STATUS OF THE ELECTRICITY SECTOR SECTOR IN SOUTH AFRICA AND PROSPECTS

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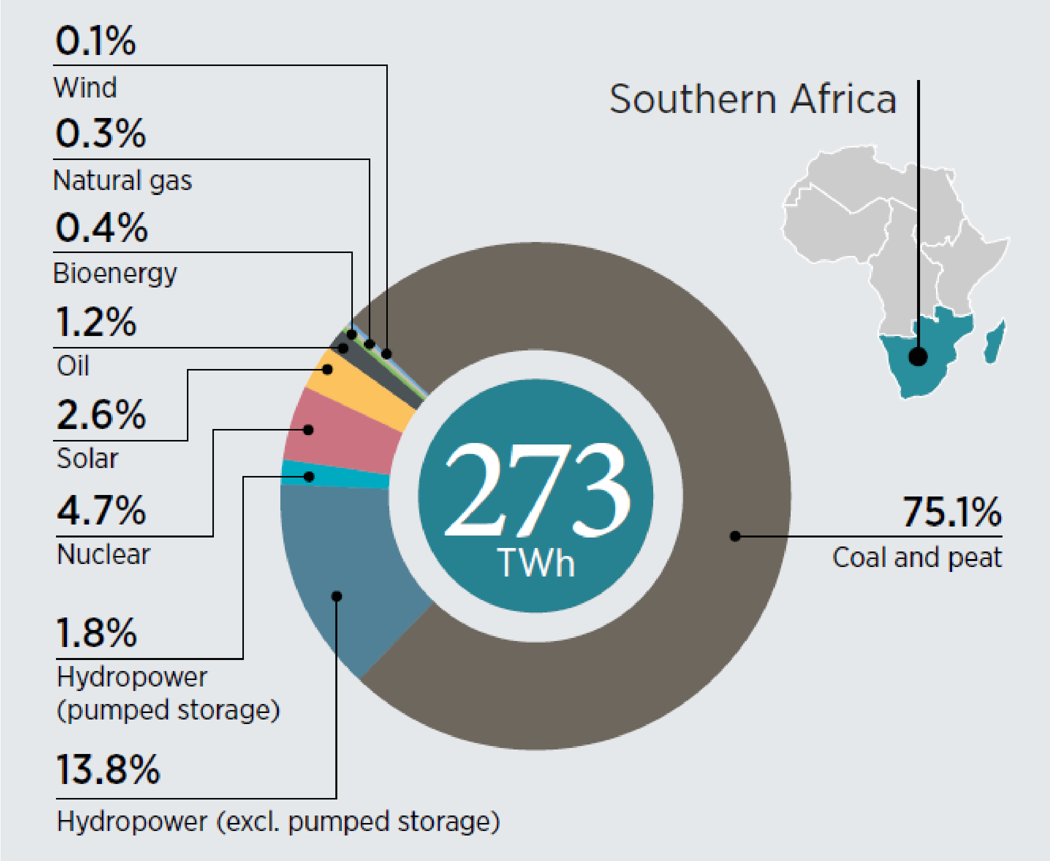
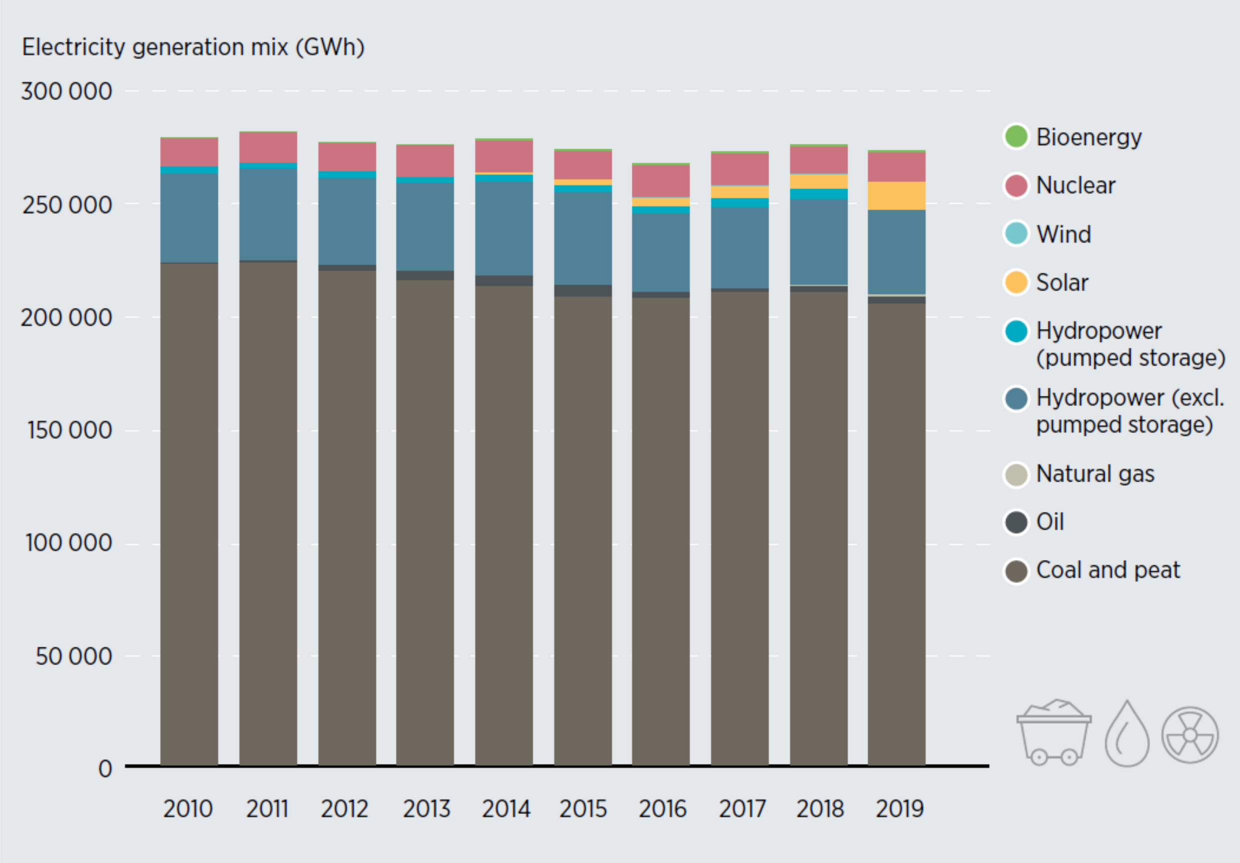
Presentation Outline

