

THE ENERGY REVOLUTION OF AFRICA

Lorenzo Colantoni, Researcher
Energy, Climate & Resources Programme, IAI



IAI ENI SUSTAINABLE ENERGY SCHOLARSHIP 2020

**Cos'è:**

una borsa di studio per una tesi di laurea magistrale

A chi si rivolge:

a studenti di scienze politiche, relazioni internazionali o economia internazionale interessati alle tematiche energetiche e ambientali

Cosa prevede:

sei mesi di ricerca ed elaborazione tesi all'Istituto Affari Internazionali (IAI), che riconosce al vincitore a titolo di diritto d'autore l'importo di € 4.000 al lordo delle ritenute previste e si riserva il diritto di procedere alla pubblicazione del lavoro

Come candidarsi:

inviando a **study@iai.it** (Rif: Bando Laureandi 2020) il CV, l'elenco degli esami sostenuti con voti conseguiti e lo schema della tesi proposta concordato con un docente della facoltà **entro il 15 luglio 2020**

Info:

<https://bit.ly/bando-tesi-energia-2020>



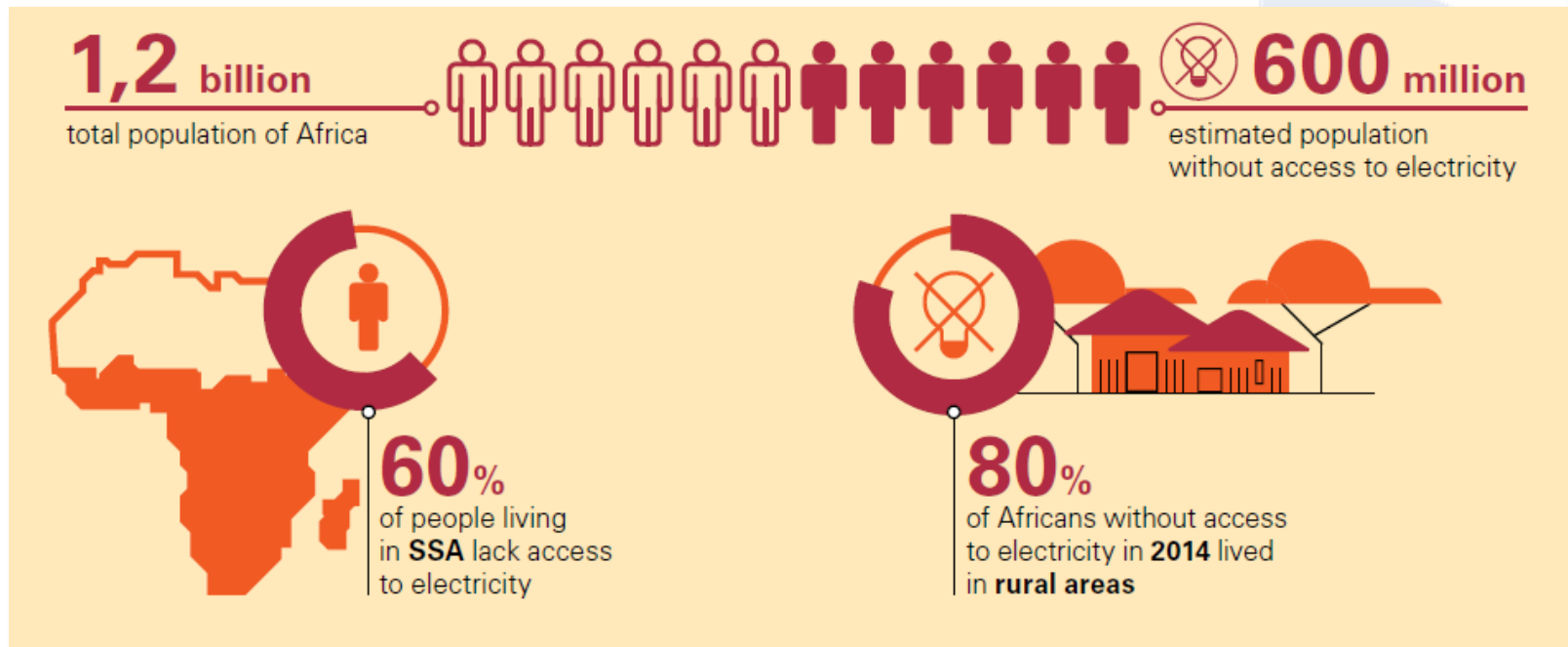
The great turn of SSA



People without access to power in SSA (Source: IEA, 2017)

In 2014 in SSA the number of people without access to power has decreased for the first time in modern African history

Africa, today/1



People without access to power in SSA (Source: IEA, 2014, UN, 2018)

More than half of the population of SSA lack access to power

Africa, today/2

Electricity consumption

Comparison on yearly electricity consumption per capita

Source: IEA 2017

Sub-Saharan Africa



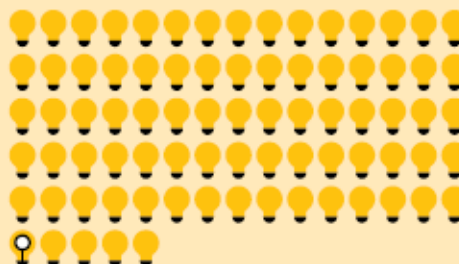
200 kWh / 

North Africa



850 kWh / 

European Union



1600 kWh / 

Africa, tomorrow

Urbanization & demographic trends

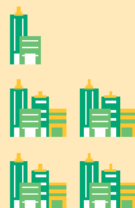
■ cities with **over 1 million** habitants

