*Centre Energie - Centre for Energy*

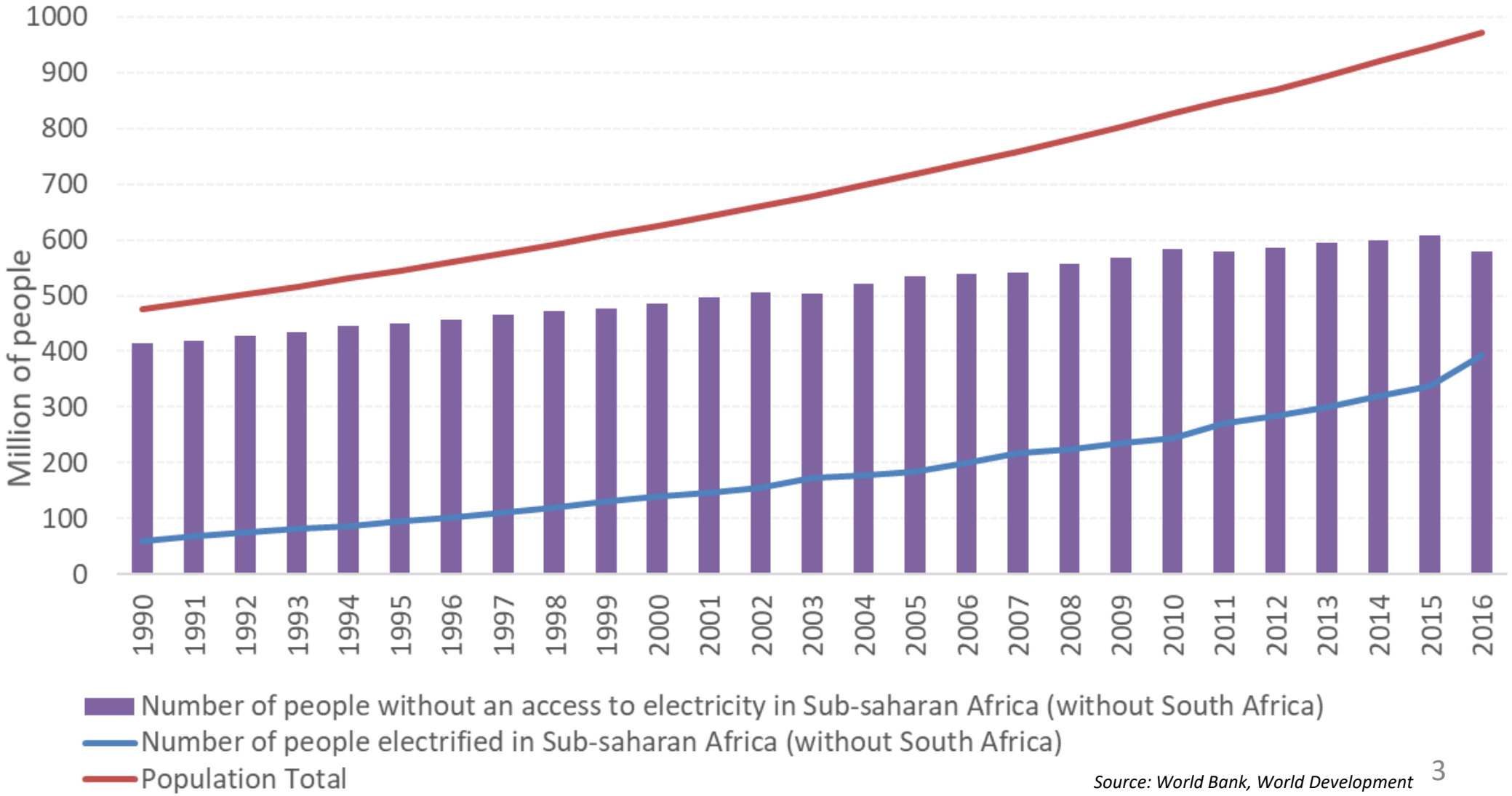
# Sub-Saharan Africa's electricity challenges and opportunities

