

African Utility Week

Clean Power Africa

The largest global meeting place from African Utilities

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Why Africa stands to benefit the most from energy storage

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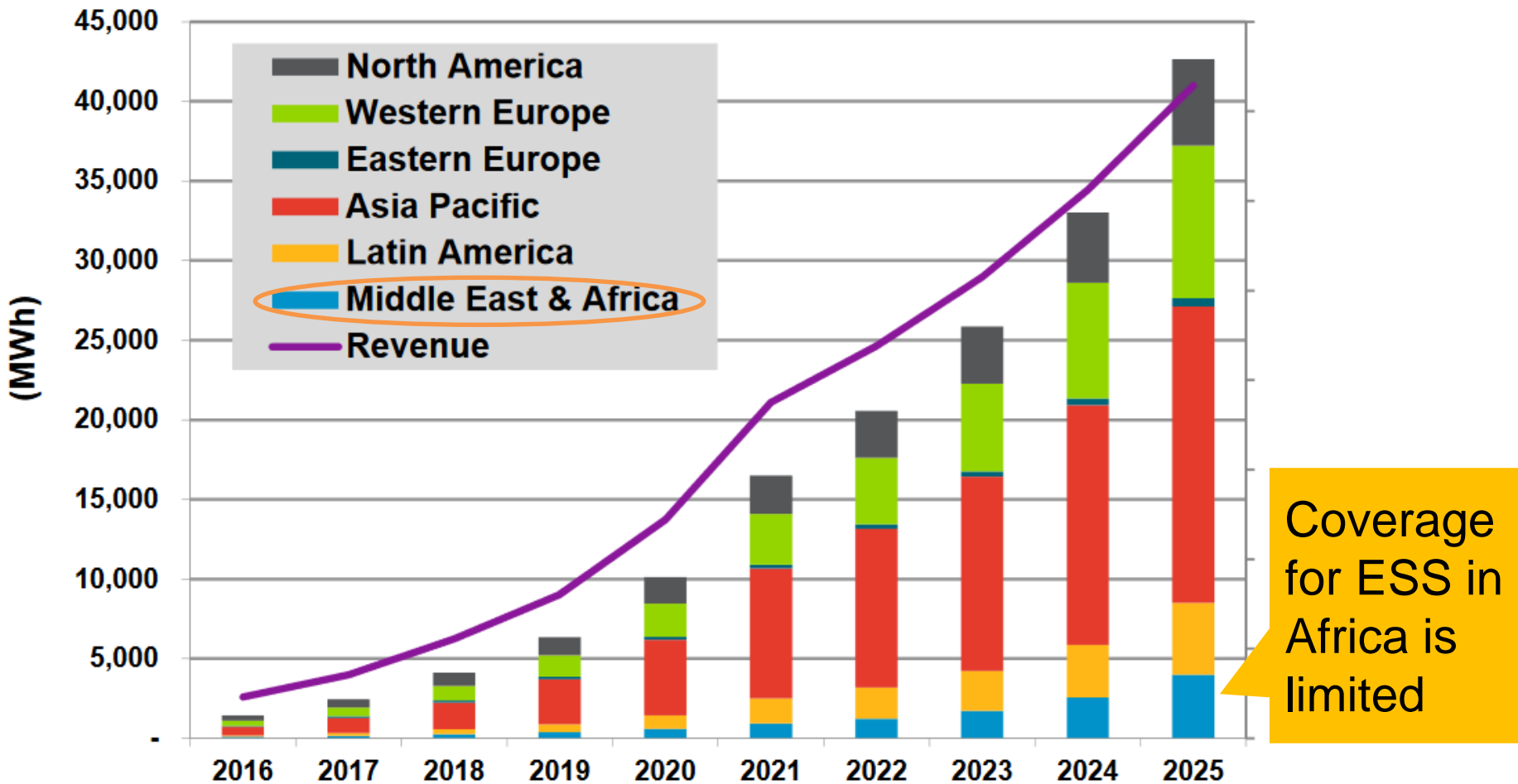
Bushveld Energy

