

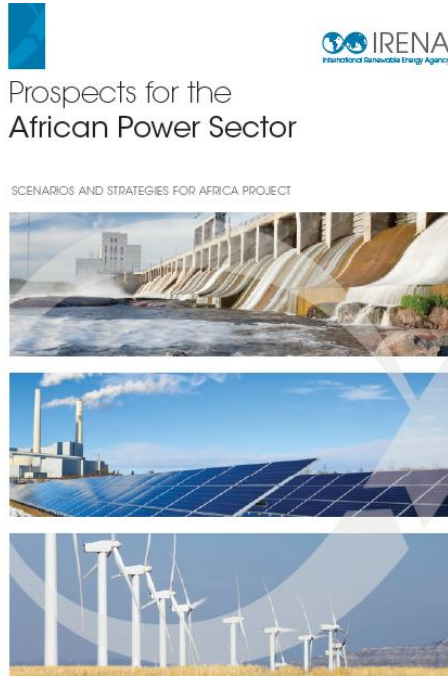
Assessment of the Corridor Potential

Dolf Gielen

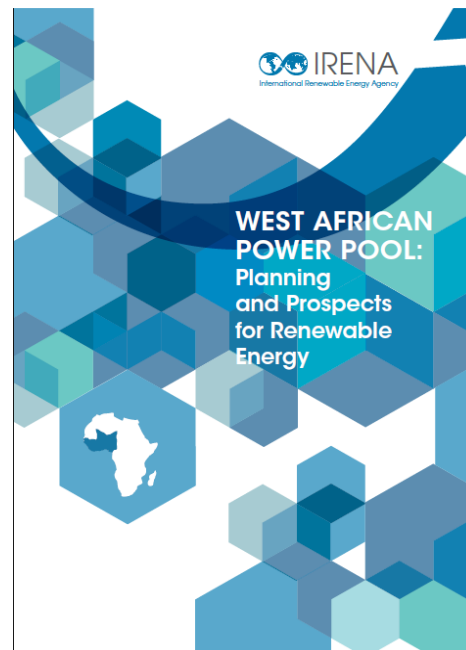
Abu Dhabi, 22 June 2013

IRENA Africa Energy Planning Programme

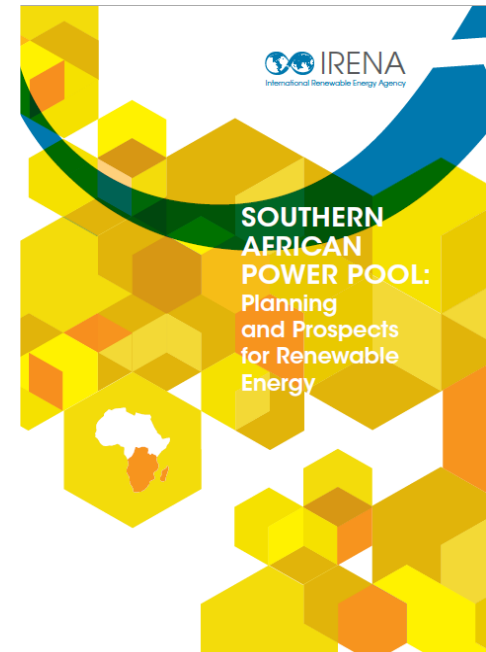
- Inventory of existing power plant
- Projections of electricity demand and supply for 2030
- Pan-Africa power trade model
- Power pool models with country detail
 - WAPP ready
 - SAPP ready
 - East Africa DRAFT
 - CAPP, COMELEC in preparation
- In cooperation with University of Cape Town and Technical University Stockholm (KTH)
- Goal: provide planning tools, assist in capacity building, provide investment advice



