



电力规划设计总院  
China Electric Power Planning & Engineering Institute

**PROSPECT OF CHINESE ENTERPRISES PARTICIPATION  
IN AFRICAN POWER COOPERATION**

**中国企业参与非洲电力合作展望**

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I Overview of African Energy and Power Development  
非洲能源电力现状及发展情况

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中国企业积极助推非洲能源电力发展

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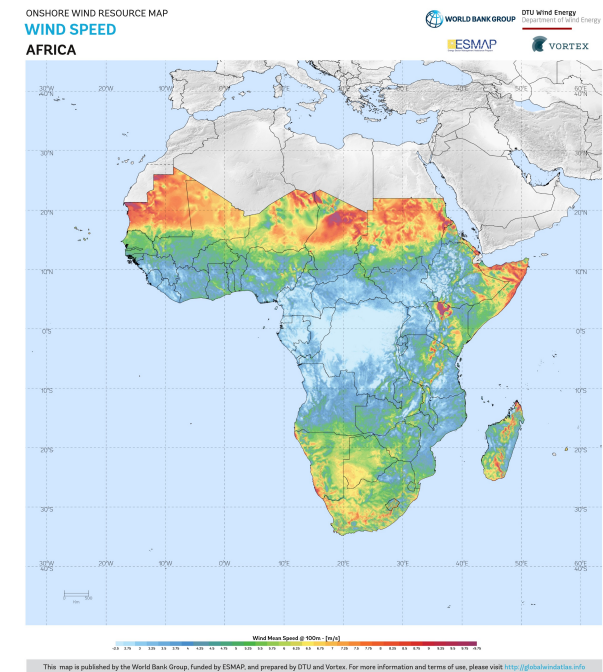
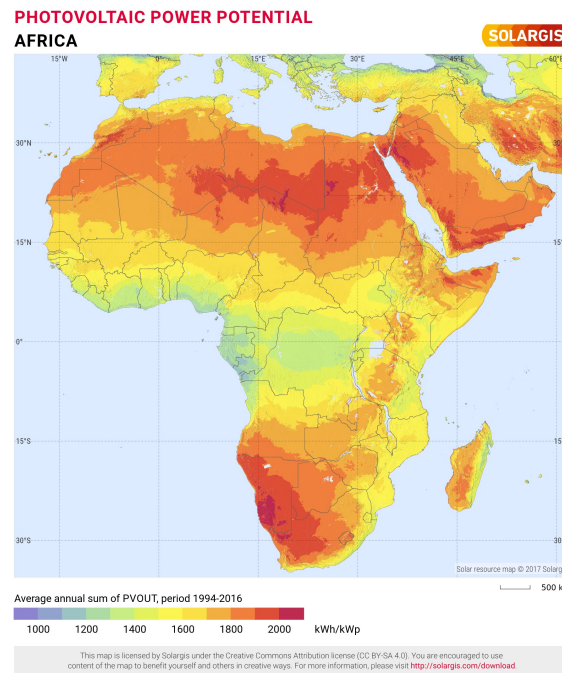
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# Diversified and Rich Energy Resources in Africa

## 非洲国家能源资源情况

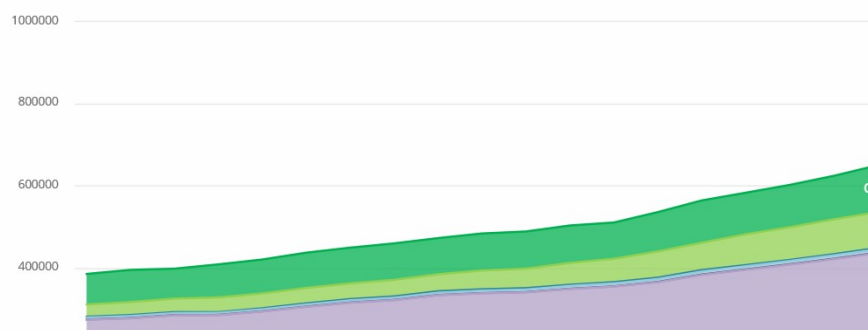
Africa is rich in both fossil and renewable energy. Specifically, the present utilization of renewable development rate is extremely low, and it is the continent with the greatest potential for renewable energy development in the world. 非洲化石能源资源丰富，同时水能、风能、太阳能等可再生能源资源丰富，理论蕴藏量分别为4.4 万亿千瓦时/年、650 万亿千瓦时/年，60000 万亿千瓦时/年，占全球的11%、32%和40%。目前可再生能源开发比例极低，开发潜力巨大。