Ifri-OCP roundtable, 09 November 2018, Rabat

# 1. Electricity access in SSA: status and challenges to meet the SDG of universal access by 2030

# Population increase is stronger than energy access progress

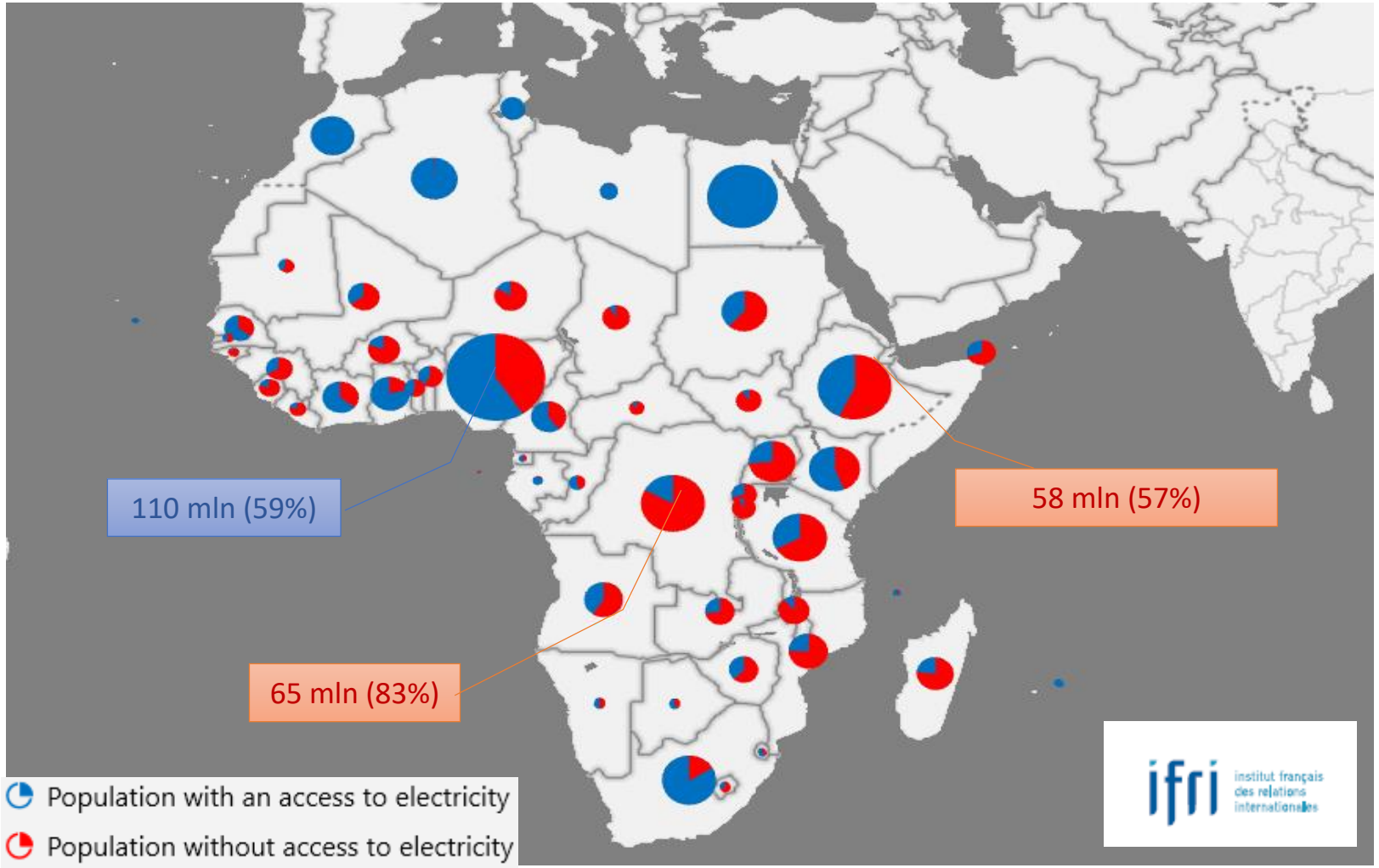
## Number of people with and without electricity in Sub saharan Africa (without South Africa)