January 2012



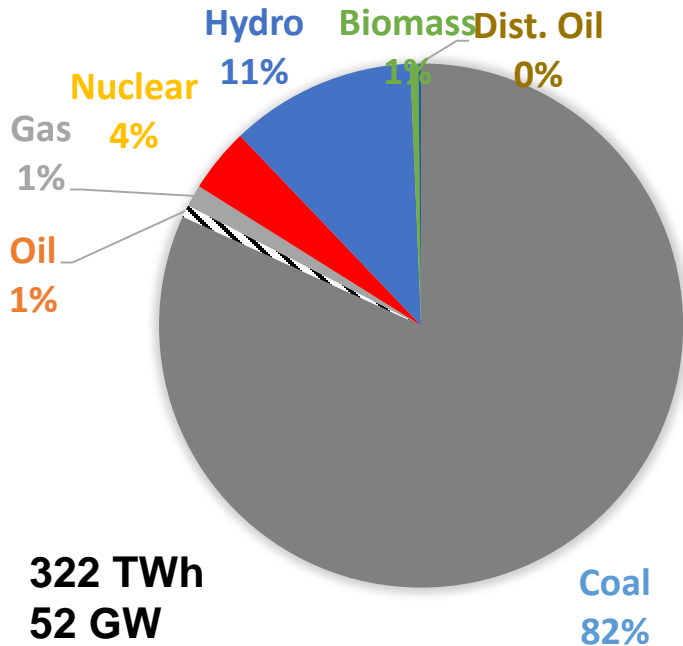
June 2013
NEW



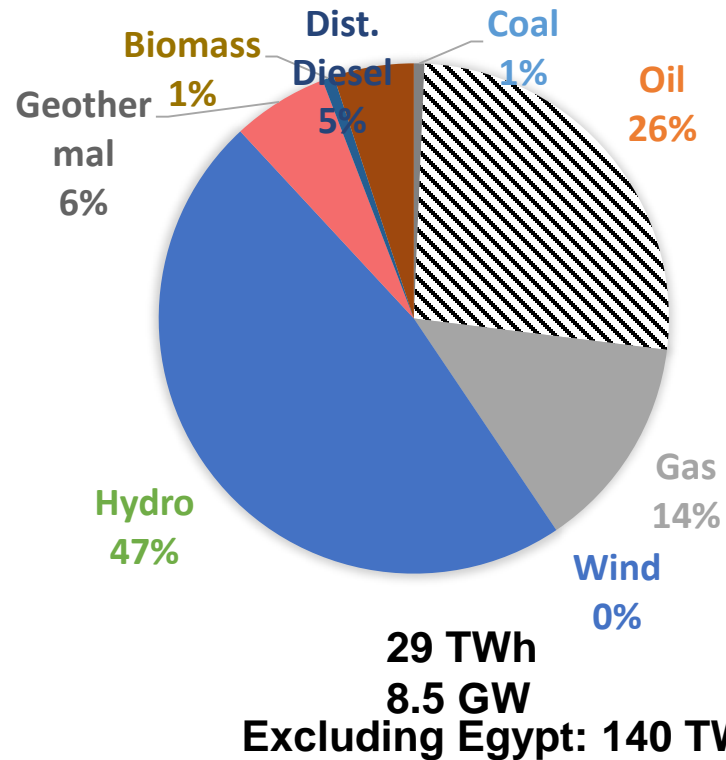
June 2013
NEW

Power generation mix 2009

SAPP



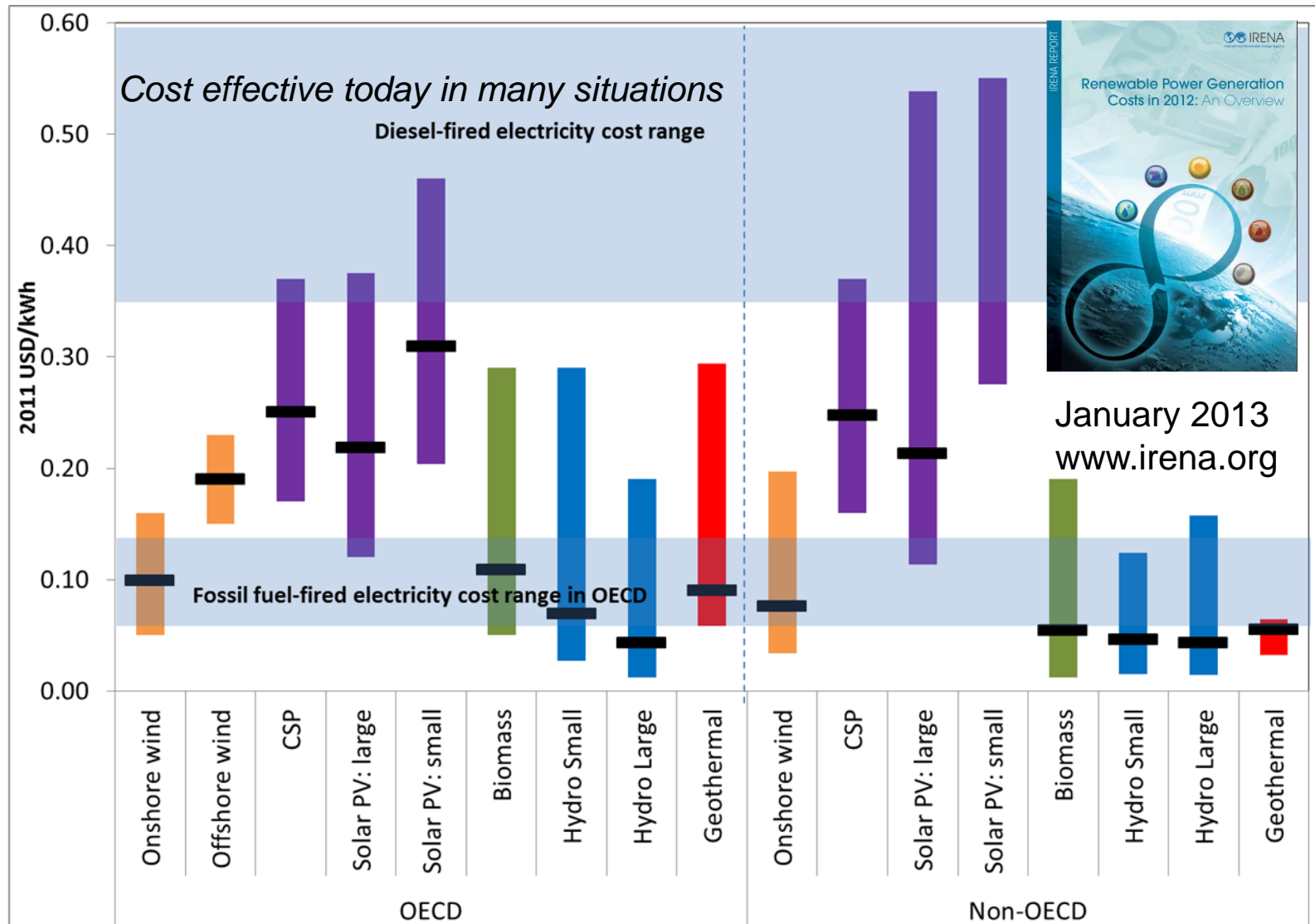
East Africa



Rationale for Corridor

- Africa has a significant untapped hydro potential
 - Also emerging opportunities for other renewables eg wind
- Centers of supply and demand are far apart
- Trade makes economic sense if total production and transmission cost are reduced
 - Imports compete with various national generation options
- Interconnectors can create win-win: revenues and reduced electricity cost
- Interconnectors strengthen the grid
- DC transmission lines can be economic over long distances
 - For example Inga – South Africa connection under development
 - Ethiopia-Kenya DC line

COST OF RENEWABLE POWER



Note: assumes a 10% cost of capital