Climate Change vs Southern Africa
Regional Energy Generation Snapshot

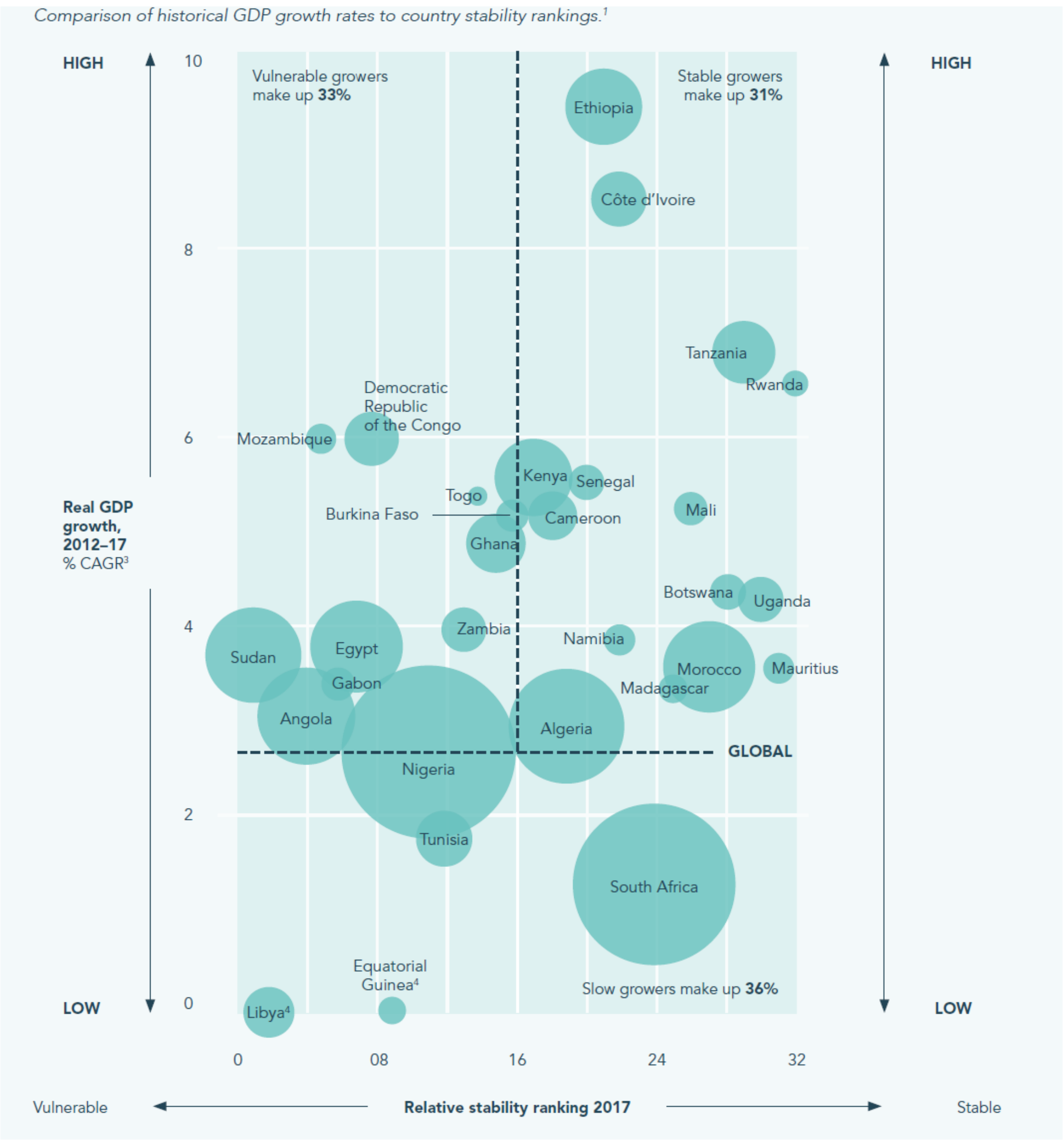


Source: ([IRENA, 2022: 83]()), Accessed March 2023



Source: ([IRENA, 2022:82]()), Accessed March 2023

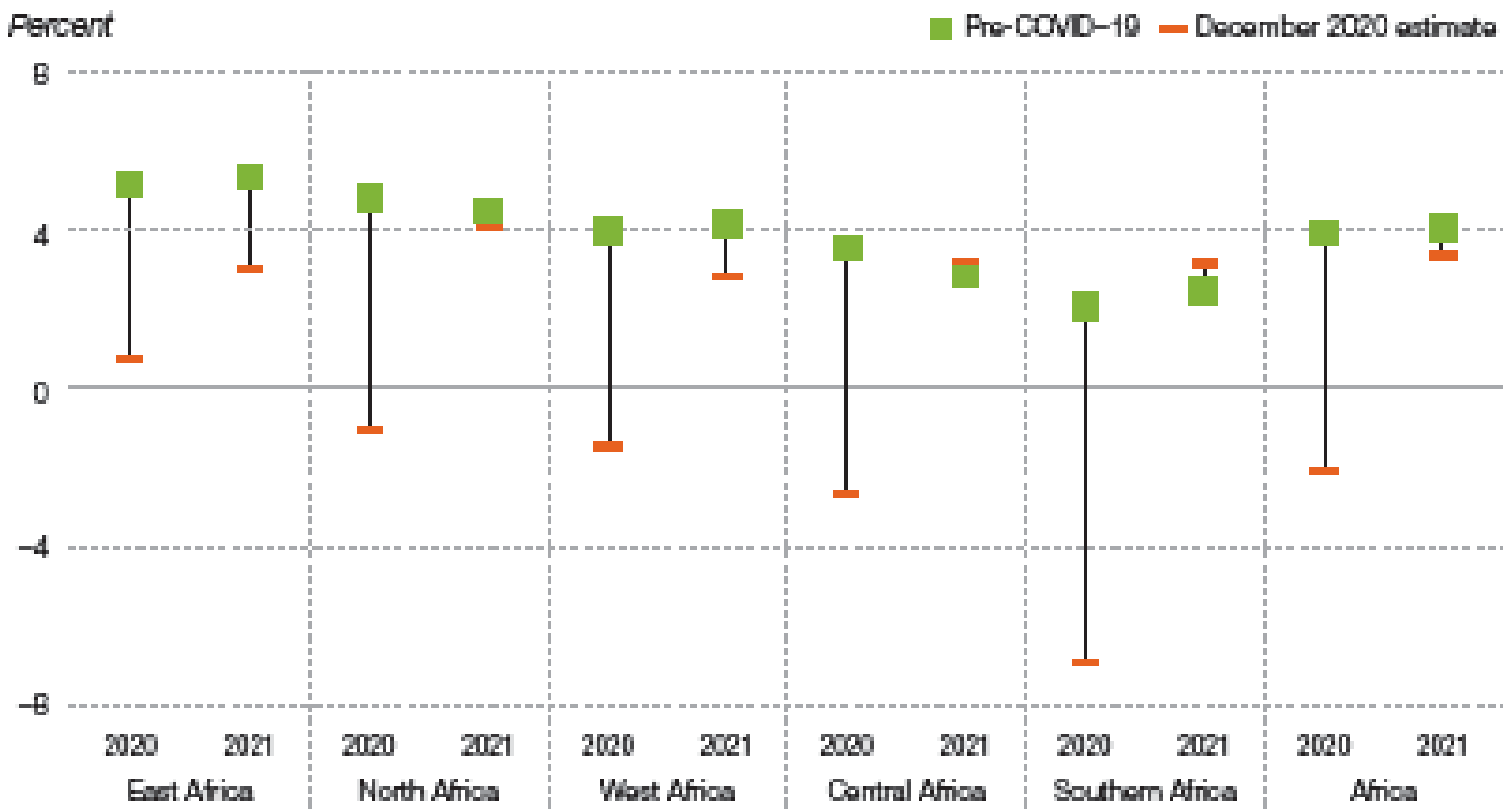
Growth and Stability



Sources: (Leke and Singe, 2019: 81).

COVID-Induced Economic Contraction

FIGURE 1.9 Growth's decline was steepest in Southern Africa, 2020–21



Source: African Development Bank statistics.

Source: (AfDB, 2021:12)

South Africa – Electricity Profile

Structure:

- Natural monopoly and national electric utility, ***Eskom, dominates the sector***.
- Electricity generation is ***mainly thermal coal-powered electricity (82%)***.
- ***Most thermal plant is over 40 years old*** (versus 25-30-year-old std. plant life).

Financing:

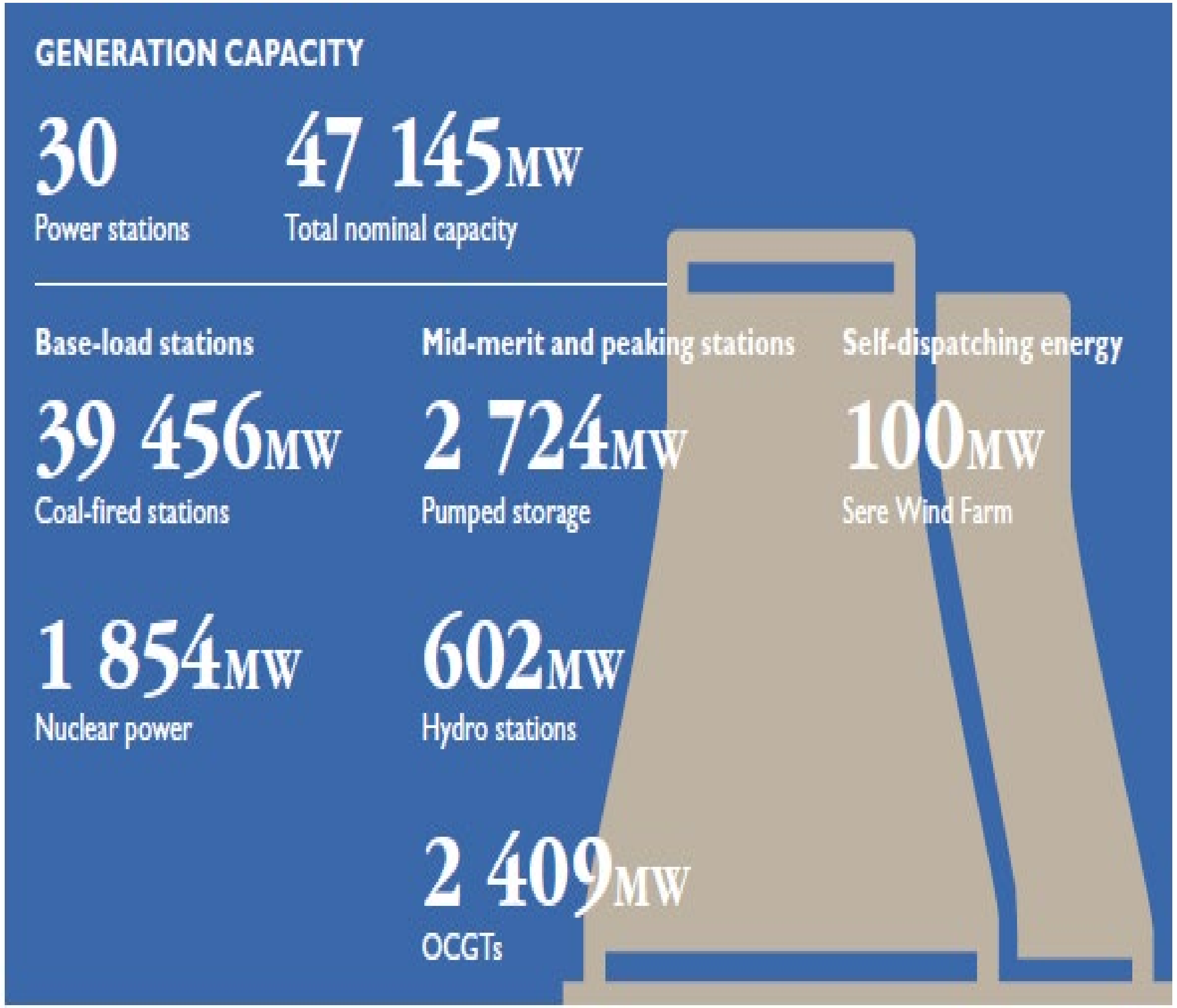
- ***Eskom has ZAR 337 billion in debt (US$ 19 Billion)*** and most of which is government-guaranteed, and ***National Treasury will provide R 254 billion (US$ 14 billion) in direct and indirect relief between 2023-2025*** (2023 Budget Speech)

Productivity and Economic Impacts:

- ***207 days of load-shedding*** or brown-outs in 2022 vs. 71 days in 2021 (2023 Budget Speech). ***Estimated 280 days of load-shedding in 2023*** (FNB, 2023)
- Estimated economy-wide -productivity losses of ***ZAR 1 - 4 billion per day*** (Stages 2 and 6)which translates into ***30% of Gross Domestic Product (GDP)***.

Source: (Eskom, 2022:12)

Eskom – Electricity Profile



Source: (Eskom, 2022:12)