Source: UN World Urbanization Prospects: The 2018 Revision

2010

46

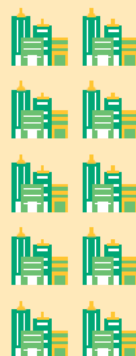
cities



2030

99

cities

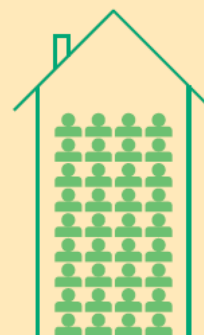


■ total African population living in cities

Source: 2016 African Development Outlook

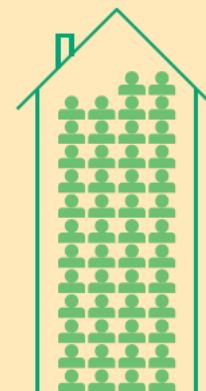
2010

36%



2030

50%



2,5 billion

expected total population of Africa in **2050**

Source: UN World Population forecast



2050

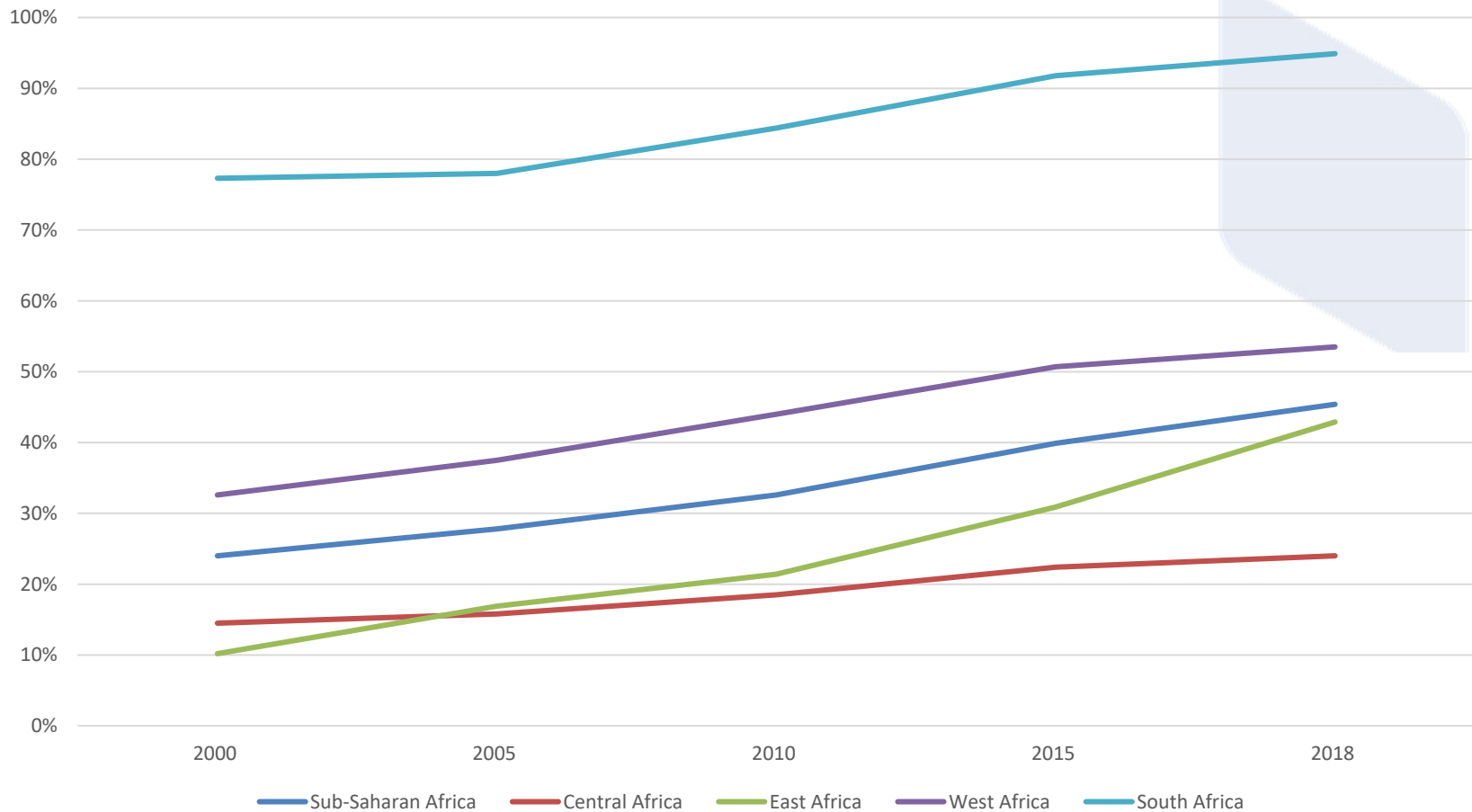


1,3 billion

expected population living in cities by **2050**

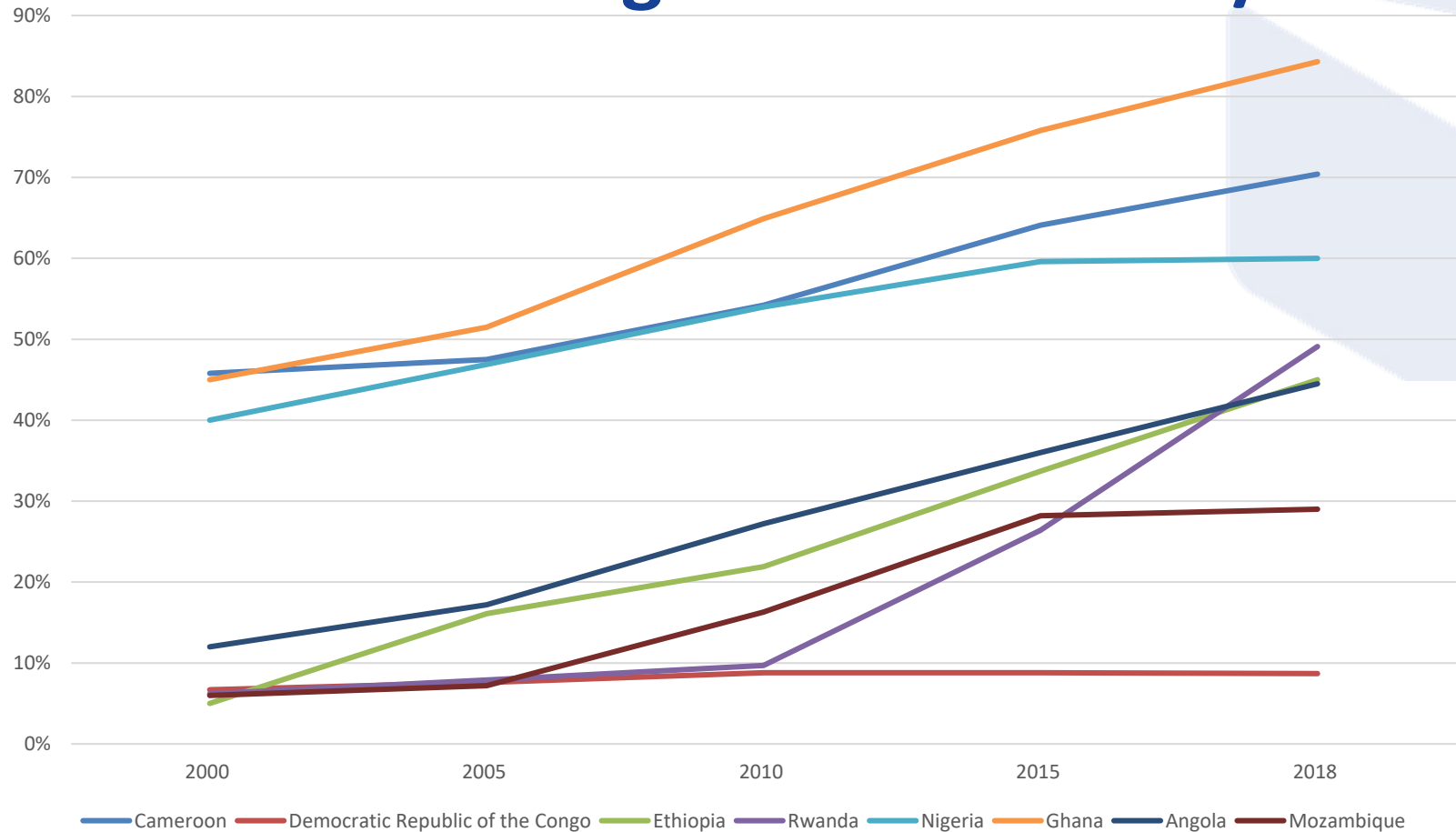
Source: 2016 African Development Outlook

Inside the great turn of SSA/1



People without access to power in SSA (Source: IEA, 2019)