## Diversified and Rich Energy Resources in Africa 非洲国家能源生产消费情况

From International Energy Agency, total primary energy supply in Africa in 2017 was 811 Mtoe, accounting for 5.8% of the global total, only 2.1% of which is from renewable, the total final consumption was 593 Mtoe, of which household, industry and transportation accounted for 54.7%, 14.8% and 19.7% respectively. 根据国际能源署统计，2017年非洲一次能源生产总量为811Mtoe，占全球总量5.8%。其中生物质占比54.3%，石油占比23.6%，天然气占比15.1%，煤炭占比13.5，可再生能源占比仅2.1%。2017年非洲终端能源消费总量为593Mtoe，其中居民消费占比54.7%，工业和交通分别占比14.8%和19.7%。

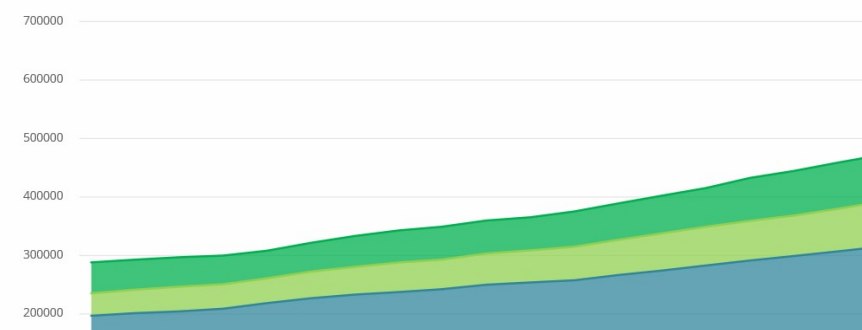
Total primary energy supply (TPES) by source, Africa 1990-2017  
ktoe



非洲一次能源生产总量及结构

Total primary energy supply (TPES) by source, Africa 1990-2017

Total final consumption (TFC) by sector, Africa 1990-2017  
ktoe



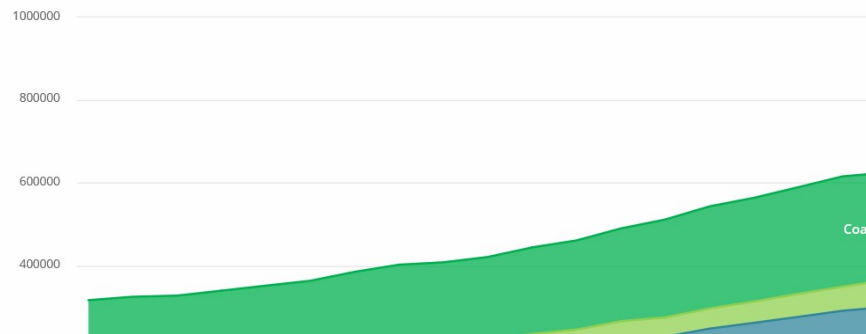
非洲终端能源消费总量及结构

Total final consumption (TFC) by sector, Africa 1990-2017

## Diversified and Rich Energy Resources in Africa 非洲国家电力生产消费情况

From International Energy Agency, In 2017, total electricity generation in Africa was 823.36 Twh, a year-on-year increase of 2.6%. Among them, fossil energy accounted for 79.6%, and renewable energy power generation accounted for 18.3%. Among renewable energy generation, hydropower accounts for 84.8%, wind power accounts for 8.2%, solar energy accounts for 3.8%, and geothermal accounts for 3.2%. 根据国际能源署统计，2017年非洲发电总量为8233.6亿千瓦时，同比增长2.6%。其中化石能源占比79.6%，可再生能源发电占比18.3%。可再生能源发电中，水电占比84.8%，风电占比8.2%，太阳能占比3.8%，地热占比3.2%。

Electricity generation by source, Africa 1990-2017  
GWh



非洲发电量结构

Electricity generation by source, Africa 1990-2017

Renewable electricity generation by source (non-combustible), Africa 1990-2017  
GWh