*Source: World Bank, World Development Indicators, and own calculations*

# Electricity access challenge unaddressed: around 550 millions without access, 700 million without clean cooking

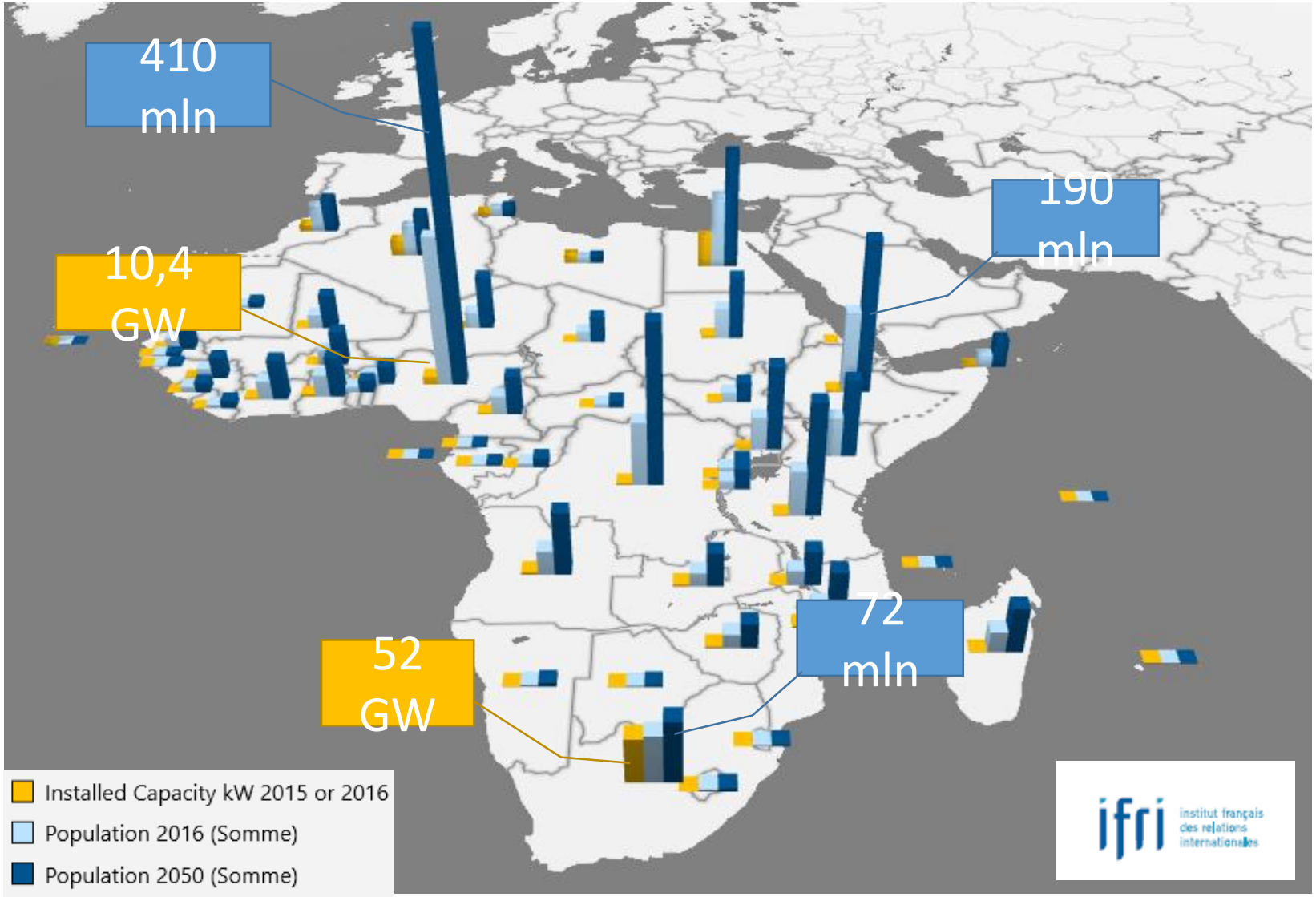
## Access to electricity (% of population) in 2016