Johannesburg, South Africa



Forecasts call for advanced / fixed energy storage systems(ESS) to grow globally

Forecast installation of “Advanced” ESS by region



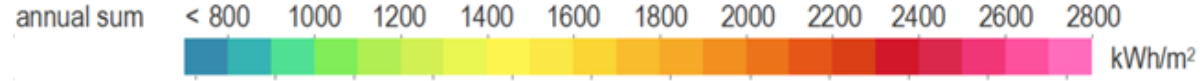
Africa may benefit the most from energy storage, compared to other regions

The objective is to highlight the “Big 5” advantages Africa offers for energy storage adoption over other regions:

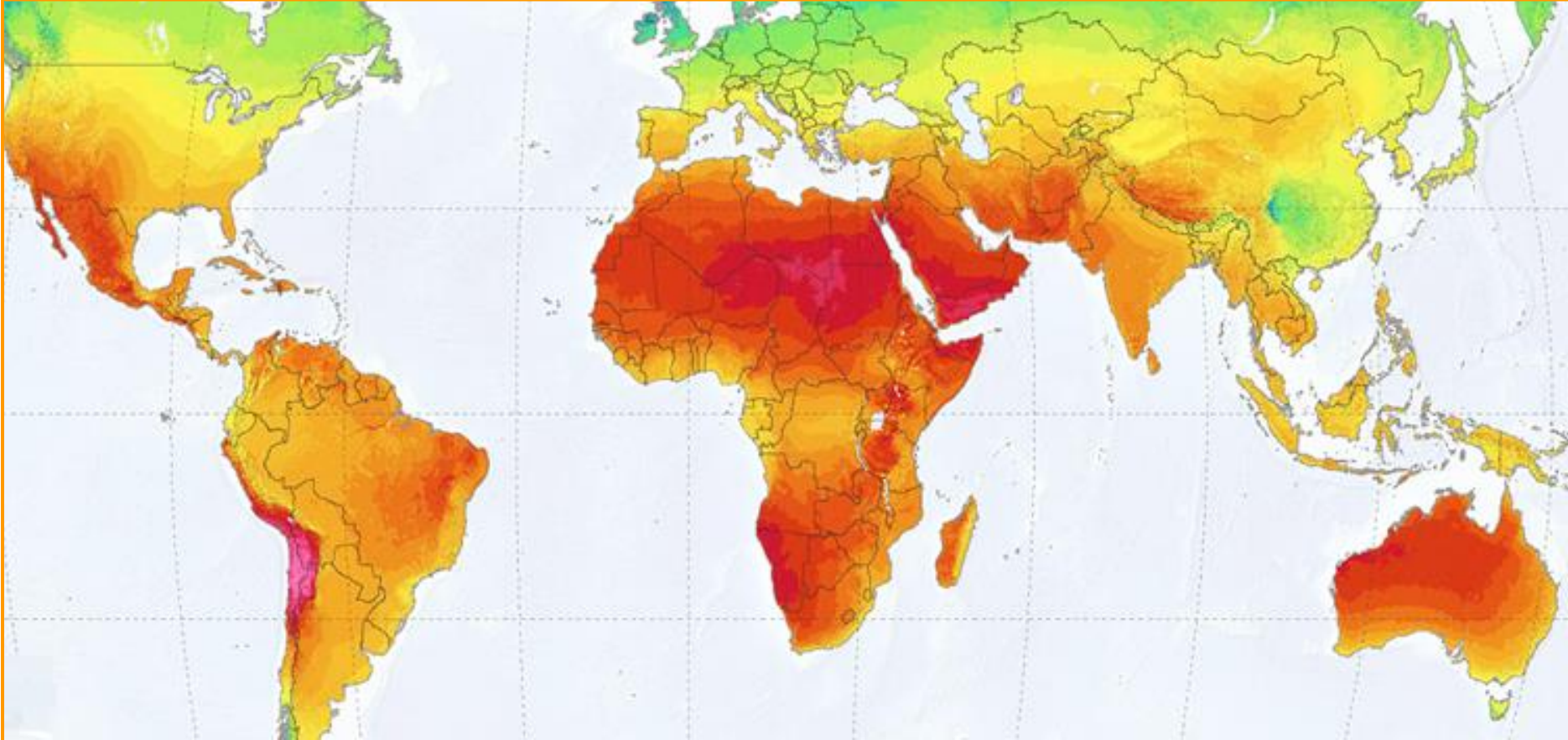
- 1 Excellent solar radiation;
- 2 600+ million people that need round-the-clock access;
- 3 Easier project implementation;
- 4 High reliance on costly diesel;
- 5 “Savvy” energy consumers, open to new solutions.