Source: IRENA

RE cost in Africa

- Project cost generally high
- High cost of capital 15-20%
- Few commercial projects, many multipurpose development projects with high cost per kW
- Issues of scope: many projects require new roads, new grid connections
- Remote sites with high quality resources
- Transmission makes economic sense
 - High volume lines 2-4 cents/kWh “from Addis to Johannesburg”
 - AC for shorter distances, DC for long distance
 - Increasing number of projects in Africa
 - Reduces supply cost and reduces variability issues
 - Regulatory issues deserve more attention

Renewable Energy Potentials

2008 energy use: 600 TWh electricity, 655 Mtoe primary

*New datasets prepared for solar, wind potentials;
biomass under preparation*

Potentials

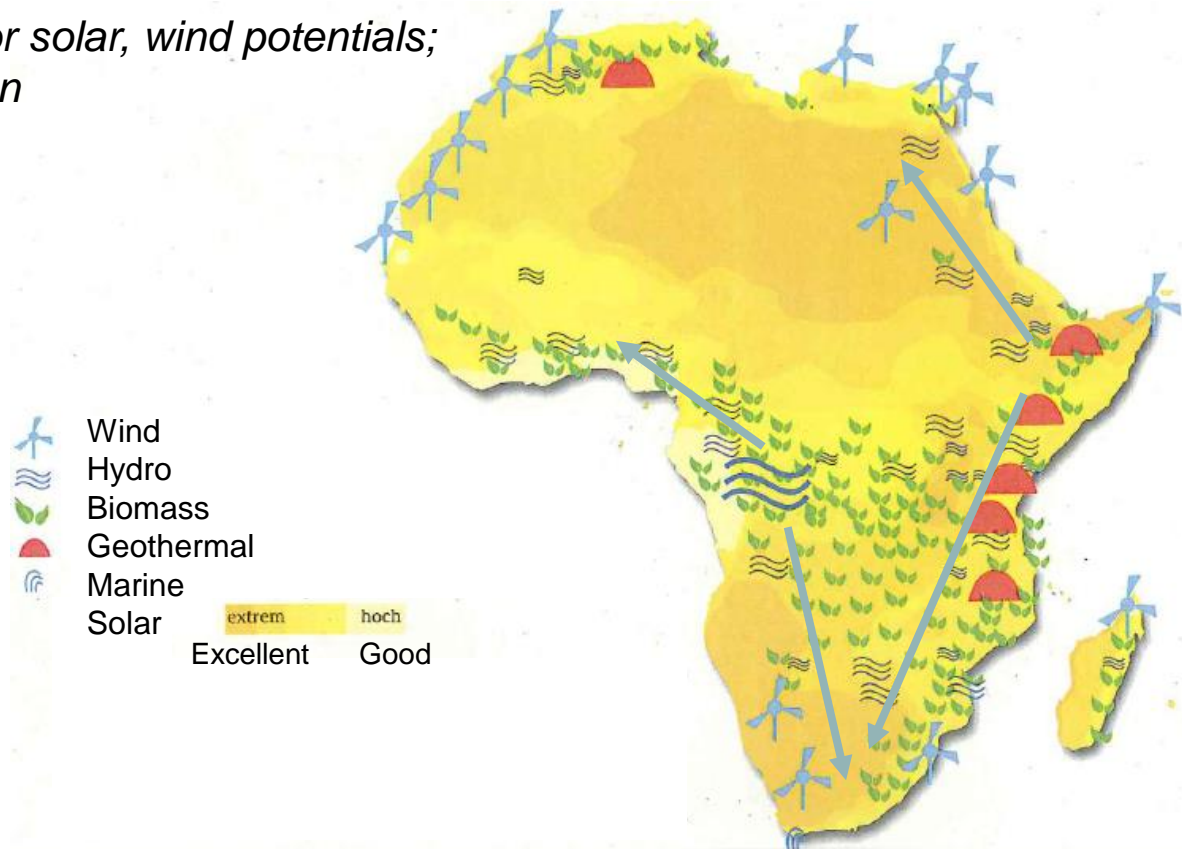
Hydro
1 850 TWh/yr Technical
900 TWh/yr Economic