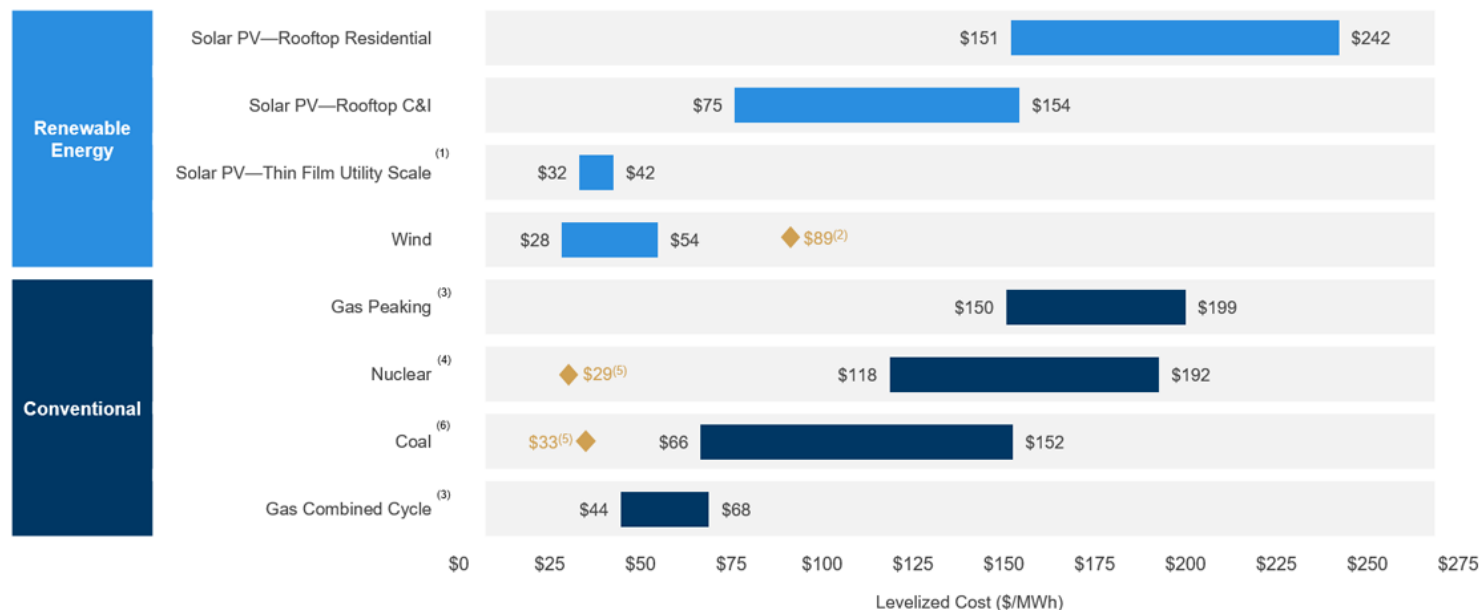
Inside the great turn of SSA/2



People without access to power in SSA (Source: IEA, 2019)

The role of renewables/1

Selected renewable energy generation technologies are cost-competitive with conventional generation technologies under certain circumstances



Source: Lazard estimates.

Note: Here and throughout this presentation, unless otherwise indicated, the analysis assumes 60% debt at 8% interest rate and 40% equity at 12% cost. Please see page titled "Levelized Cost of Energy Comparison—Sensitivity to Cost of Capital" for cost of capital sensitivities. These results are not intended to represent any particular geography. Please see page titled "Solar PV versus Gas Peaking and Wind versus CCGT—Global Markets" for regional sensitivities to selected technologies.

(1) Unless otherwise indicated herein, the low end represents a single-axis tracking system and the high end represents a fixed-tilt system.

(2) Represents the estimated implied midpoint of the LCOE of offshore wind, assuming a capital cost range of approximately \$2.33 – \$3.53 per watt.

(3) The fuel cost assumption for Lazard's global, unsubsidized analysis for gas-fired generation resources is \$3.45/MMBTU.

(4) Unless otherwise indicated, the analysis herein does not reflect decommissioning costs, ongoing maintenance-related capital expenditures or the potential economic impacts of federal loan guarantees or other subsidies.

(5) Represents the midpoint of the marginal cost of operating coal and nuclear facilities, inclusive of decommissioning costs for nuclear facilities. Analysis assumes that the salvage value for a decommissioned coal plant is equivalent to its decommissioning and site restoration costs. Inputs are derived from a benchmark of operating coal and nuclear assets across the U.S. Capacity factors, fuel and variable and fixed operating expenses are based on upper and lower quartile estimates derived from Lazard's research. Please see page titled "Levelized Cost of Energy Comparison—Renewable Energy versus Marginal Cost of Selected Existing Conventional Generation" for additional details.

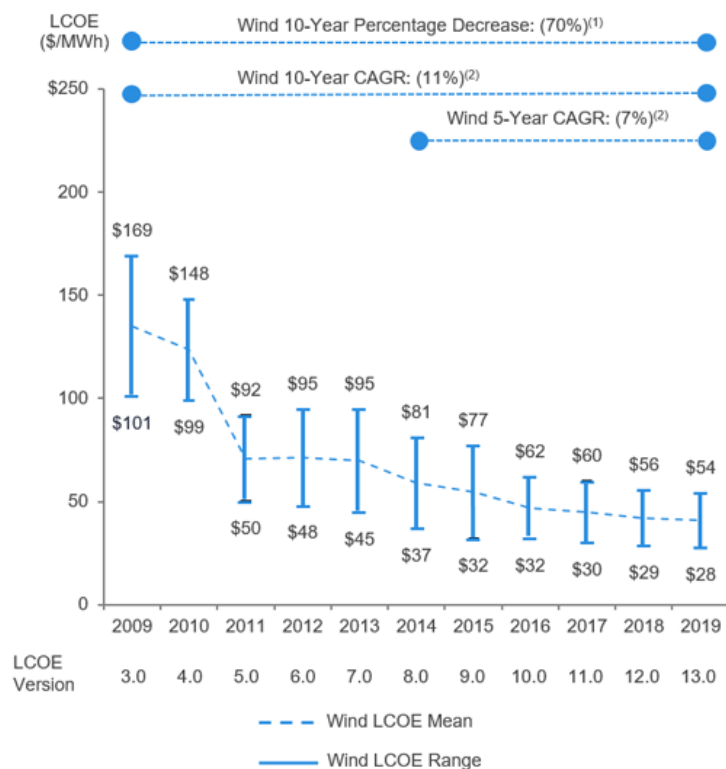
(6) High end incorporates 90% carbon capture and compression. Does not include cost of transportation and storage.