*Source: World Bank, World Development Indicators*

# Tiny installed power generation capacity, less than Germany

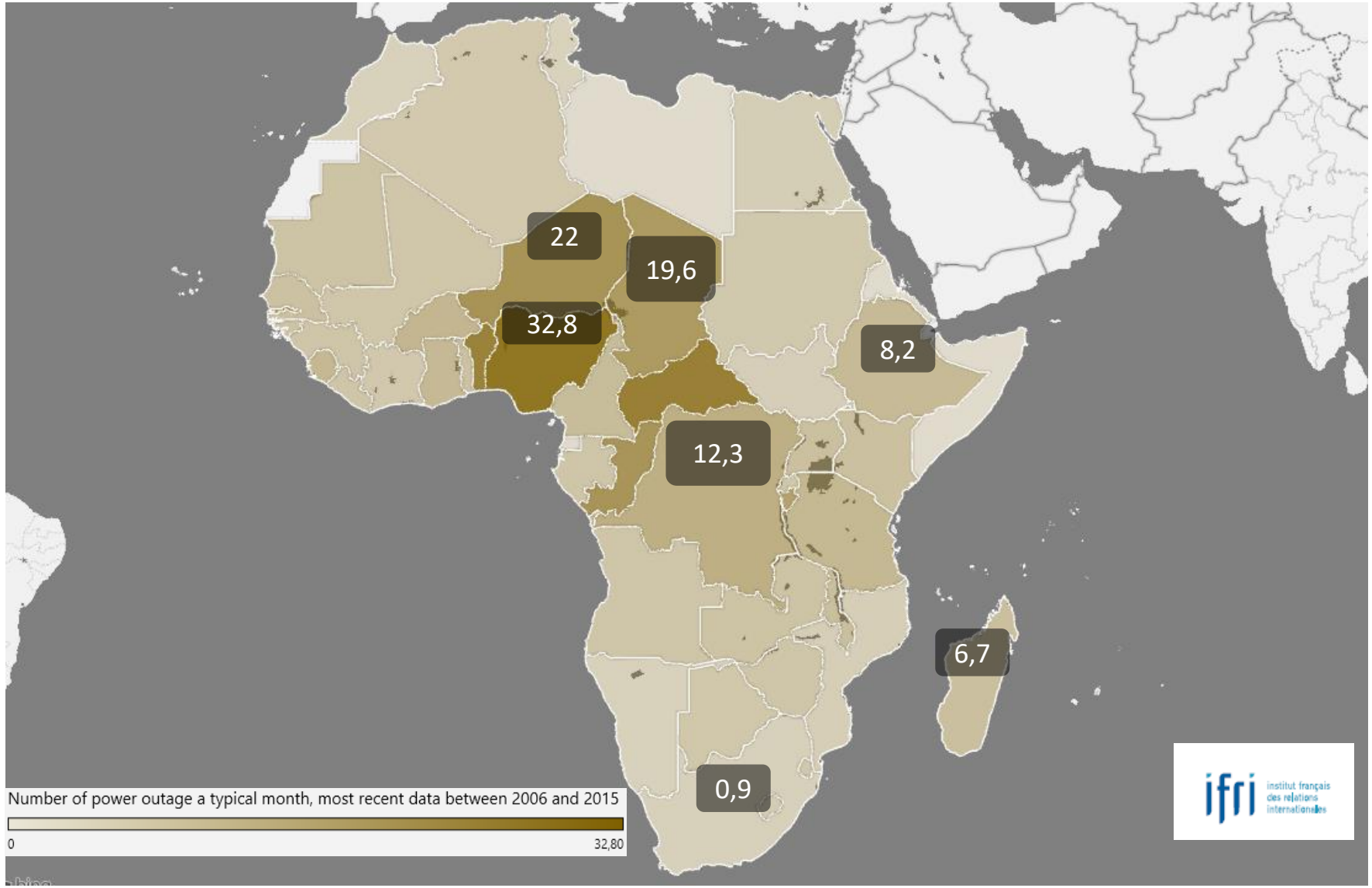
## Installed capacity, actual and projected population




*Source: World Bank, World Development Indicators, United Nations' Database, UN Population Division World Population Prespects 2017*

# When there is access, power outages impede economic activities

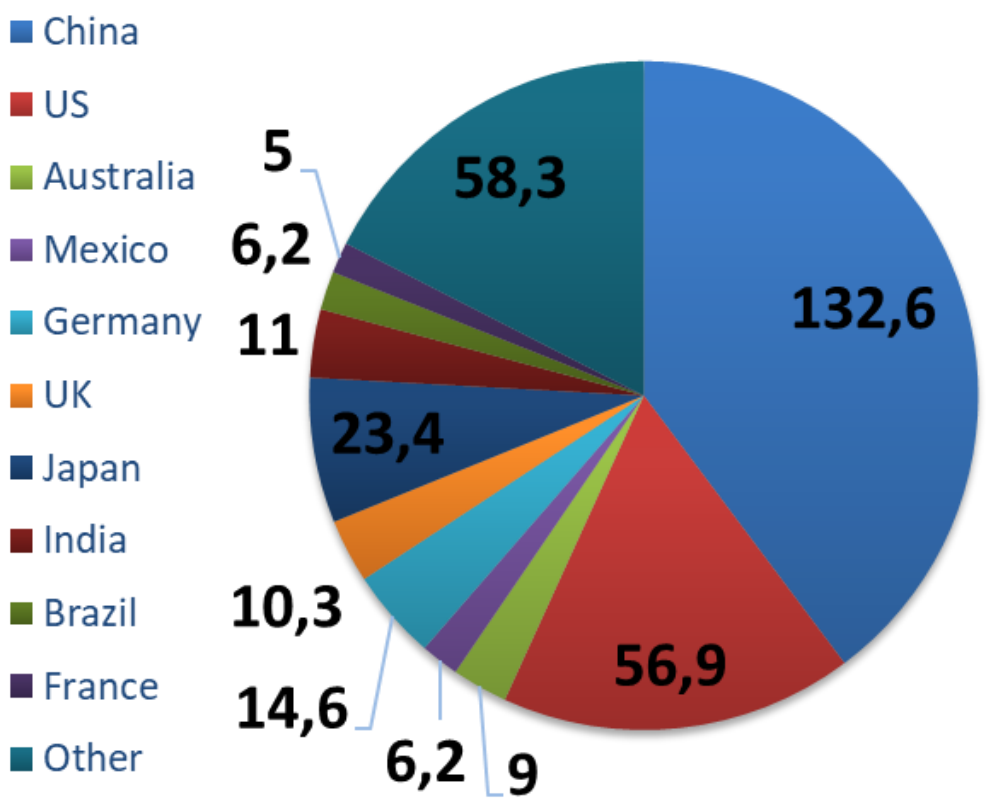
## Power outages in a typical month (indicative)