Wind
5 000-7 000 TWh/yr
800 TWh/yr Economic

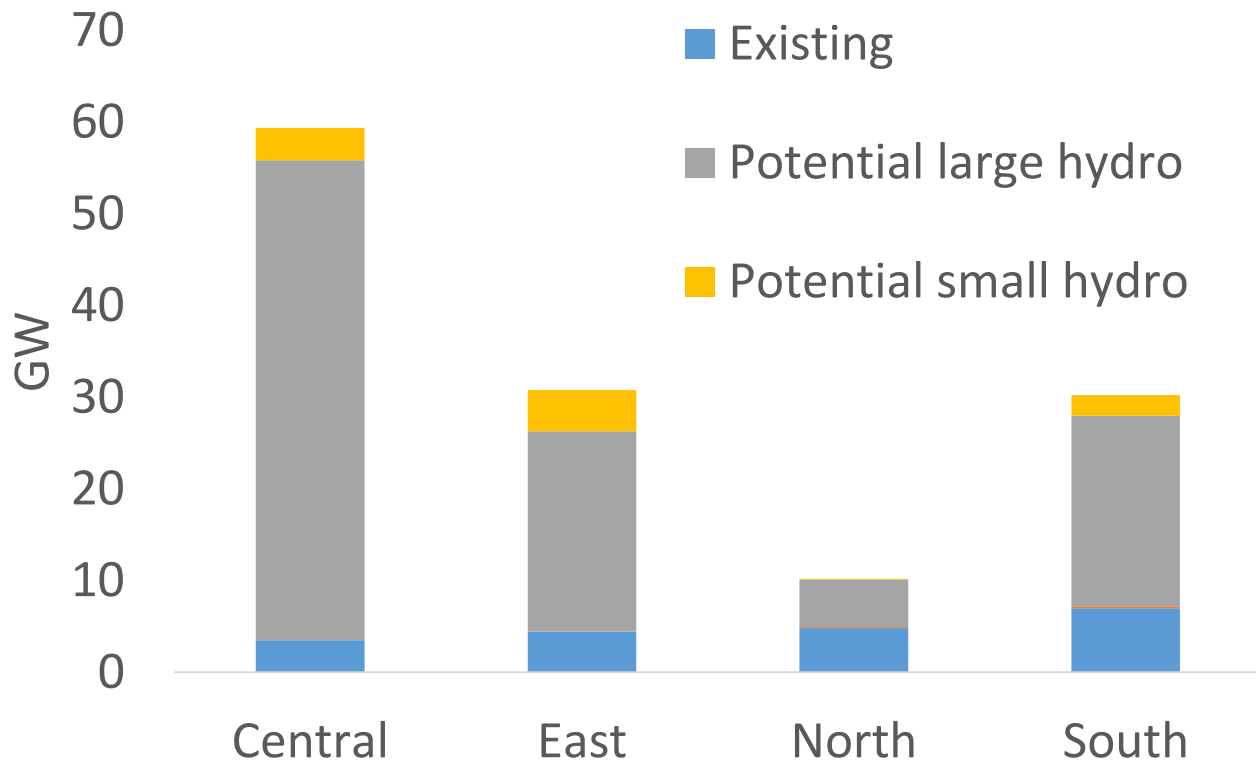
Solar
100 000 – 200 000 TWh/yr

Geothermal
< 100 TWh/yr
7-15 GW

Biomass
>2 600 TWh/yr

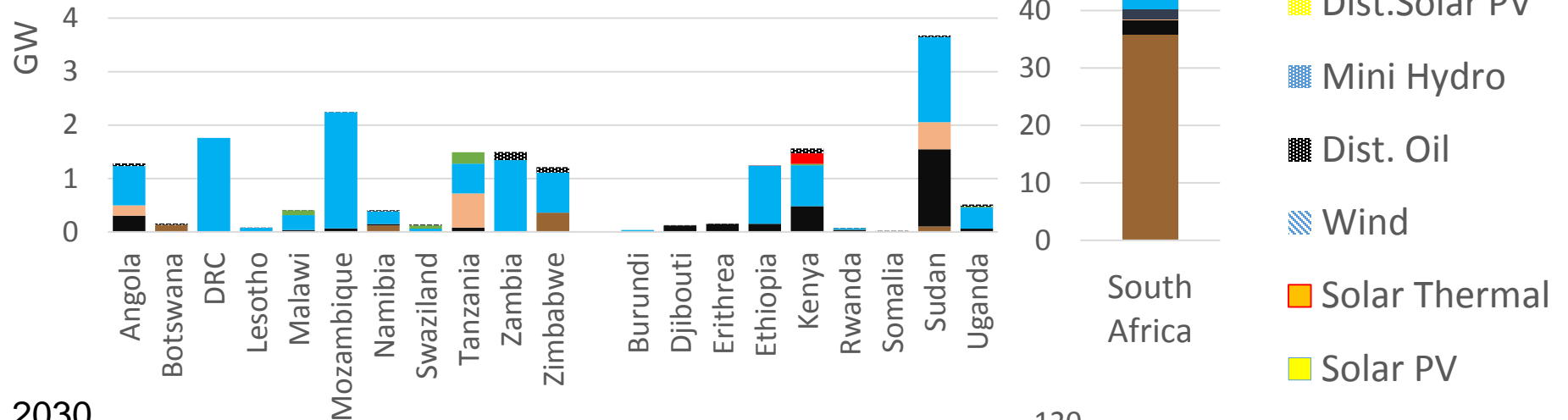


Example Hydropower: potential up to 2030

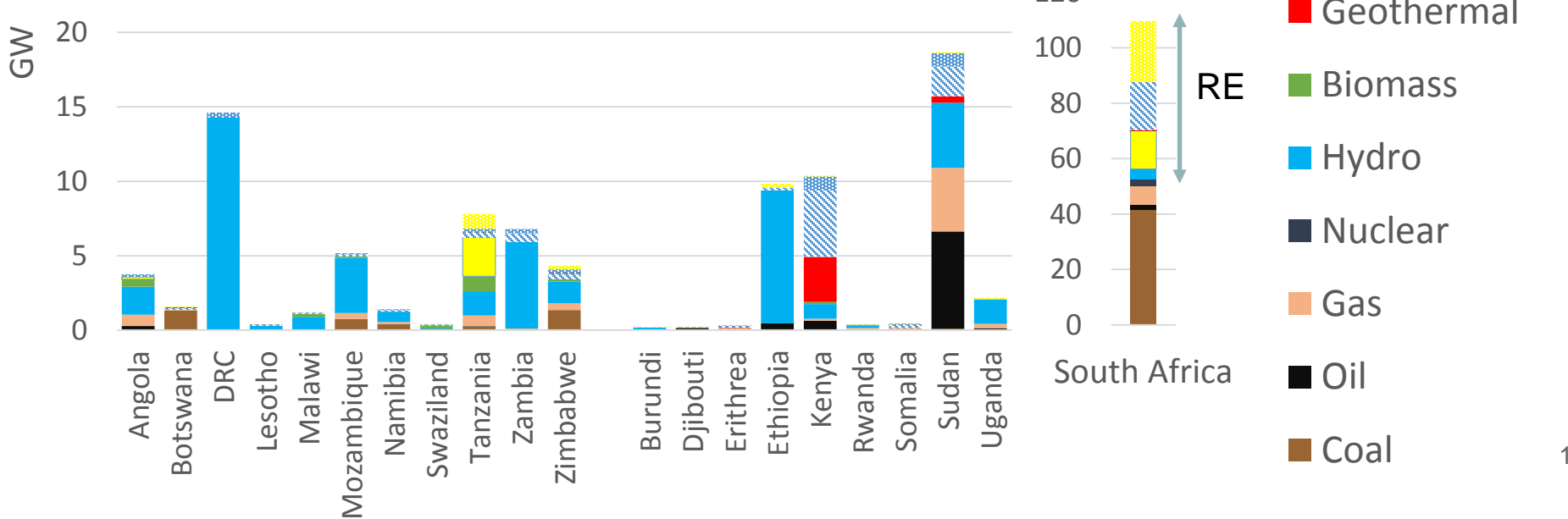


Capacity 2010 and 2030

2010 (for EAC 2009)