Together these present a unique and significant opportunity for energy storage on the continent

1. Great solar irradiation



Africa has the world's best solar radiation

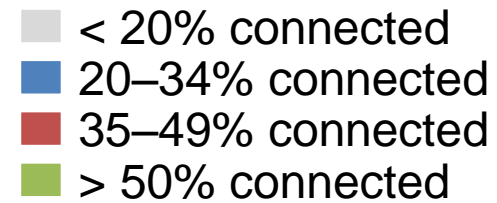
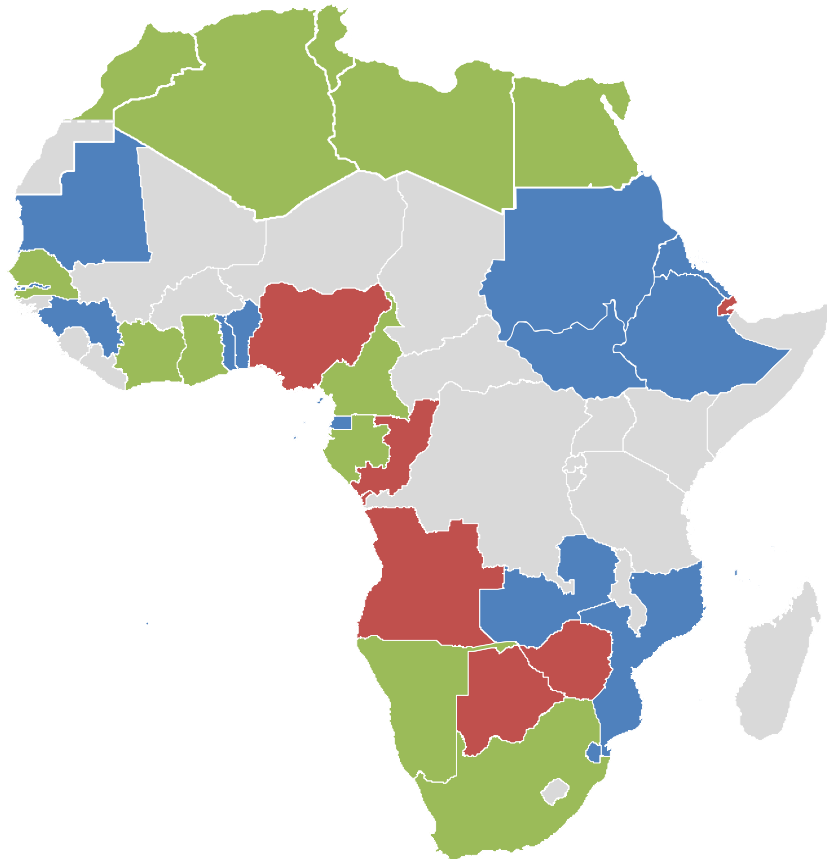