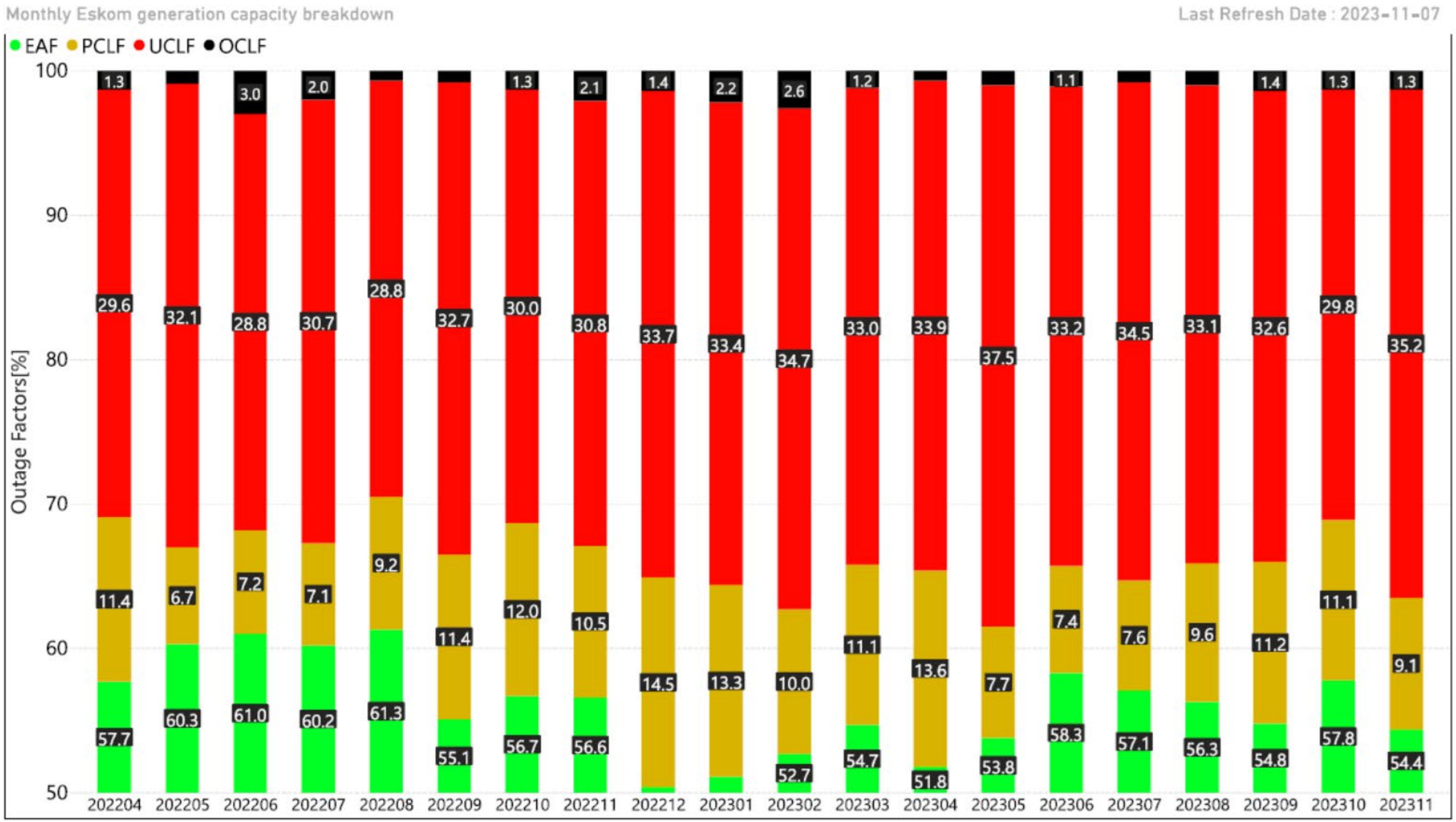
South Africa – Electricity Status

		COST	PRODUCTION	UNIT COST	
BASE-LOAD	COAL AND OTHER [1]	R80 595 million (2021: R74 496 million)	191 507GWh (2021: 190 040GWh)	R424/MWh (2021: R404/MWh)	5% ▲
BASE-LOAD	NUCLEAR	R1 228 million (2021: R1 040 million)	12 355GWh (2021: 9 903GWh)	R99/MWh (2021: R105/MWh)	5% ▼
DIESEL	ESKOM OCGTs [2]	R10 097 million (2021: R4 125 million)	1 826GWh (2021: 1 457GWh)	R4 708/MWh (2021: R3 951/MWh)	19% ▲
DIESEL	IPP OCGTs [3]	R4 649 million (2021: R2 911 million)	899GWh (2021: 704GWh)	R4 574/MWh (2021: R3 578/MWh)	28% ▲
	RENEWABLE IPPs	R30 554 million (2021: R27 921 million)	15 073GWh (2021: 12 821GWh)	R2 027/MWh (2021: R2 178/MWh)	7% ▼
	IMPORTS	R5 316 million (2021: R4 998 million)	8 500GWh (2021: 8 812GWh)	R625/MWh (2021: R567/MWh)	10% ▲
	TOTAL [4]	R132 439 million (2021: R115 492 million)	230 161GWh (2021: 223 738GWh)	R575/MWh (2021: R516/MWh)	11% ▲