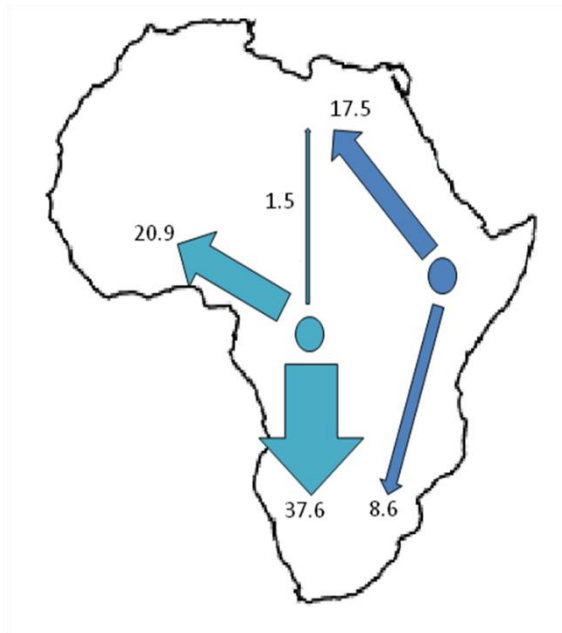


2030

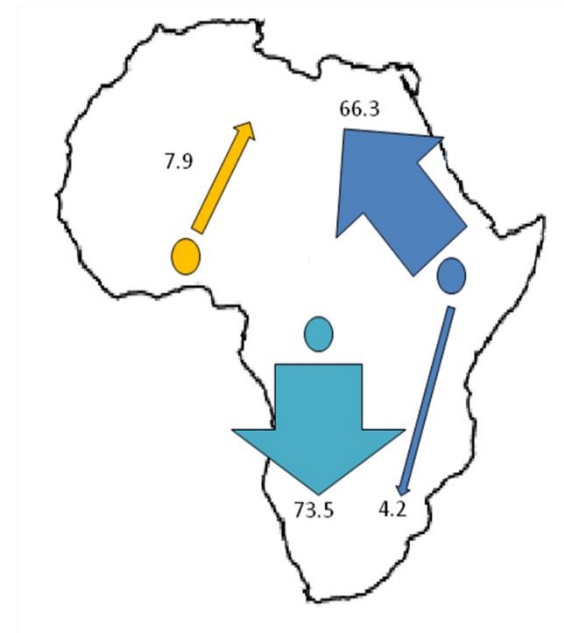


Regional trade in 2030 [TWh]