*Source: World Bank, World Development Indicators*

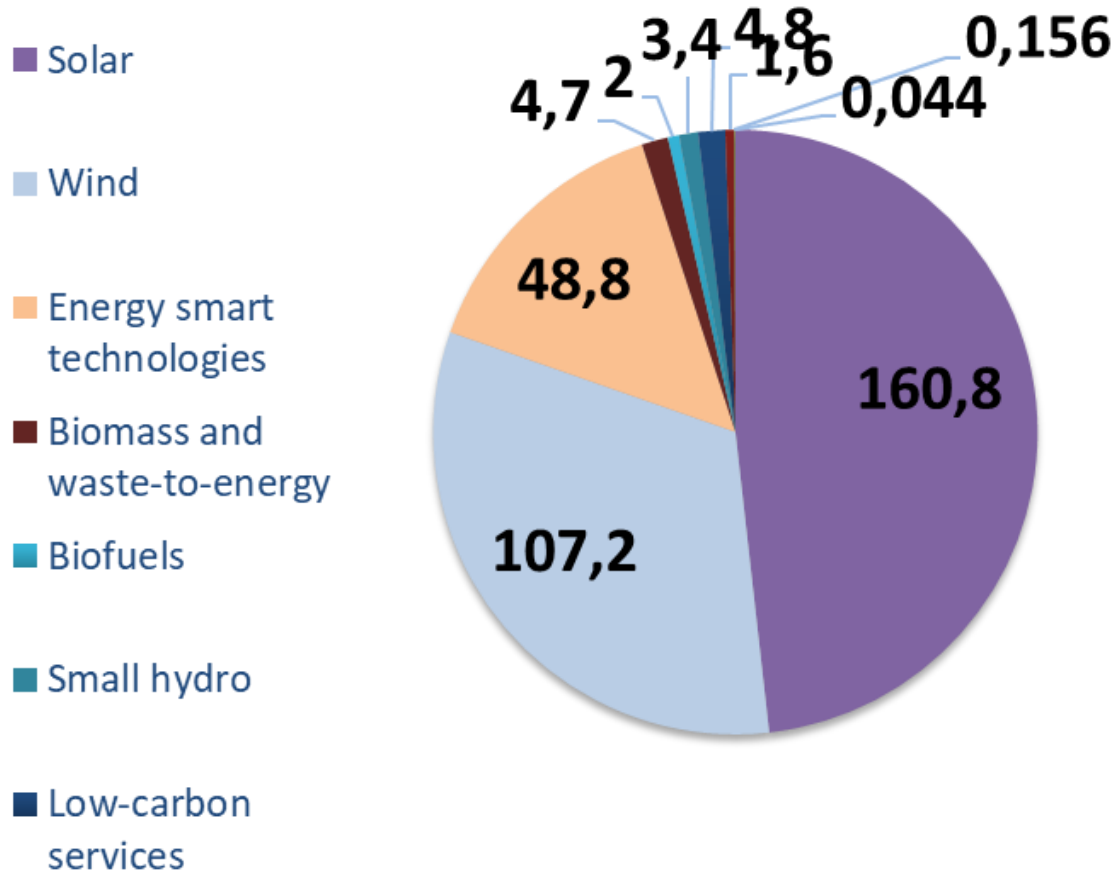
# 2017 renewable investment high but too little in Africa, especially solar PV where the potential is strongest