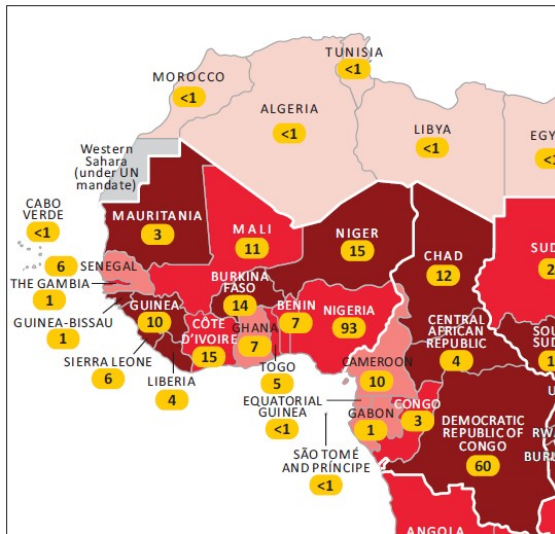
非洲可再生能源电量及结构

Renewable Electricity Generation by source, Africa 1990-2017

# Power Development in Africa: Challenges

## 非洲国家电力发展面临挑战

The per capita electricity consumption level in African countries is much lower than the world average, and there are still a large number of people without electricity. Most countries have not yet established a sound electricity market mechanism and the power infrastructure is yet to be developed, and are not capable of integrating large scale of wind and solar power. 非洲国家人均用电量水平远低于世界平均水平，仍然有大量无电人口，大部分国家尚未建立完善的电力市场机制，电网基础设施薄弱，基本未实现全国联网，无法适应可再生能源大规模并网和消纳。



非洲无电人口数量和比例

Number and share of people without access to electricity

Map of the status of electricity market

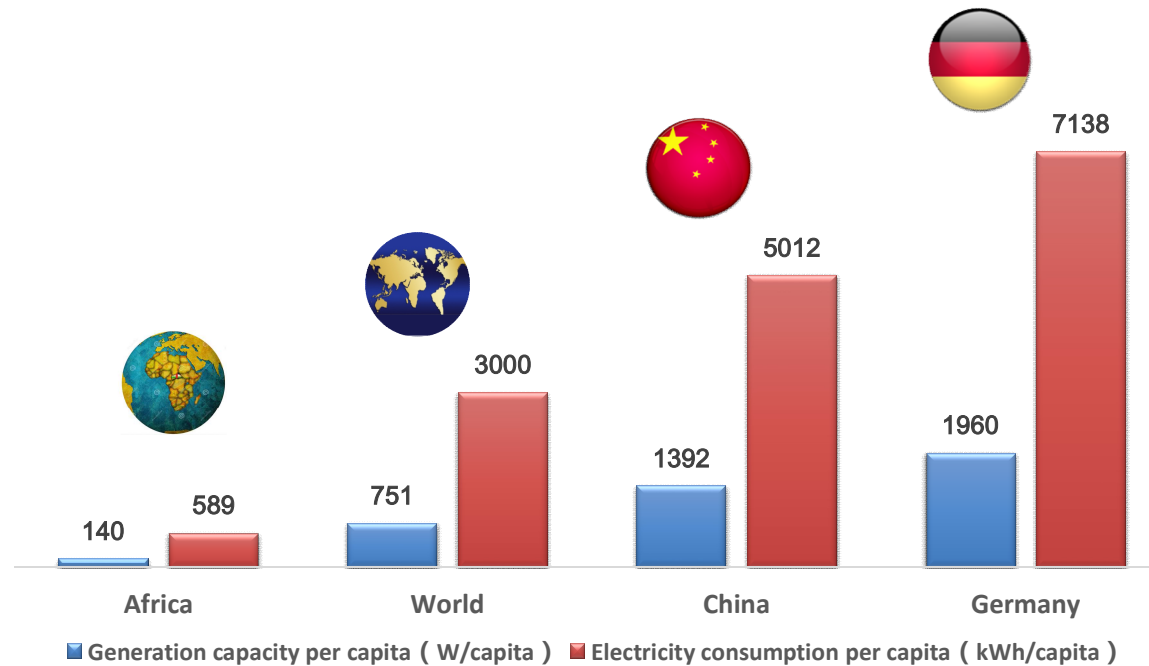


电力市场建设情况

Electricity Market Liberalization

## Outlook of African Power Demand 非洲国家电力需求展望

In Africa, the current per capita electricity consumption is only 590 kWh, which is less than 1/5 of the world average. According to the forecast of the GEIDCO, the electricity demand in Africa will maintain rapid growth in the future. In 2050, the electricity demand will reach 4000 Twh. 非洲目前人均用电量仅590 千瓦时，不足世界平均水平的1/5。根据全球能源互联网发展合作组织预测，未来非洲电力需求总量将保持快速增长，预计2050年电力需求将达到近4万亿千瓦时。