▼ Unit cost declined ▲ Unit cost increased

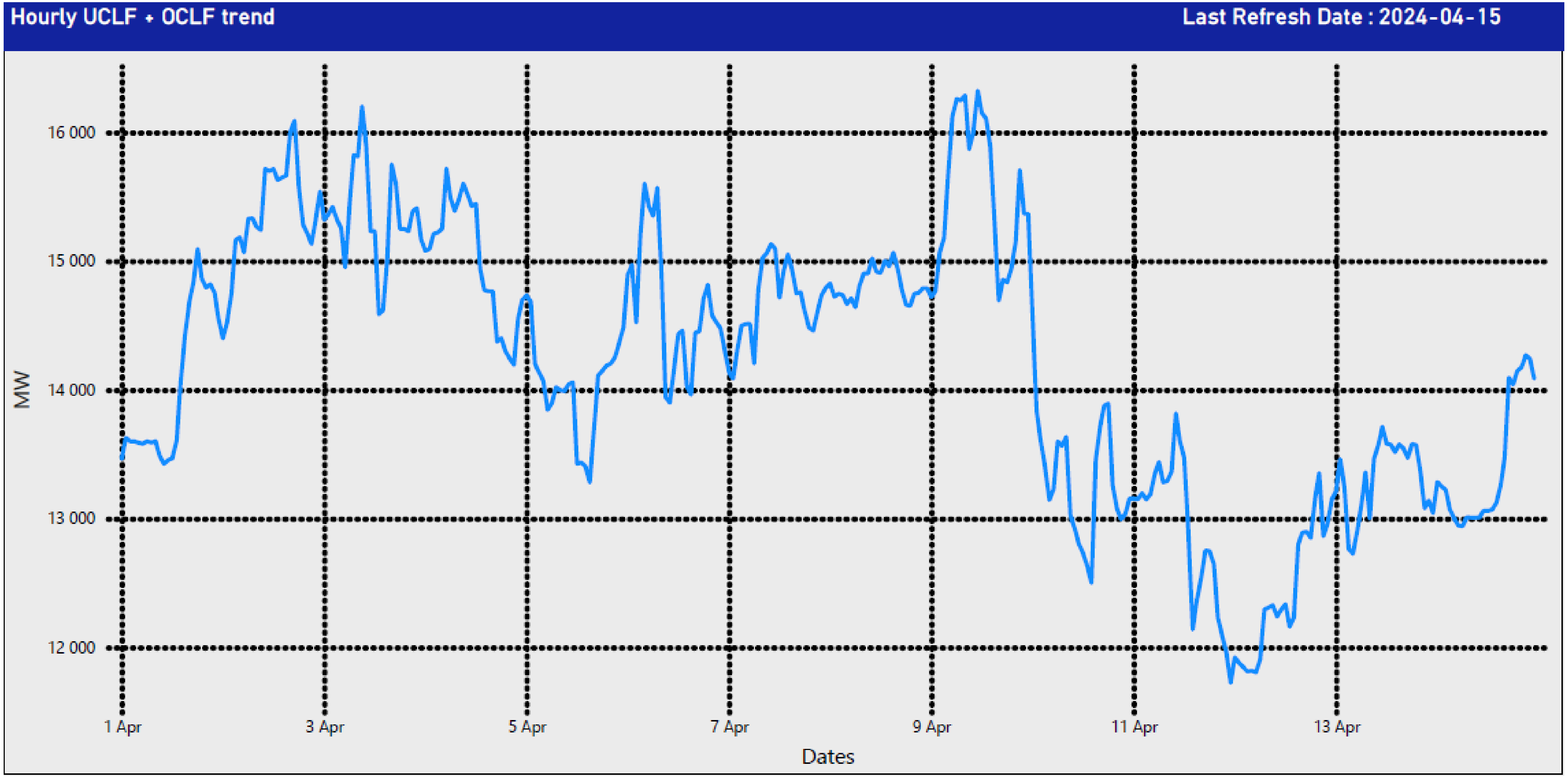
Source: (Eskom Results Presentation, 2022:12)

South Africa – Electricity Status



Source: (Eskom, 2023)

South Africa – Electricity Status April 2024



Source: (Eskom,2024)

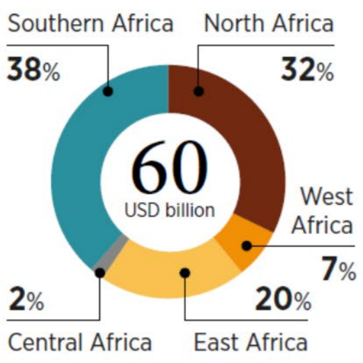
South Africa's Electricity Challenge

- **Requires ZAR 1 Trillion/CHF 50,7 Billion in new investment by 2030**
  - 33 000 MW in new generation capacity from solar, wind, gas, and storage (IRP).
  - REI4P has delivered 100 projects and 6500 MW at R 200 billion in investments
- **Very limited space for Government and Eskom to borrow from Capital Markets**
  - Post-COVID pandemic sovereign debt level projected at 89 percent of GDP by 2025/26.
  - Eskom is technically insolvent:- generates only half the cash for its debt service.
- **Requires immediate implementation of fundamental reforms**
  - Attracting private sector-led investment in distributed generation and distribution.
  - Establishing an independent transmission system and market operator.
  - Transmission Grid reconfiguration ~ ZAR 180 billion/CHF 9,7 billion.
  - Integrating green hydrogen into IRP and attracting investments ~ ZAR 200 Billion/CHF 10,7 billion.
  - Capacitating National Energy Regulator (NERSA), municipalities, and other sector players.

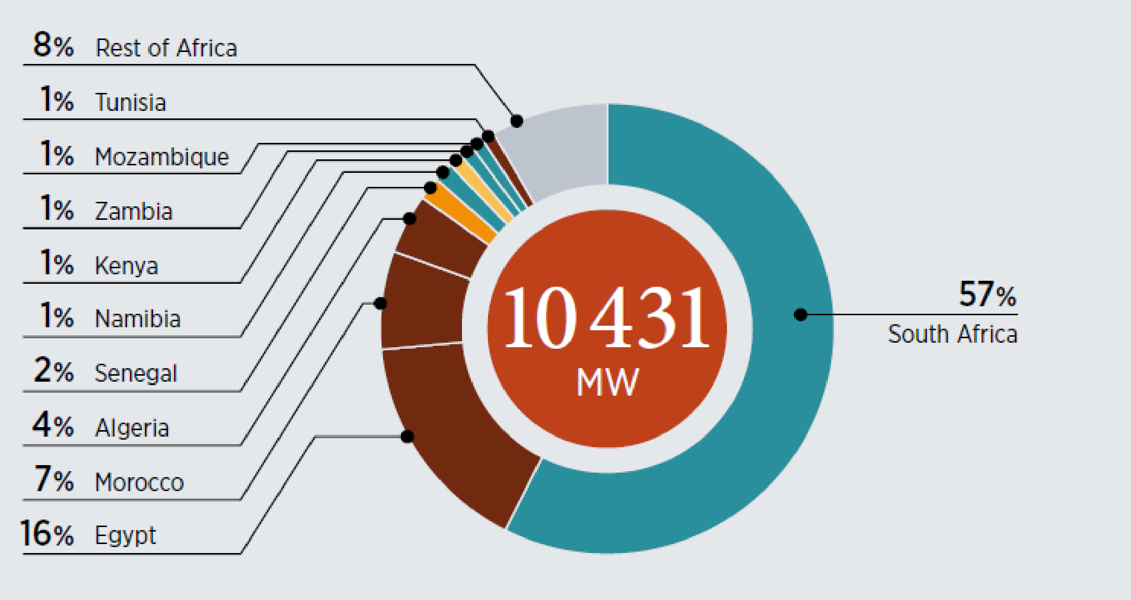
Renewable Energy Investments in Africa

USD Billions, current 2020

	2000-2009	2010-2020	Cumulative 2000-20
Global	587 USD billion	2 254 USD billion	2 841 USD billion
Africa	4.8 USD billion (0.8% of global investment)	55 USD billion (2.4% of global investment)	60 USD billion (2% of global investment)
North Africa	1.9 USD billion	17.5 USD billion	
West Africa	0.5 USD billion	3.9 USD billion	
East Africa	2.0 USD billion	9.7 USD billion	
Central Africa	0	1.3 USD billion	
Southern Africa	0.3 USD billion	22.4 USD billion	

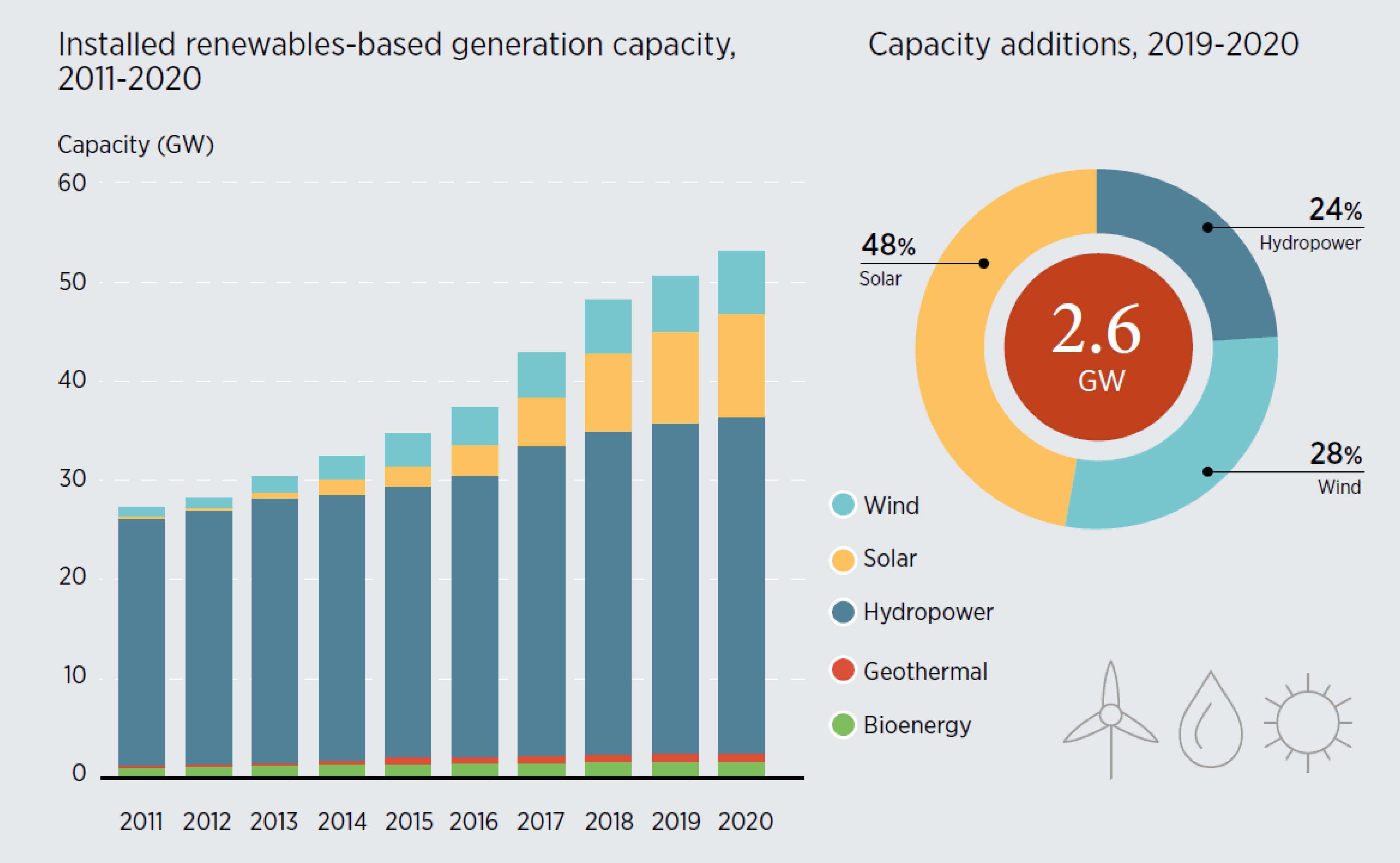


Source: (IRENA, 2022:90)