As a result, Africa is an ideal fit for solar + storage solutions

2. 600+ million people that need round-the-clock access to electricity

African electrification rates

% of population connected to a grid



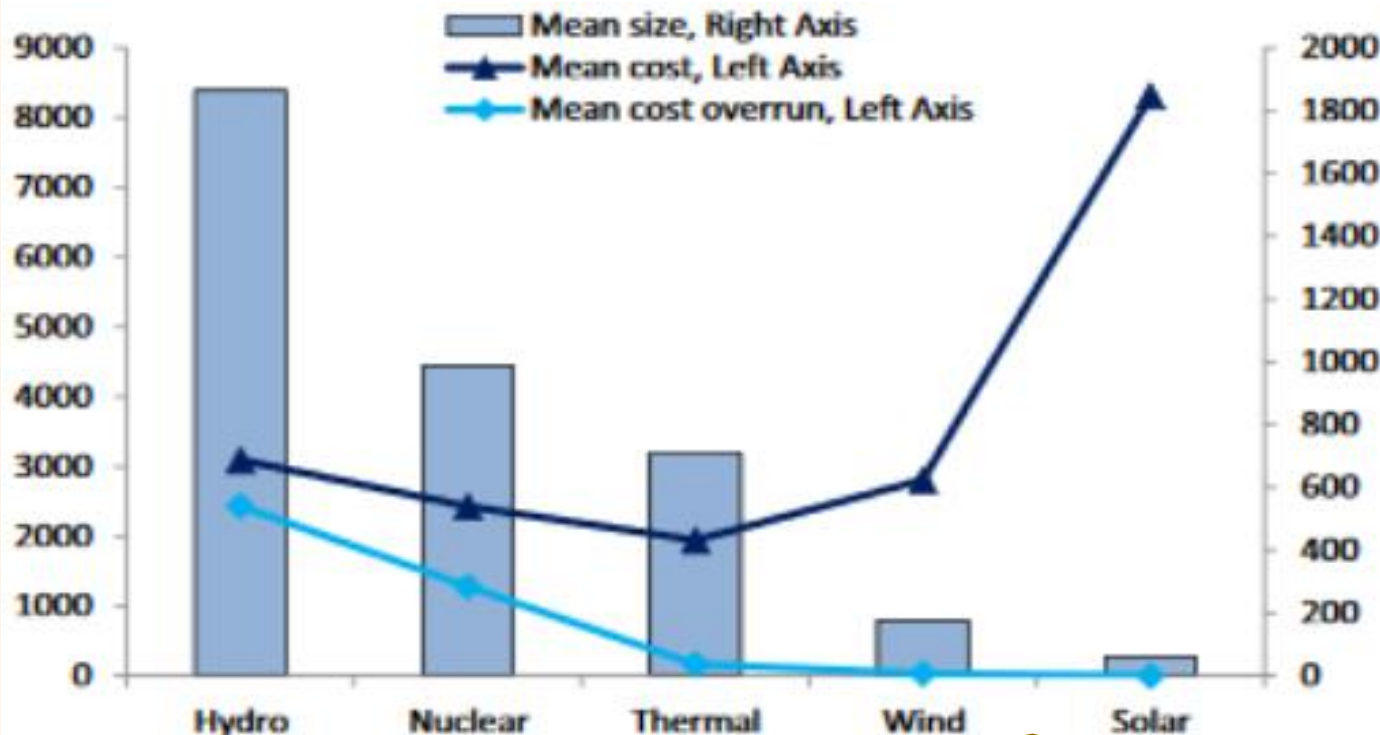
Greater opportunity to “leapfrog” with help of new technologies

- Low legacy Tx & Dx
- Increased challenges for power line easements
- Increasing urbanisation makes T&D less attractive long term
- Energy independence will require decentralisation

3. Easier and faster project delivery

Smaller projects overrun less

Mean size (MW); Cost of installed technology (per kW); Cost overrun (USD mil)



- ESS projects are small to medium sized
- ESS use of containerised systems for large sites further reduces site-related risks

Additional benefits include less opportunity for “fund diversion” and a lower need for high skilled labour