Global RES investments in 2017 in key countries ($ billion)




Source: Bloomberg New Energy Finance

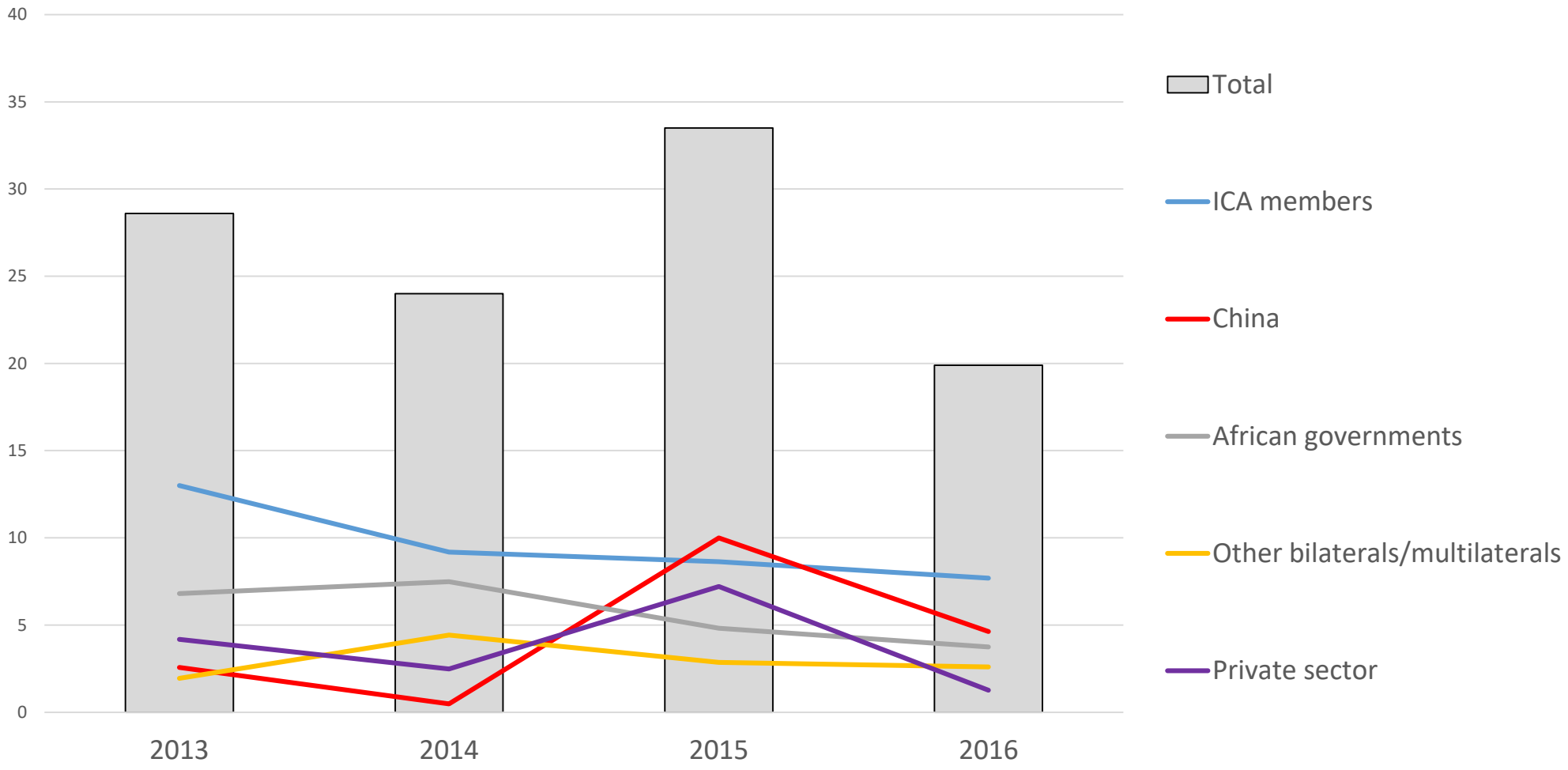
Global RES investments in 2017 by technologies ($ billion)