Major demand centres in South Africa, Egypt

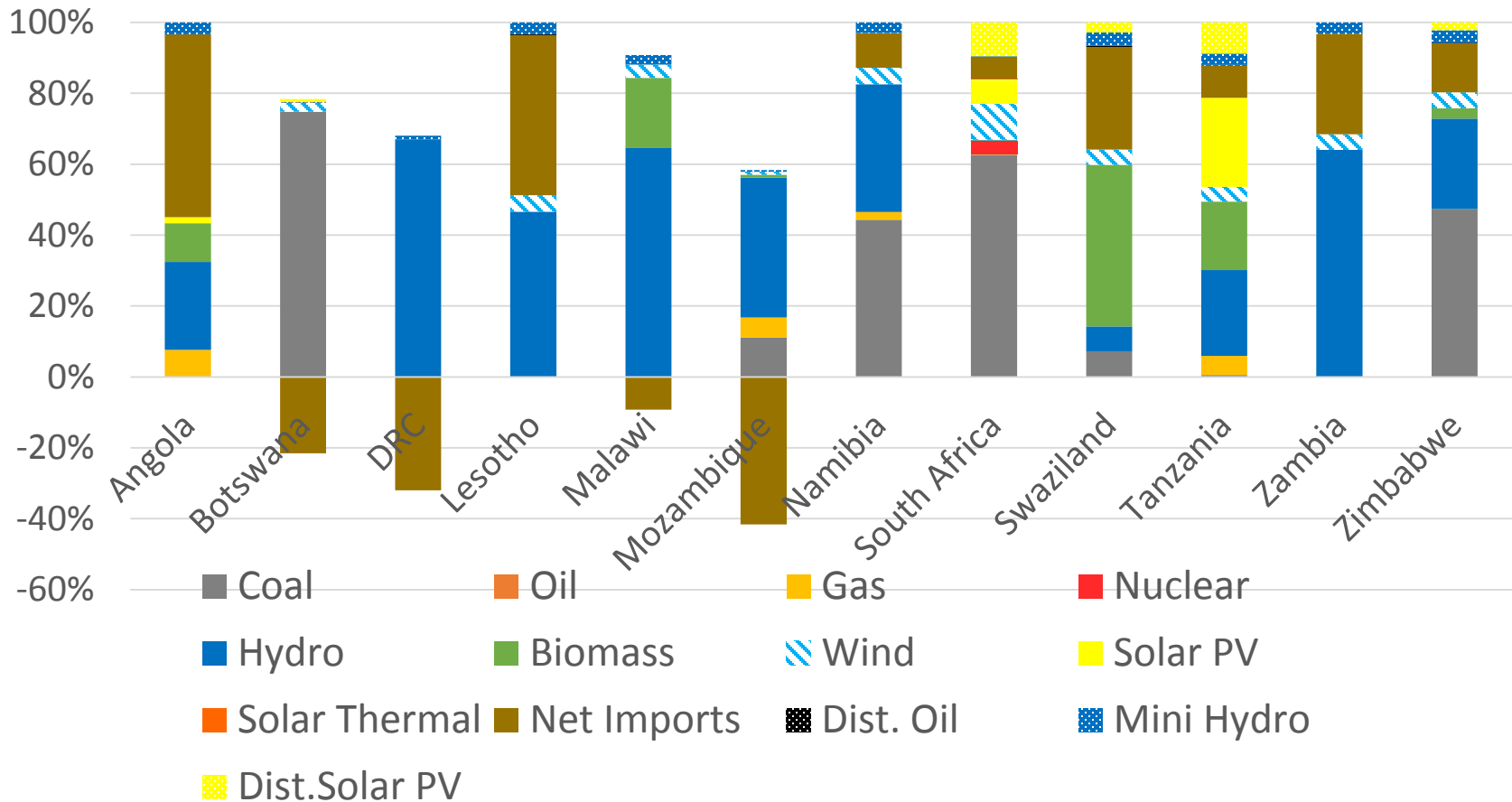


High GDP scenario

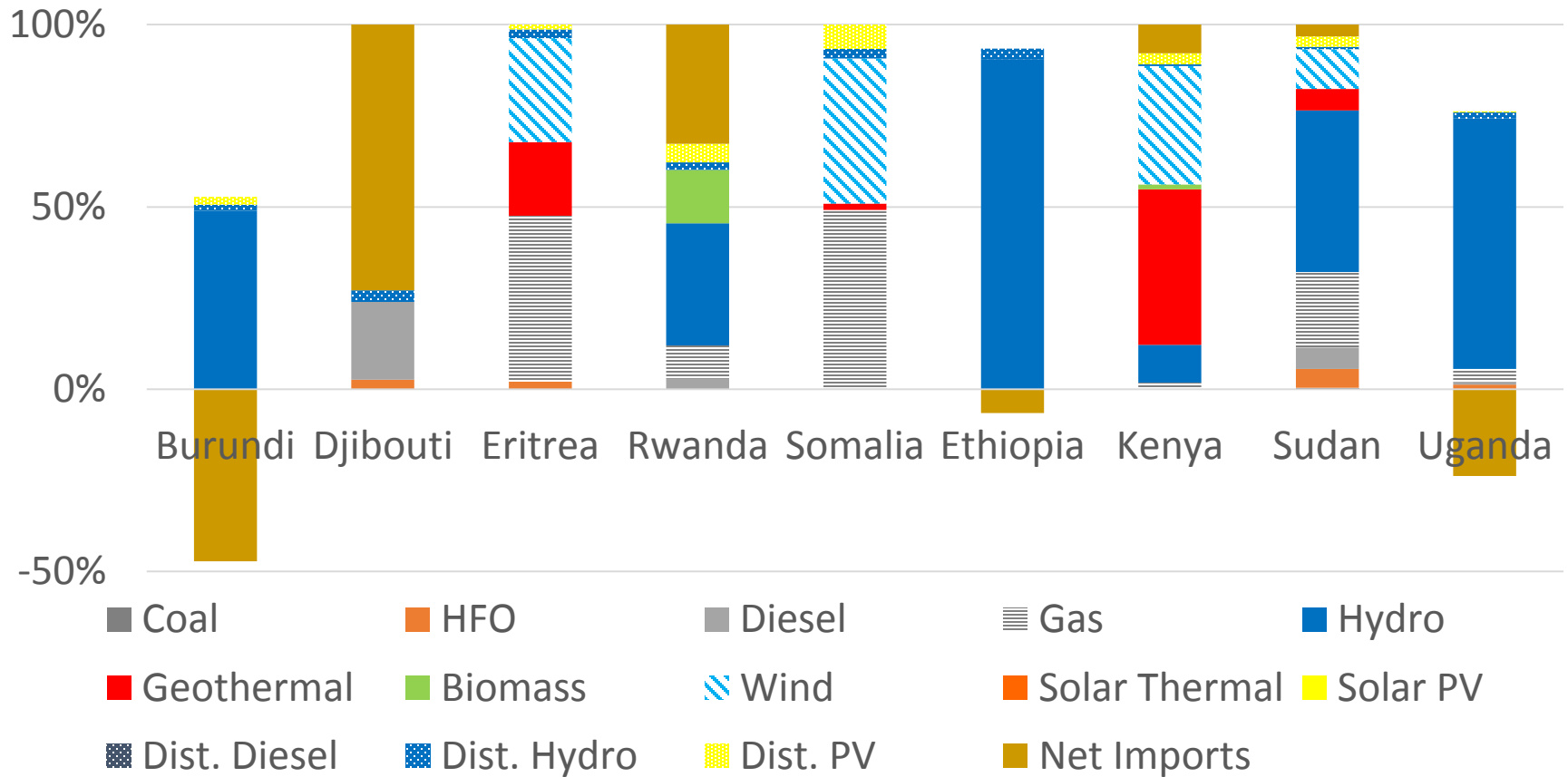


Low GDP scenario

Southern Africa Power Pool 2030 (Ren Scenario)



East Africa, 2030 (REN Scenario)



Key Messages

- Africa has an excellent RE potential
- Renewables can provide a solution to some of the power sector challenges
- Regional cooperation and interconnectors can help to raise the renewables share
- Especially relevant for large hydro and perhaps wind
- Power pool tools are available for further analysis upon request
 - Elaboration master plans
 - Technology and resource potential data
- IRENA can assist in capacity building for energy planning