4. High reliance on costly diesel

■ Africa
■ Not Africa

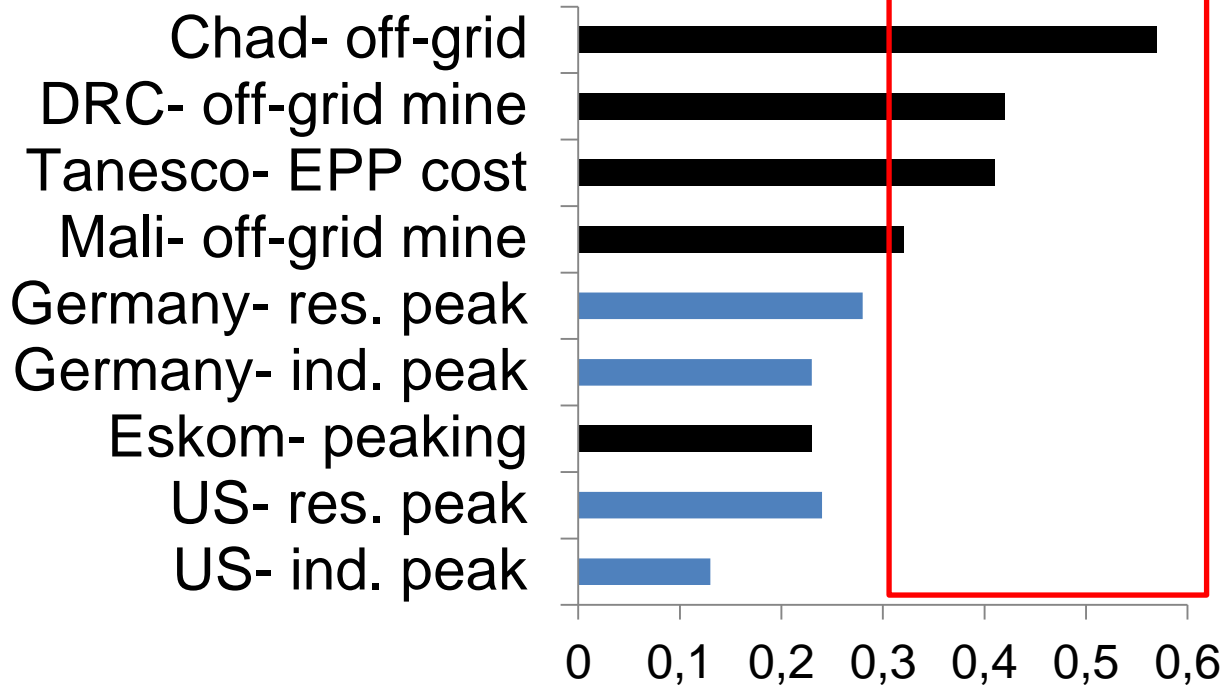
Diesel and HFO¹ reliance is high outside of Northern Africa and South Africa due to

- Low grid penetration beyond urban centers
- Intermittency of grid power, where there is grid

As a result, many Africans and Africa-based companies pay more for electricity than their global counterparts

Electricity cost to customer²

USD / kWh, 2014-2015



1 Heavy Fuel Oil; 2 Energy charge only

Source: Bushveld Energy analysis

5. African consumers are “energy consumption savvy,” lending well to adopting energy storage quicker



Existing understanding of how to manage own energy needs / “fend for oneself”



Higher relative energy costs provide higher incentive to reduce / optimize costs (esp. highly variable costs)



More creativity and open-mindedness to experiment with new solutions

The benefits do come with challenges, however, that are solvable

NOT EXHAUSTIVE

1. Financing

Distributed projects are inevitably smaller projects

- Tougher to raise funding finance
- Opportunity for utilities and smaller investors

2. Standardisation

54 countries implies many different standards, regulations and markets

- Greater advantage to local companies and agencies
- Opportunity for leadership from NEPAD and the regional power pools

3. Local content

Tariffs, duties, delivery costs, etc. drive up costs for everyone. Decision makers need to pick among often counter-acting priorities

- Lower electricity costs
- Faster power sector expansion
- Local manufacturing and job creation