Source: Bloomberg New Energy Finance

# 2,5 times more power sector investments needed per year, private sector investment is dominated by South Africa

## Power sector investments in Sub-Saharan Africa, 2013-2016 ($ billion)




*Source: Infrastructure Consortium Africa*

# 2. Opportunities, options and solutions: stepping up efforts and progress to another scale

# The toolbox and options: supply side

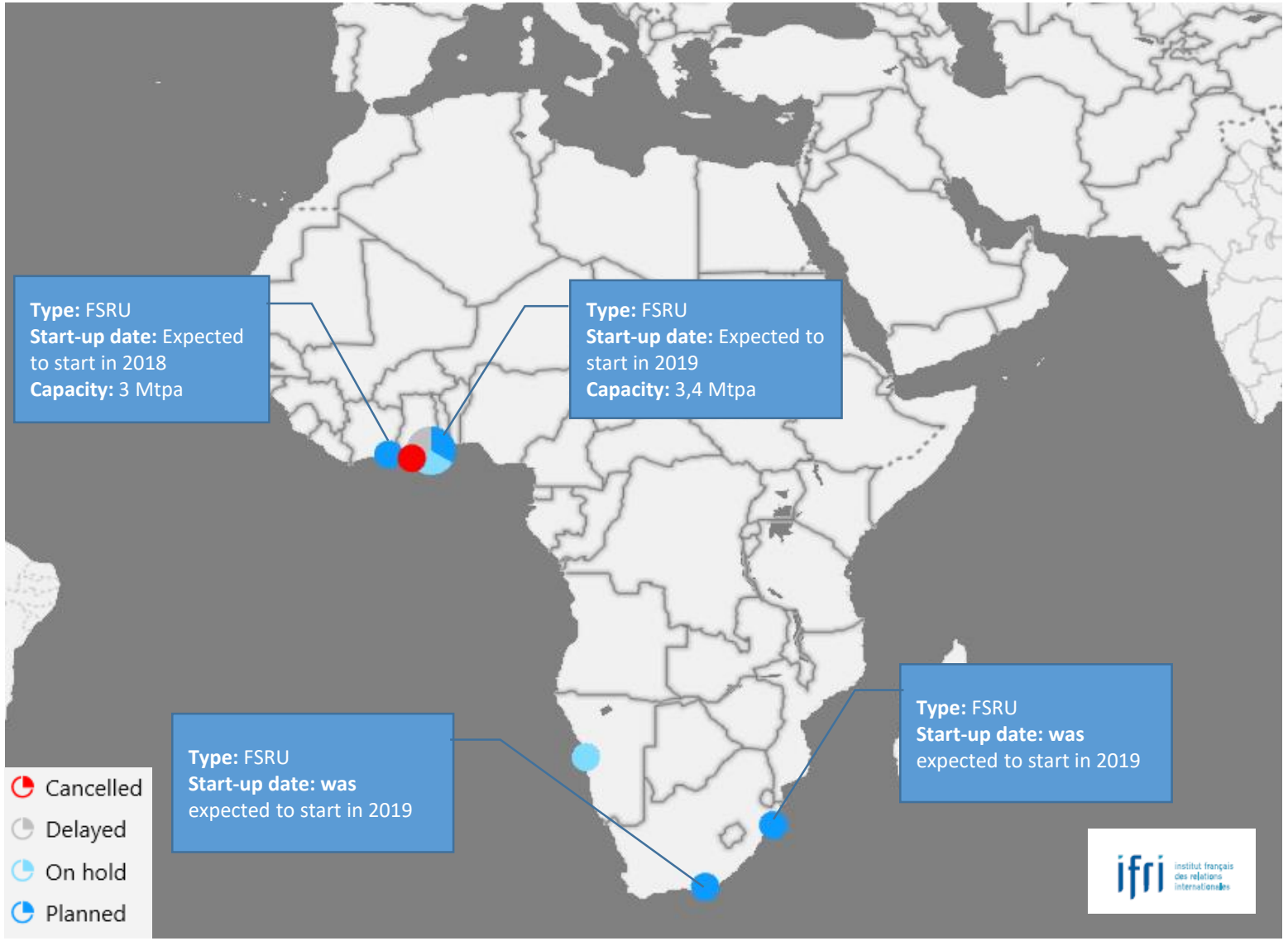
- Solar (PV and CSP) and onshore wind potential with sharply declining costs
  - Centralized, coupled with batteries
  - Decentralized: mini/micro-grids and individual solar home systems; private or publicly supported
- Biomass potential: small biogas digesters
- Gas fired thermal plants:
  - LNG to power
  - Gas flaring capture, utilization of local gas production
- Hydro: large, small, mini dams, can be covered by solar cells
- Grid extension, interconnections
- Waste to energy: large untaped potential, only one plant operational (Ethiopia)
- Nuclear ?