Levelised Cost of Energy (unsubsidized, 2019)

(Source: Lazard, 2019)

The role of renewables/2

Unsubsidized Wind LCOE

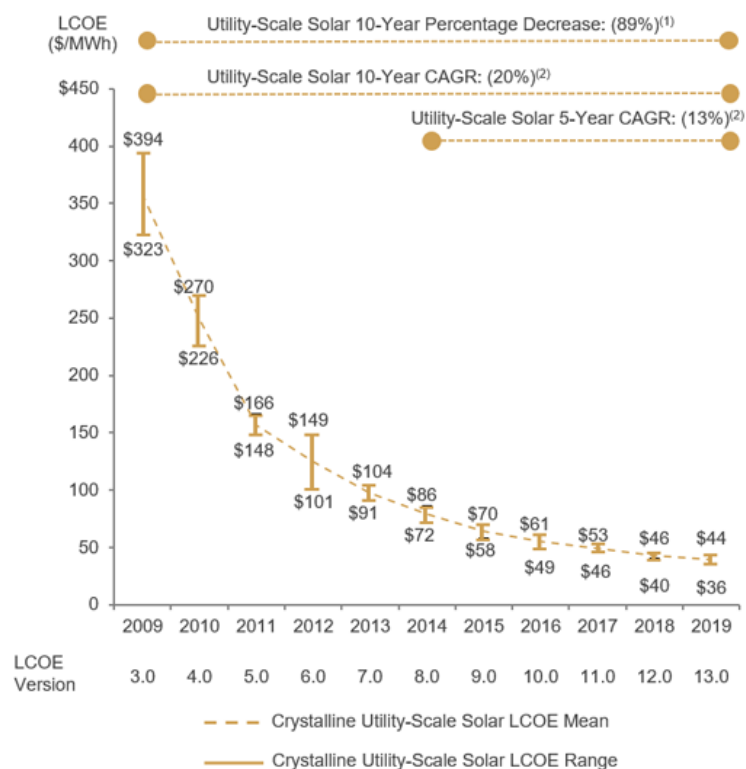


Source: *Lazard estimates.*

(1) Represents the average percentage decrease of the high end and low end of the LCOE range.

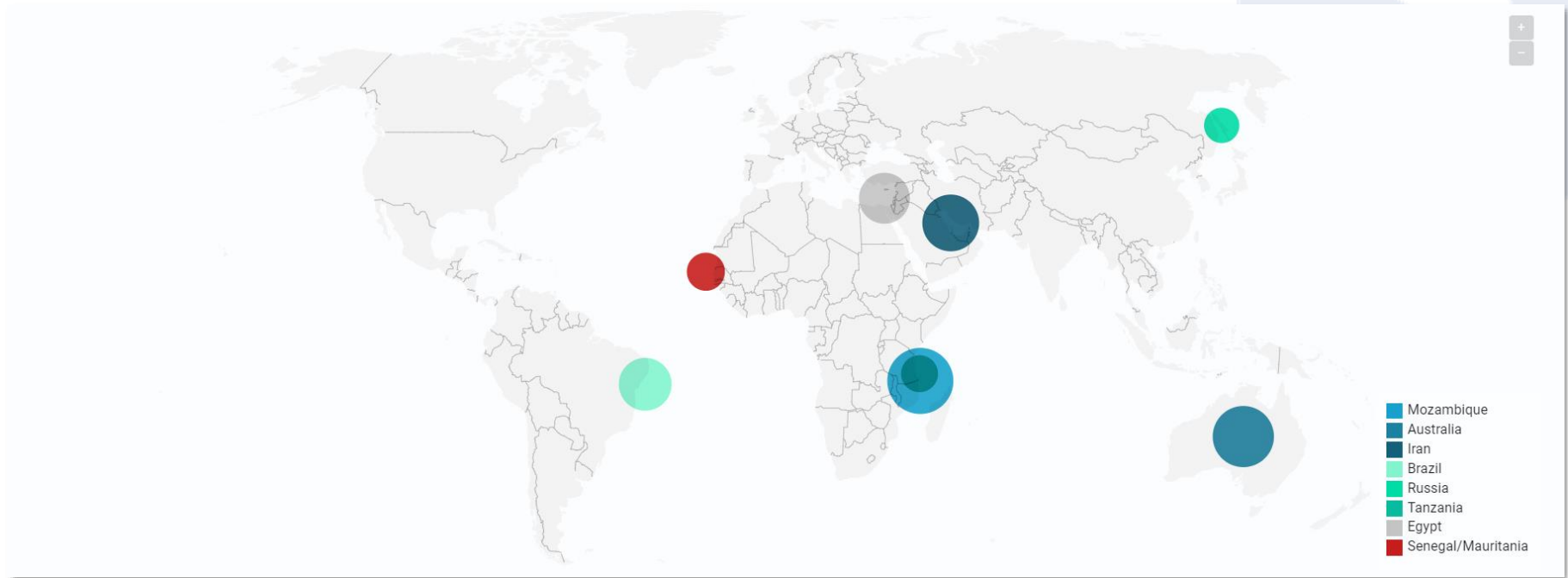
(2) Represents the average compounded annual rate of decline of the high end and low end of the LCOE range.