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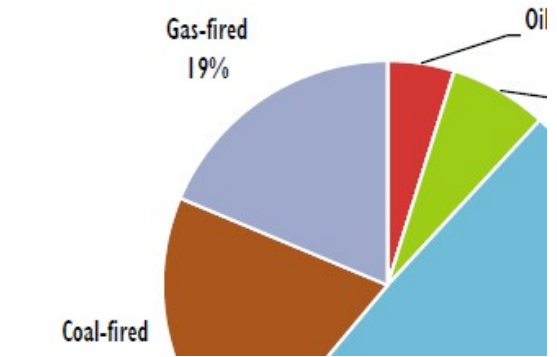
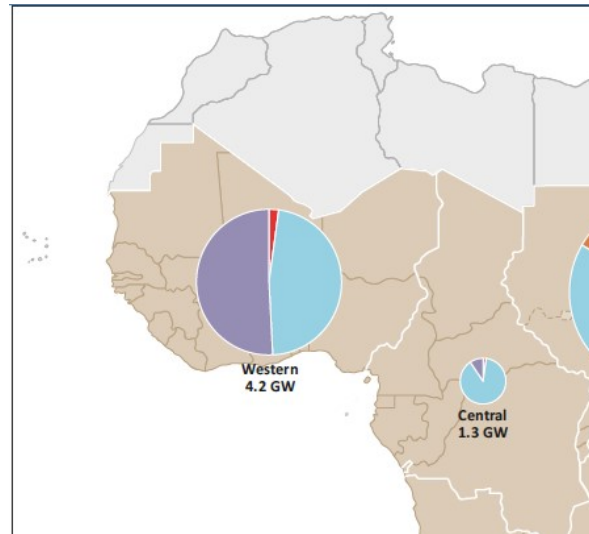
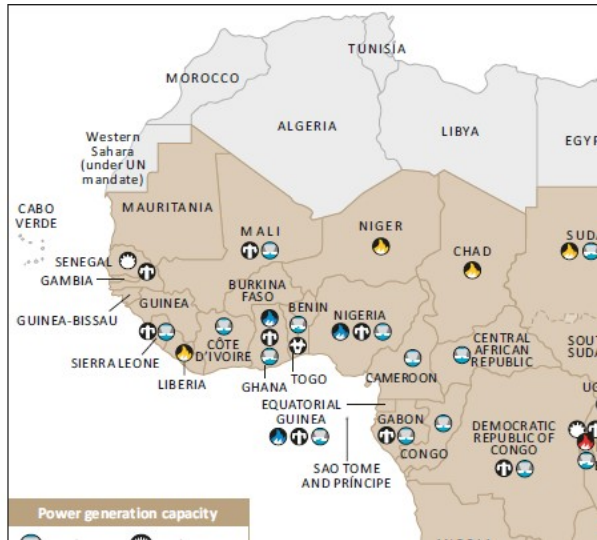
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# Overview of Chinese existing power projects

## 中国已经参与的电力项目概况

Chinese companies contracted greenfield power projects in more than three-quarters of sub Saharan African countries. Chinese projects cover almost the entire capacity mix, but hydropower dominates. Renewable sources make up 56% of total capacity added by Chinese companies between 2010 and 2020. 2010-2020年间，中国公司承建的新电力项目在撒哈拉以南非洲分布广泛，覆盖四分之三以上的撒哈拉以南非洲国家。其中，新建发电装机容量的56%为可再生能源，并以水电为主。



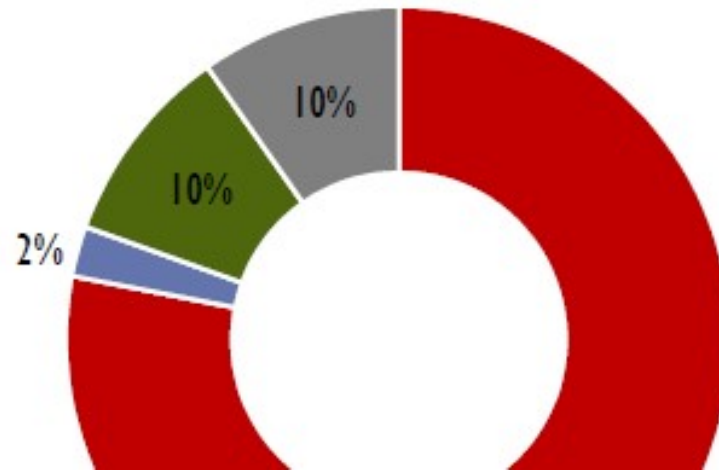
中国承建项目的新增发电装机容量结构  
Chinese-added generation capacity mix