# The toolbox and options: demand side

- Capacity building in EE indicators
- Energy efficiency in buildings: standards, best practices
- Standards for appliances at regional level
- Centralized cooling systems instead of individual air conditionning
- Designing efficient and sustainable cities/urban areas
  - Avoid urban heat island effects
  - Improved and sustainable public transportation
  - Better fuel quality standards, more efficient cars&motorcycles
  - Electric mobility
  - Capacity building, knowledge sharing
  - Standards and controls
  - Slow down of urbanization with country side development & climate mitigation

# LNG to power is an option, but no game changer

## Main proposed LNG import terminals in Sub-Saharan Africa




*Source: New and emerging LNG markets: the demand shock, IFRI.*

# Hydro has a further potential

| Top 5 African countries by installed hydropower capacity (2016) | MW |
|---|---|
| Ethiopia | 4 054 |
| South Africa | 3 583 |
| Egypt | 2 800 |
| DR Congo | 2 509 |
| Zambia | 2 392 |

*Source: Hydroworld. Hydropower Status Report 2017, International Hydropower Association. Renewable Power Generation Costs in 2017, IRENA.*

- Technical **potential** of hydropower production of about **1 800 TWh/y, compared with 1,238 TWh in 2015.**
- Total **installed** capacity of about **34 GW**
- In Africa, **large** hydropower project have an **average LCOE** of about **0,05$/kWh** and about **0,07-0,08$/kWh** for **small** project
- Projects: Ivory coast (Singrobo, Gribo Popoli), Tanzania (Rusumo falls), Uganda, Ethiopia (Renaissance), DRCongo (Inga)…

# Lessons from India and Bangladesh

- Need to plan for maintenance of system, especially when financed via grants
- Pay as you go systems to avoid non-payments
- Mini grids: Not necessarily enough electricity to meet demand from small industries; systems often not well designed for demand;
- Entrepreneurs looking to develop mini-grids project to un-electrified rural India control risks such as revenue collection problems, or theft associated risks by tailoring each project's business model…but:
  - What happens if the central grid reaches a mini-grid?
  - Customers would switch to the main grid to benefit from lower government subsidized electricity prices.
  - Entrepreneurs would be left with stranded assets.
- Need for an efficient and stable regulatory framework
- Business models can be diverse, but effective when including services
- Need for strong governmental support, political will, availability of finance and local& micro-finance
- Need to overcome the investment challenge: high capital costs, short term risk takers, high RR
- Local communities & people must be involved at all stages to define technoloy, needs, business model (pay as you go, ESCO model)
- Feasibility studies key

# International initiatives helpful but only private sector investments can scale up electrification

- ✓ UN Sustainable Development Goals (2015)- Sustainable Energy for All (SE4All), hosted by ADB
- ✓ NEPAD, Programme for Infrastructure Development in Africa (African Union/ADB), focusing on eight African regions
- ✓ World Bank
- ✓ Power Africa
- ✓ Sutainable Energy Fund for Africa
- ✓ African Development Bank (ADB)/ The New Deal for Energy in Africa (2015): full electricity access by 2025
- ✓ Electrification Financing Initiative (ElectriFI) – European Union
- ✓ Partenariat Afrique-UE pour l'énergie (PAEE)
- ✓ Bilateral development aid and support programmes (Afd, Norad, GIZ, DevCo)

All key to provide funding and structure bankable projects, but slow, unefficient, insufficient…

# Conclusion 1/2: scaling up and accelerating RES is now possible, need of greater private investment

- ✓ No silver bullet, no unique solution: combination of technologies, business models tailored to specific needs
- ✓ Combination of demand side and supply side measures needed!
- ✓ Technical conditions are in place: innovations, technology costs are down, business models work, best practices and numerous pilot projects &larger scale deployment exist
- ✓ Foreign aid, grants, guarantees and credits are important but will not be enough and cannot be enough
- ✓ Need for much greater private investment
- ✓ Need to make more cheap funding available
- ✓ Private entrepreneurship is already successful !
- ✓ Need of greater coordination among donors and greater focus on Sub-Saharan Africa
- ✓ Need to overcome the finance bottleneck with a reform of the global financial system

# Conclusion 2/2: Local governments must do more, need for strategic approach with climate adaption

- Governance of public institutions and state-owned companies
- Investment framework: robust banking and financial sector
- Regional cooperation and interconnections, capacity building at the local, national and regional level
- Regulation, land registries
- Need for tariff reforms
- Improved tax collection, higher saving rate, higher share of domestic investments key, especially of pension funds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