Unsubsidized Solar PV LCOE



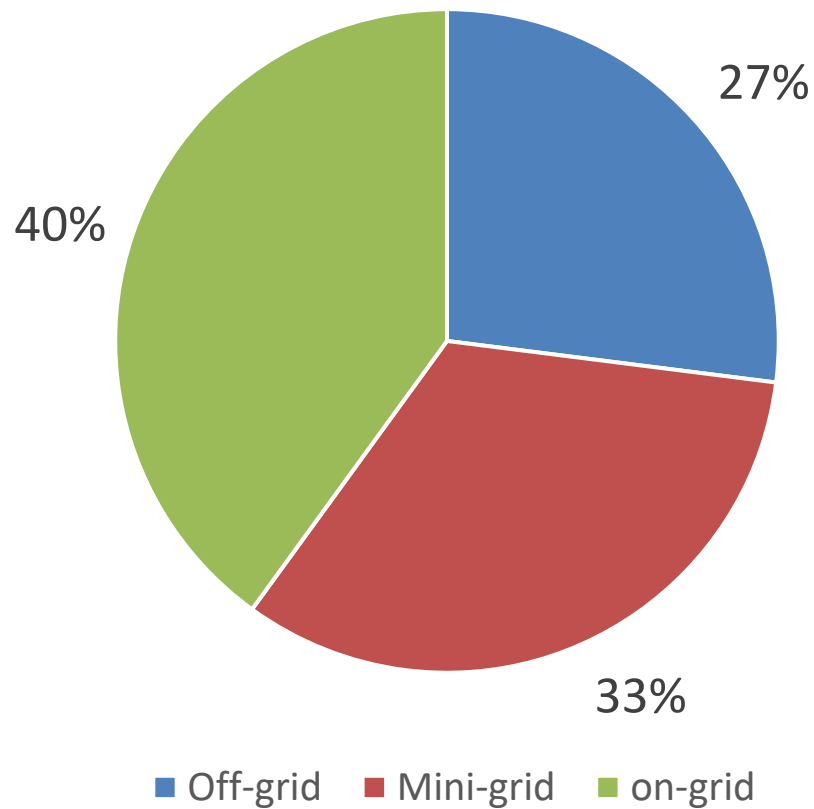
LCOE for wind and solar energy 2000-2019 (Source: Lazard, 2019)

The rise of gas



Main conventional gas discoveries in the past ten years (Source: author elaboration on Eni and IHS data, 2018)

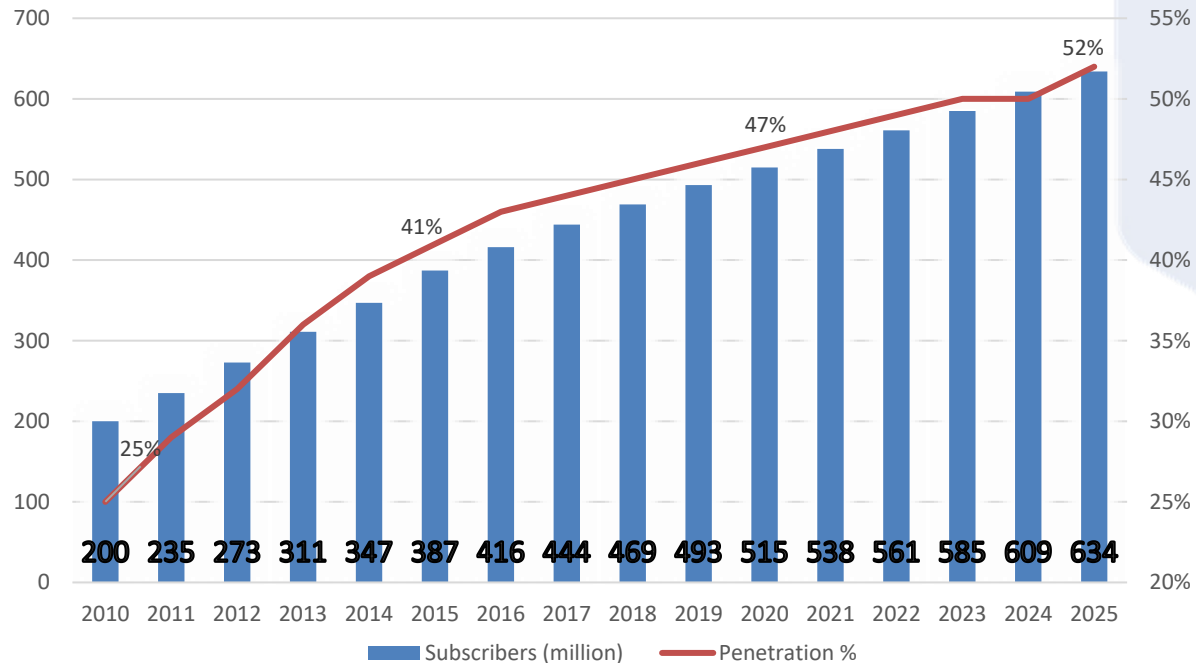
Off grid or on grid?



**New connections required for universal energy
access in SSA (by connection type)**

(Source: IEA, 2018)