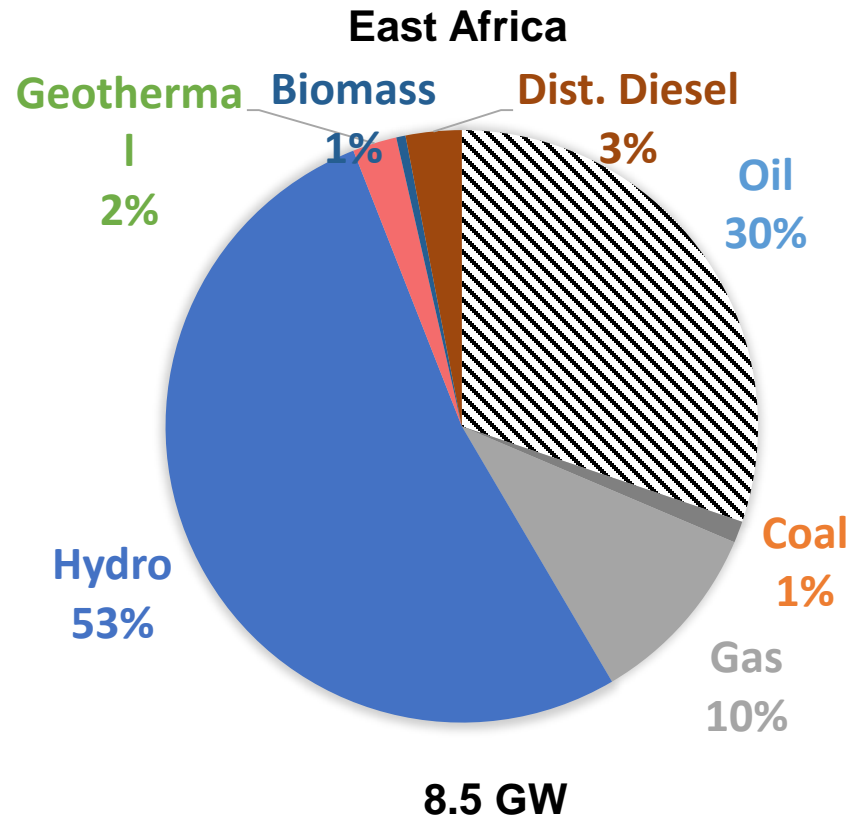
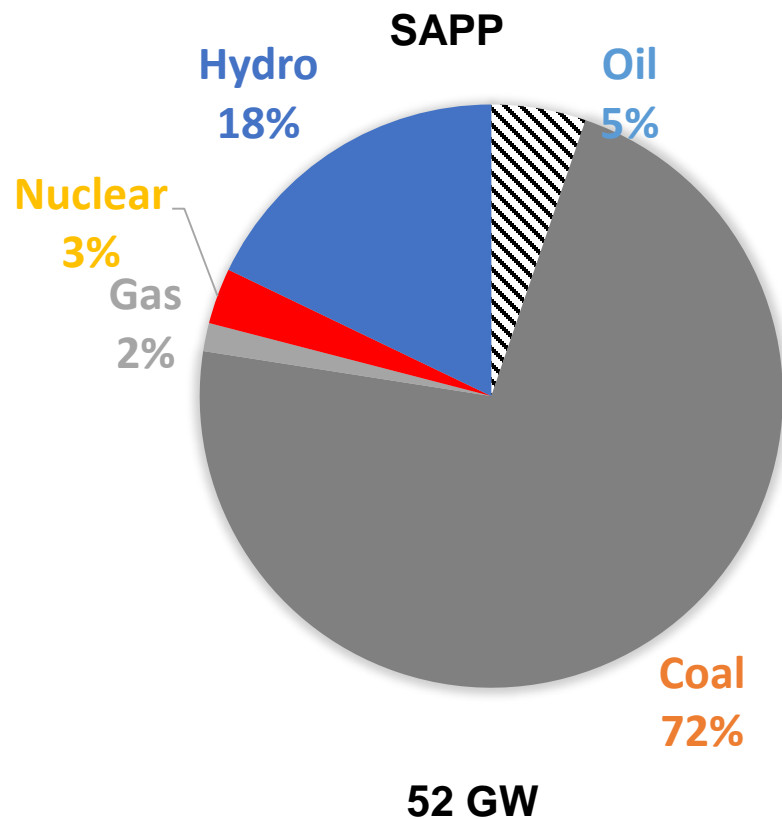
Thank you !

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www.irena.org

Power generation capacities 2009



Regional classification

South: Angola; Botswana; Lesotho; Madagascar; Malawi; Mauritius; Mozambique; Namibia; Seychelles; South Africa; Swaziland; Zambia; Zimbabwe

East: Burundi; Kenya; Rwanda; Tanzania; Uganda (all EAC); Djibouti; Eritrea; Ethiopia; Somalia; Sudan

North: Algeria; Egypt; Libya; Mauritania; Morocco; Tunisia; Western Sahara

Central: Cameroon; Central African Republic; Chad; Congo; Democratic Republic of Congo; Equatorial Guinea; Gabon; Rwanda; Sao Tome et Principe.

West: Benin, Burkina Faso, Cabo Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo