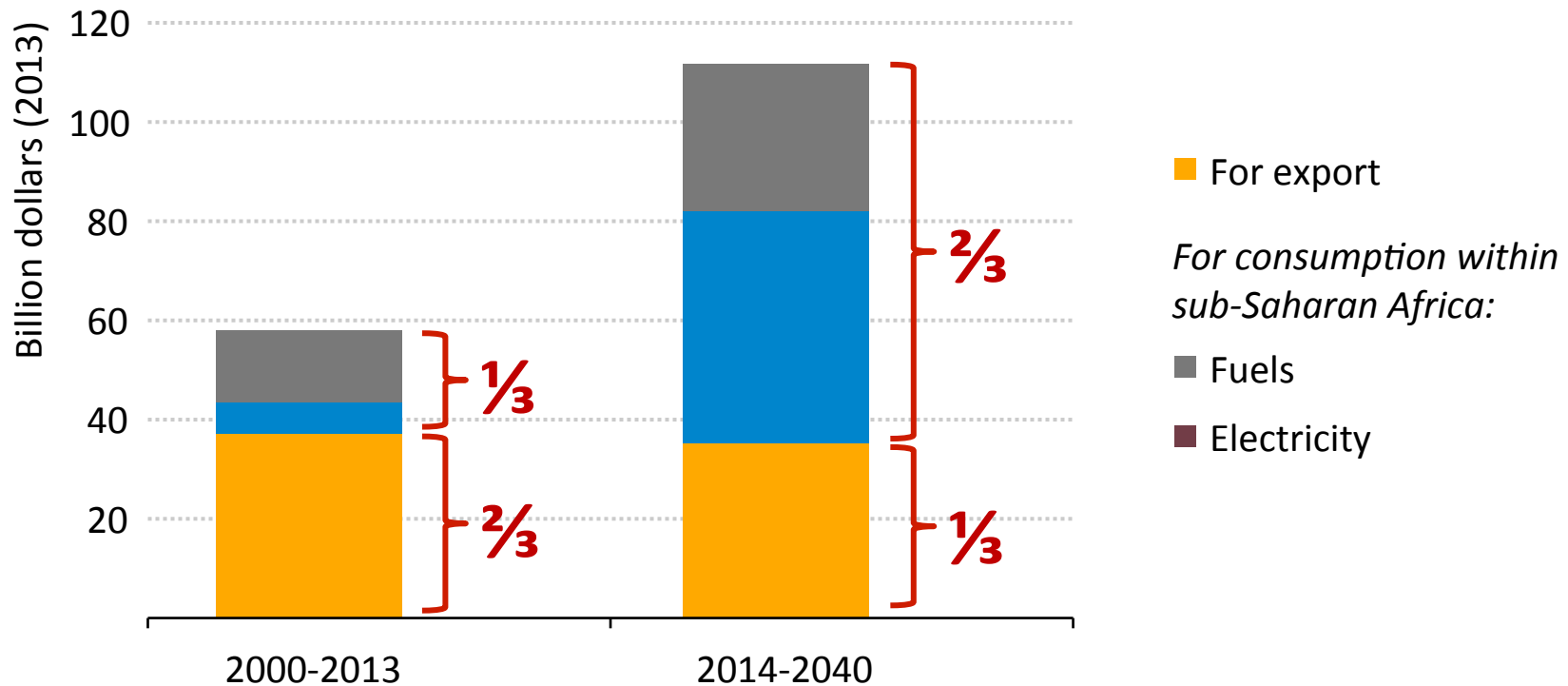
## Increase in gas production in selected countries & regions, 2013-2040



***LNG export is the anchor for the east coast gas discoveries, but a major share of the increase in overall gas output goes to domestic power generation and industry***

# Investment has to come home

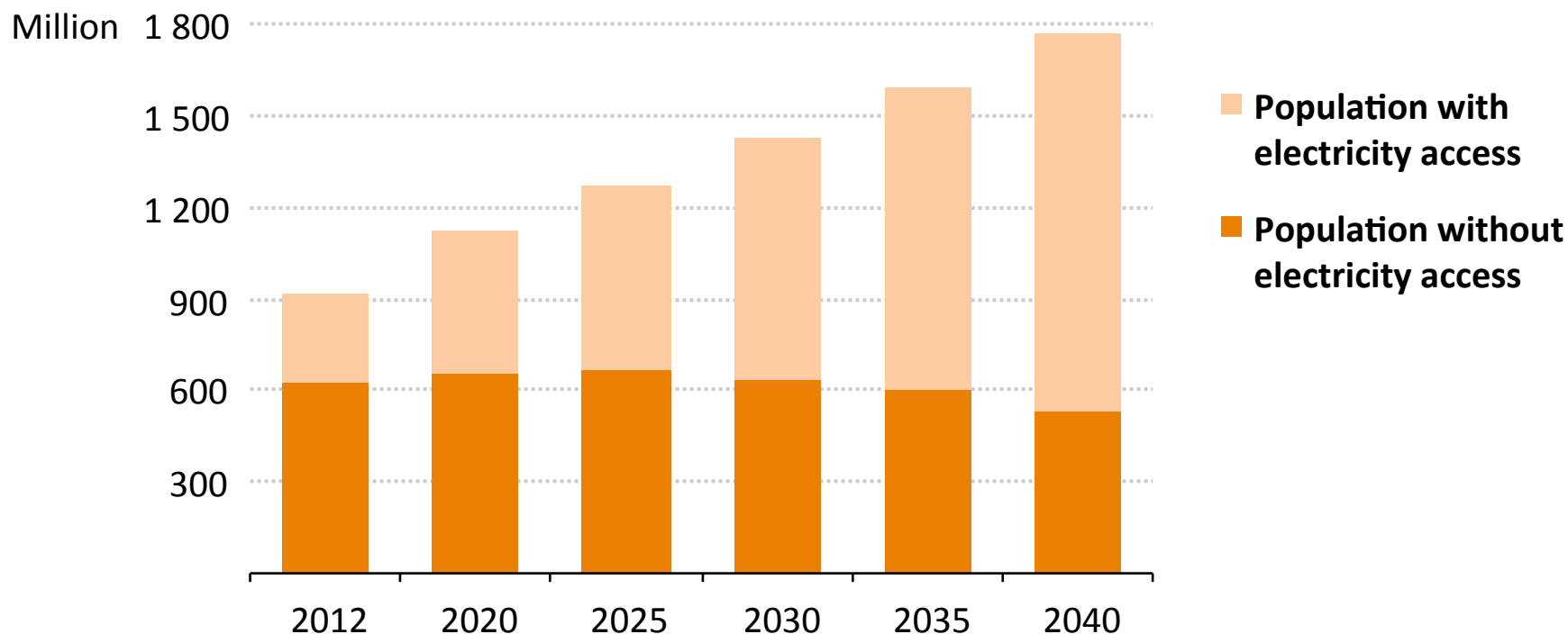
## Average annual investment in sub-Saharan energy supply



***In a reversal of current trends, 2 out of 3 future investment dollars produce energy for sub-Saharan consumers, but this is still not enough to meet their needs in full***

# A large step towards universal access, but still a long way to go

## Access to electricity in sub-Saharan Africa

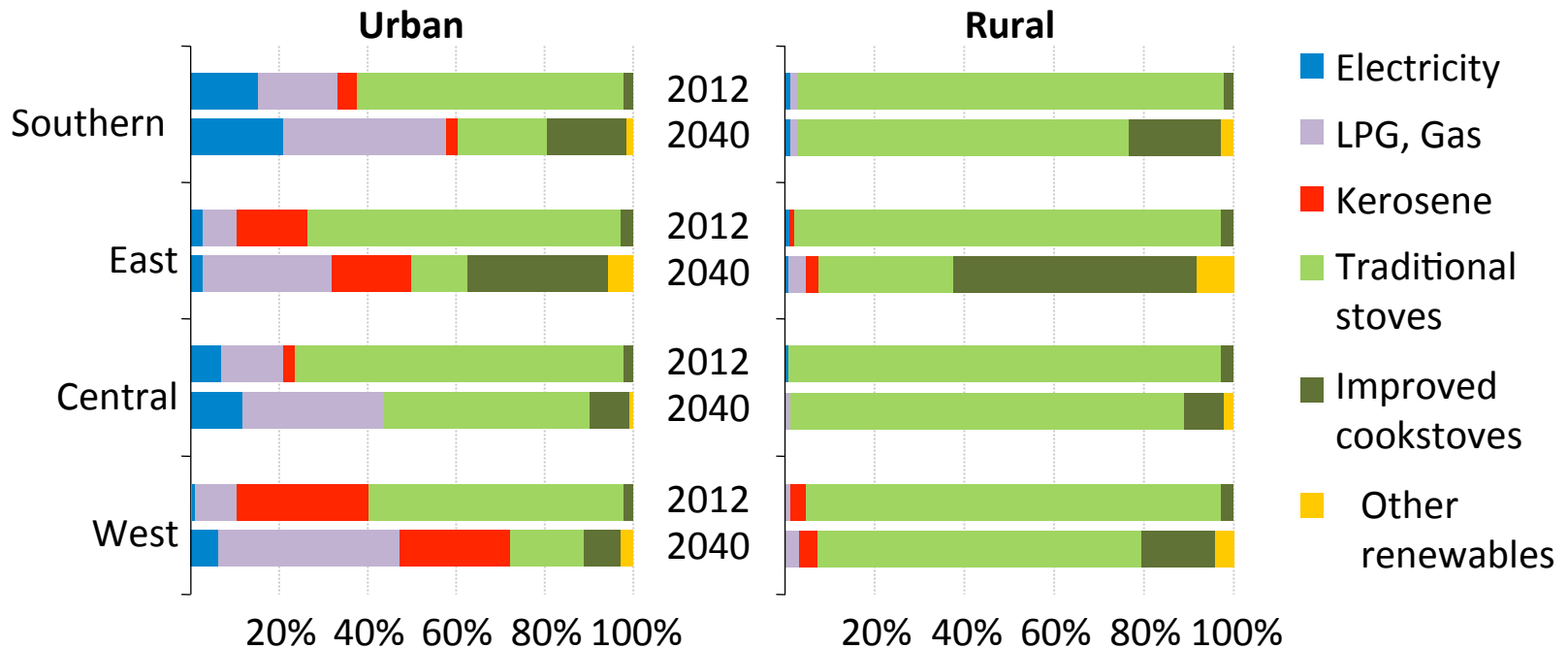


***Nearly one billion people gain access to electricity, but over 500 million remain without power in 2040 – primarily in rural communities***



# Biomass continues to dominate energy demand for cooking

## Primary fuel/technology used by household for cooking in sub-Saharan Africa in the New Policies Scenario



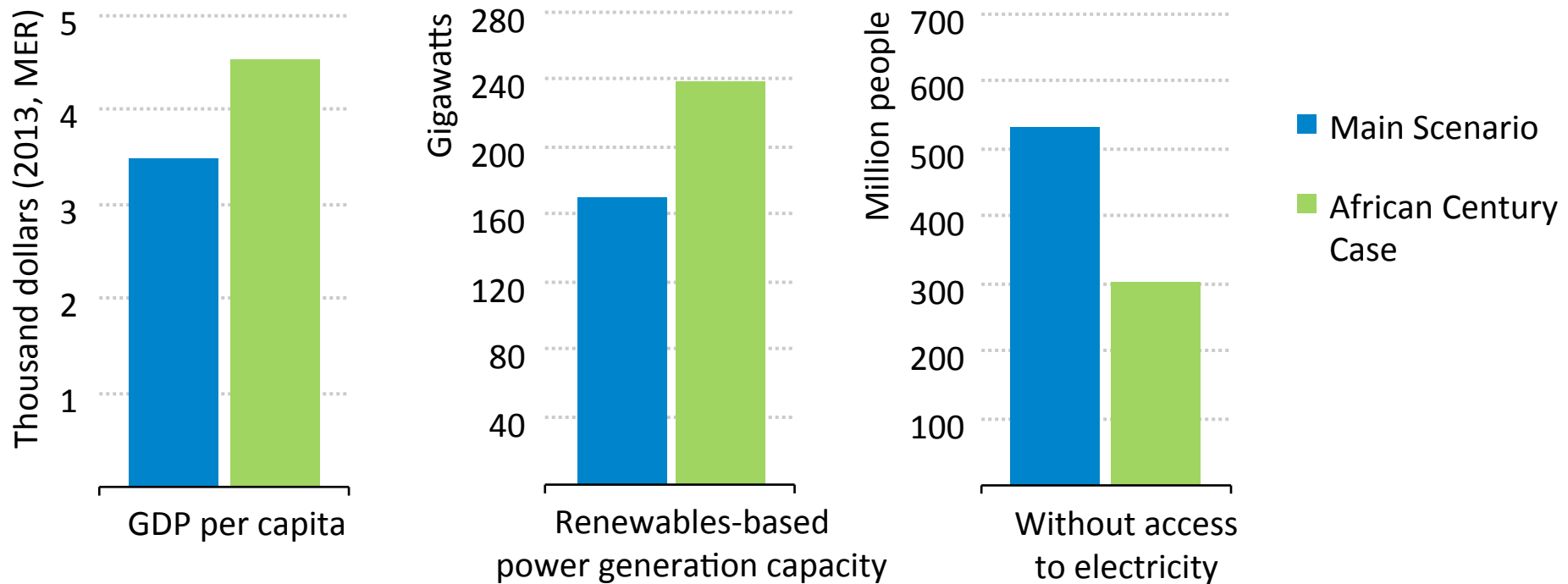
***In urban areas, access to clean cooking facilities is mainly by fuel switching, while in rural areas it is mainly via improved biomass cookstoves***

# How could energy make the 21<sup>st</sup> century an African century?

- **Energy could do more to act as an engine of inclusive economic and social development**
- **An African Century Case assesses the impact of faster movement in three key areas:**
  - *An upgraded power sector; reducing power outages by half and achieving universal access in urban areas*
  - *Deeper regional co-operation; expanding markets and unlocking a greater share of the continent's hydropower potential*
  - *Better management of resources and revenues; more efficiency and transparency in financing essential infrastructure*

# Energy can build a path to prosperity

## Outcomes in the African Century Case, 2040



***By increasing the coverage and reliability of energy supply, the African Century Case unlocks an extra decade's worth of growth in per-capita incomes by 2040***

- **Energy is a cornerstone of sub-Saharan strategies for poverty reduction and economic growth**
- **Improvements in sector governance are needed to bring in new energy investors and kick-start development**
- **The shortest route to power is a combination of regional and national level grid projects, and mini-off grid projects**
- **Renewables are central to the regions energy outlook, while more efficient and sustainable use of biomass will create a healthier domestic energy balance**
- **Concerted action to improve the functioning of the energy sector is essential if the 21<sup>st</sup> century is to become an African century**



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