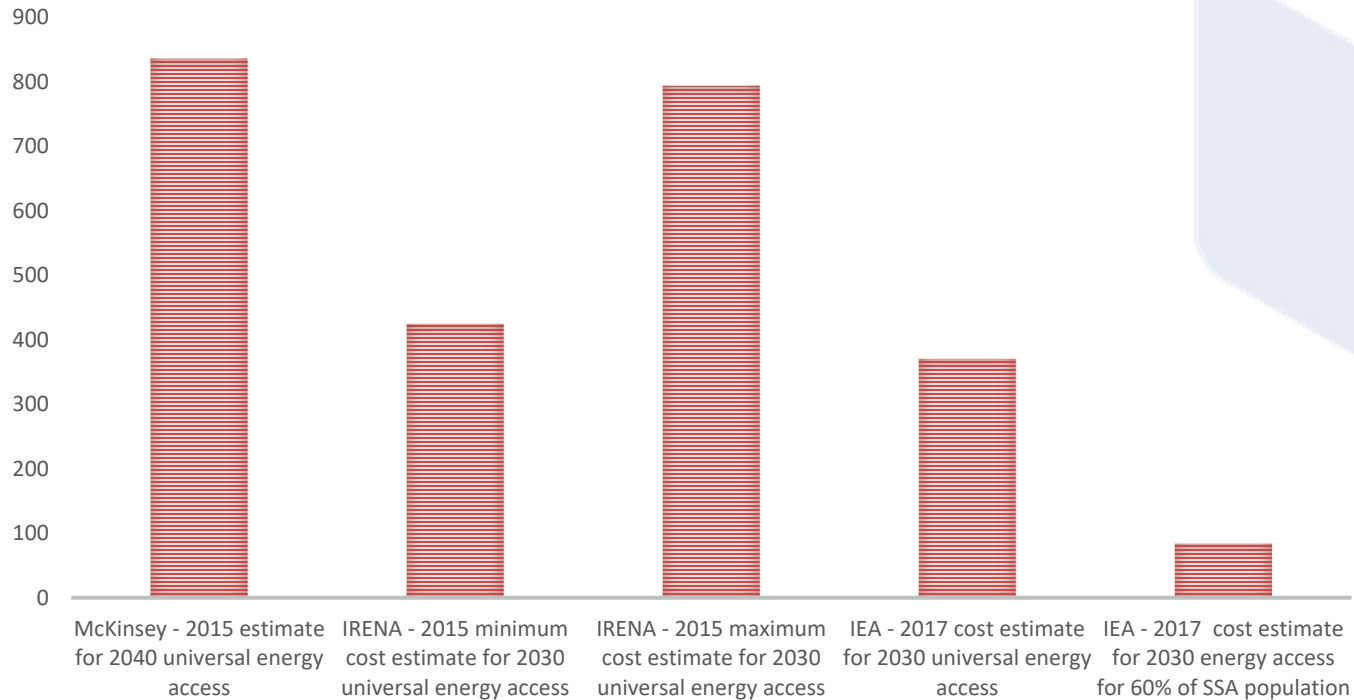
The other revolution



Mobile penetration in SSA. Source: Bilotta and Colantoni (2018)