中国公司承建的新电力项目，2010-2020 年

Greenfield power projects contracted to Chinese companies, 2010-20

## Overview of Chinese existing power projects 中国已经参与的电力项目概况

Chinese companies offer integrated solutions in power generation, transmission and distribution projects financed by a combination of Chinese enterprises commercial investment as well as assistance and loans from China. 中国企业为发电，输电和配电项目提供一揽子解决方案，目前资金主要来自中方企业投资及中方提供的援助及贷款。



中方承建的电力项目融资来源

Origin of financing for Chinese-built power projects

## Suggestion for future cooperation 中国企业参与非洲电力合作建议

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The power cooperation of Chinese enterprises in Africa has effectively promoted the elimination of energy poverty, development of energy and power sector, as well as economic and social progress. 中国企业在非洲开展的电力合作，已经有力地促进非洲能源普及，推动能源电力发展，促进经济社会进步，未来合作建议：

1. Assist African countries to develop electricity planning according to local conditions and improve the top design of power development. 协助非洲国家，因地制宜开展电力规划，完善电力发展顶层设计。
  2. Diversify project cooperation and investment models, and make full use of local renewable energy to further increase the degree of power penetration. 采取多样化项目合作和投资模式，充分利用非洲当地可再生能源，进一步提升非洲电力普及程度，促进经济社会发展。
  3. Enhance power system connectivity to allow low-cost utilization of renewables and increase the scale of renewable energy utilization. 推动各国电力设施的互联互通，实现可再生能源优化配置，降低可再生能源的利用成本，提高可再生能源利用规模。
  4. Capacity building and improve the expertise of local personnel. 开展能力建设，融入当地，提升本地员工技术水平。
  5. Support the alignment of standards related to efficiency & emission control of fossil fuel units, digitalization of power grid and energy savings. 加强与各国对相关标准进行对接，包括化石能源机组能耗和排放标准，电网数字化标准以及终端用能的能效标准。
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# EPPEI Introduction

## 电力规划设计总院介绍



As a state-level high-end consulting institution, EPPEI provides services to government departments, financial institutions, power and related enterprises. 电规总院作为国家级高端咨询机构，主要向政府部门、金融机构、电力及相关企业提供服务。服务领域包括能源电力行业发展战略、产业政策、发展规划、电力新技术等研究，以及电力工程项目的咨询评估、标志制定，电力行业信息化等。



国际能源署中国联络办公室  
IEA China Liaison Office



中国-中东欧国家能源项目对话与合作中心  
CDCEP 17+1 Chinese Secretariat



能源委员会互联互通专家工作组中方秘书处  
UN ESCAP EWG-EC



中芬能源合作平台  
China-Finland Energy Cooperation Platform

## EPPEI Footprint in Africa 电力规划设计总院非洲业务介绍

EPPEI has actively participated in China-Africa Power Cooperation.

电规总院近年来积极参与非洲电力合作:

- ✓ Entrusted By NEA, China-Sudan Power Cooperation Planning Research, Belt and Road Energy Ministerial Meeting, China-Arabian Countries Energy Cooperation Forum. 受中国国家能源局委托, 开展中国-苏丹电力合作规划研究, 承办“一带一路”能源部长会, 中国-阿拉伯国家能源合作大会。
- ✓ Consultation on Power Projects in Djibouti, Ghana, Mozambique, South Africa, etc. 吉布提, 加纳, 莫桑比克, 南非等十余国的电力项目咨询评估工作。
- ✓ Electricity market analysis and power system planning research in Congo DR, Kenya, Egypt, São Tomé e Príncipe, etc. 开展刚果(金), 肯尼亚, 埃及, 圣多美和普林西比等十余国的电力市场分析和电力系统规划研究。
- ✓ Participate in the preparatory work of the China-Africa Energy Cooperation Committee. 积极参与中非能源合作委员会筹建工作。



**THANKS**  
感谢您的时间



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