Mobiles and fintech are key for delivering energy access in SSA

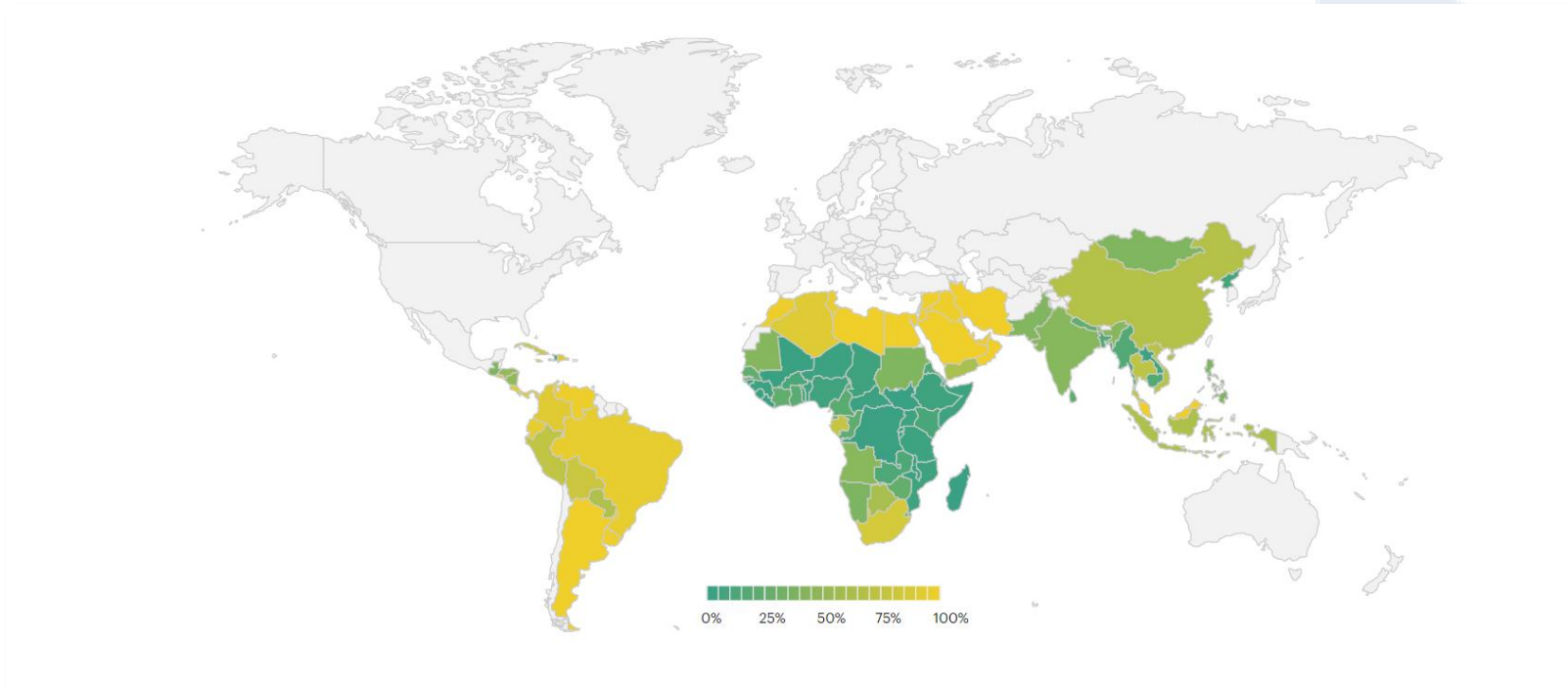
Finance for Africa's energy



Estimates for financial needs to electrify SSA

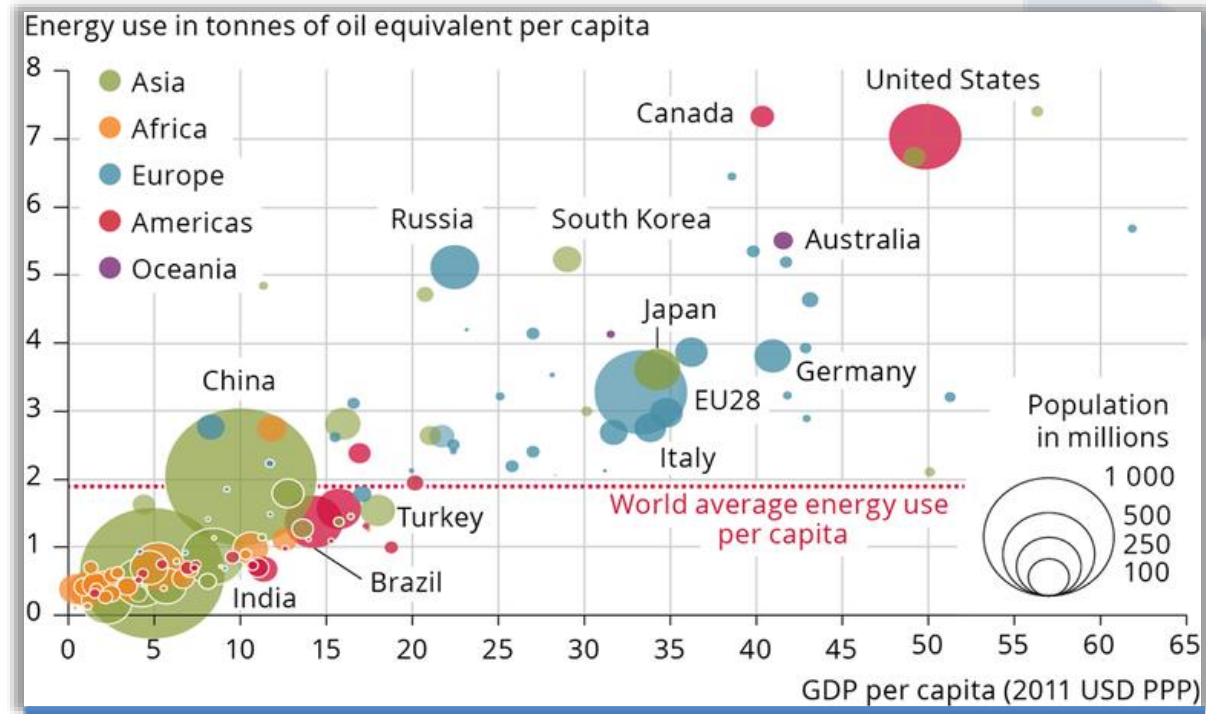
The number of investments to reach universal access to energy in SSA is high, but decreasing

The case of clean cooking



Proportion of population with primary access to clean cooking facilities in 2018 (Source: IEA, 2020)

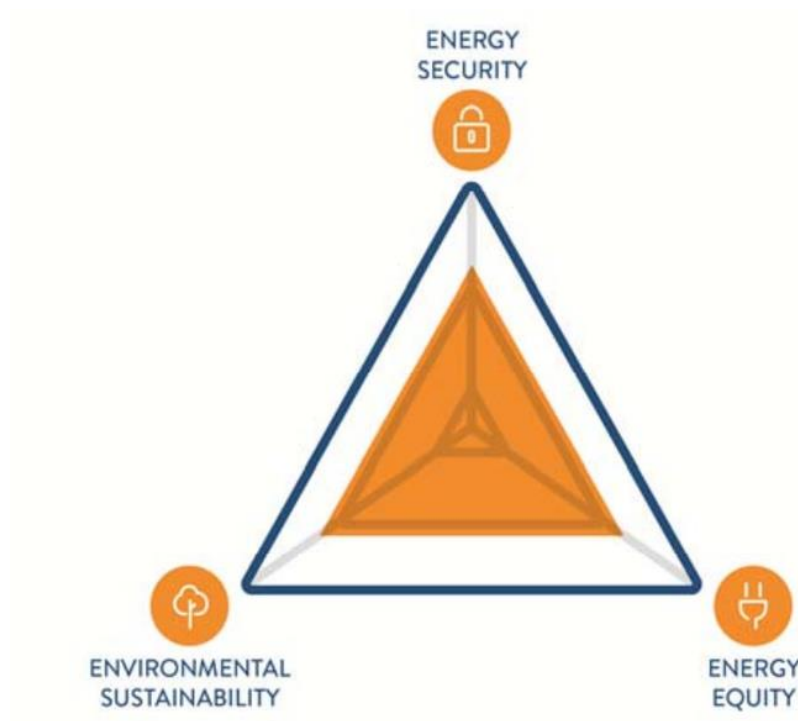
Energy to prevent migrations



(Fonte: EEA, 2016)

Energy poverty is one of the key causes for the lack of development of most African countries, and it is thus a significant *push* factor

The energy trilemma



Balancing the three elements of the energy trilemma is fundamental for the development and prosperity of countries

Thank you!

Let's keep in touch

Lorenzo Colantoni l.colantoni@iai.it @colanlo