Source: (IRENA, 2022: 41)

Installed Renewables in Africa



Source: (IRENA, 2022: 37)

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South Africa's Electricity Future

FULL COLOUR THINKING

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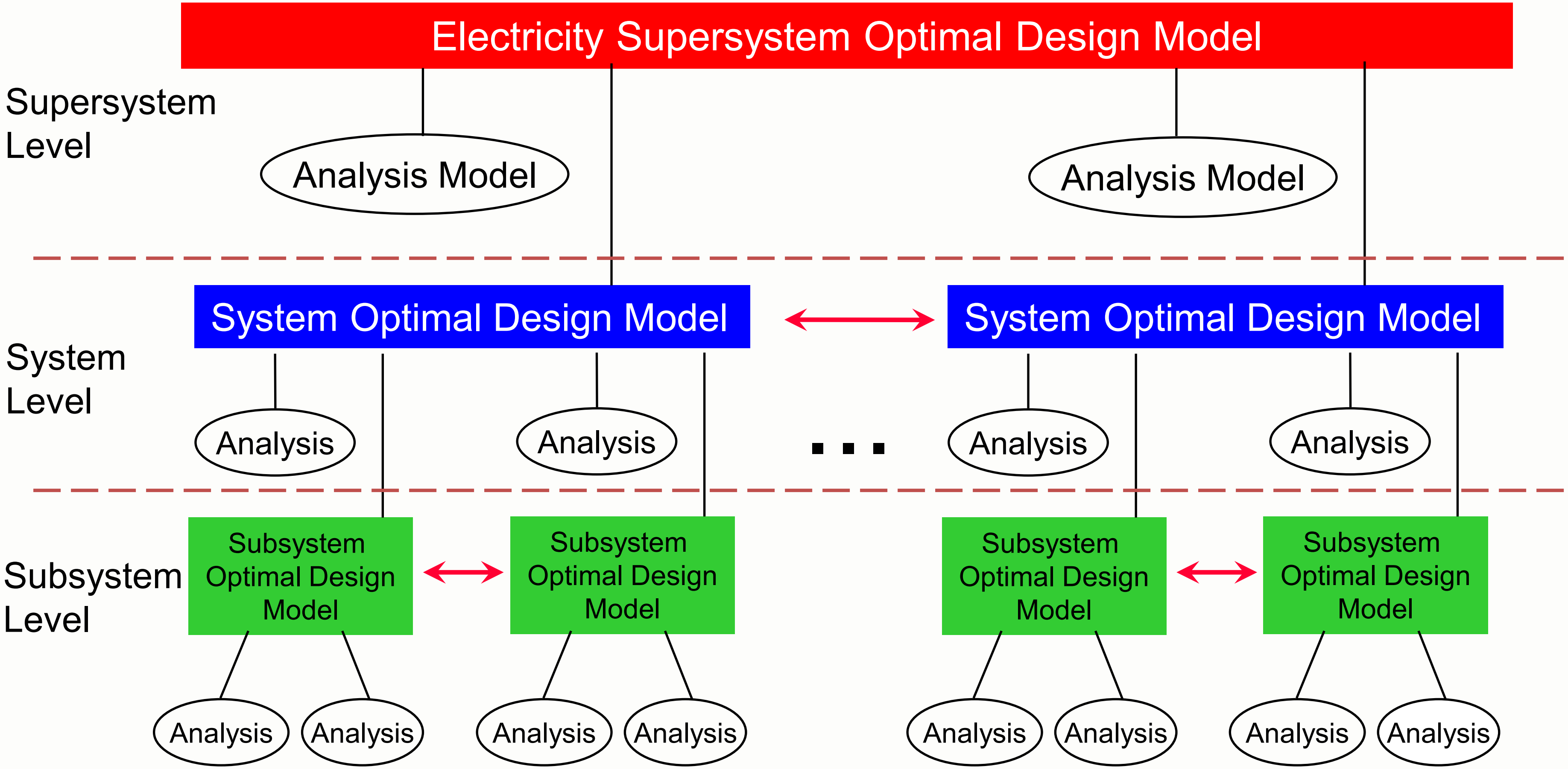
New Electricity Sector Challenges

- **Changes to Schedule 2 of the Electricity Act (2022)**
  - Own-generation capped at 1 MW, then 10MW, then 100 MW, and now uncapped in 2022-23.
  - Seismic shift or "liberalization" of the electricity sector.
- **Presidential Climate Change Commission (2023)**
  - Just Transition commitment to adding 8500 MW of renewable generation capacity by 2030.
  - Seismic shifts in required capabilities, business models, and state-bureaucracy re-configurations.
- **Emergence of New Sector Actors (2022-2023)**
  - Small and Embedded Generators (SEGs), Prosumers, Independent Power Producers (IPPs), Municipalities, Licensed Energy Traders, and National Energy Regulator (NERSA).
- **Tax Incentives (2023)**
  - 2023 National Budget Tax Credits (ZAR 4 billion to individuals & ZAR 5 billion to companies).
  - Rooftop Solar contributed 4883 MW (10% of total installed generation cap.) in September 2023.

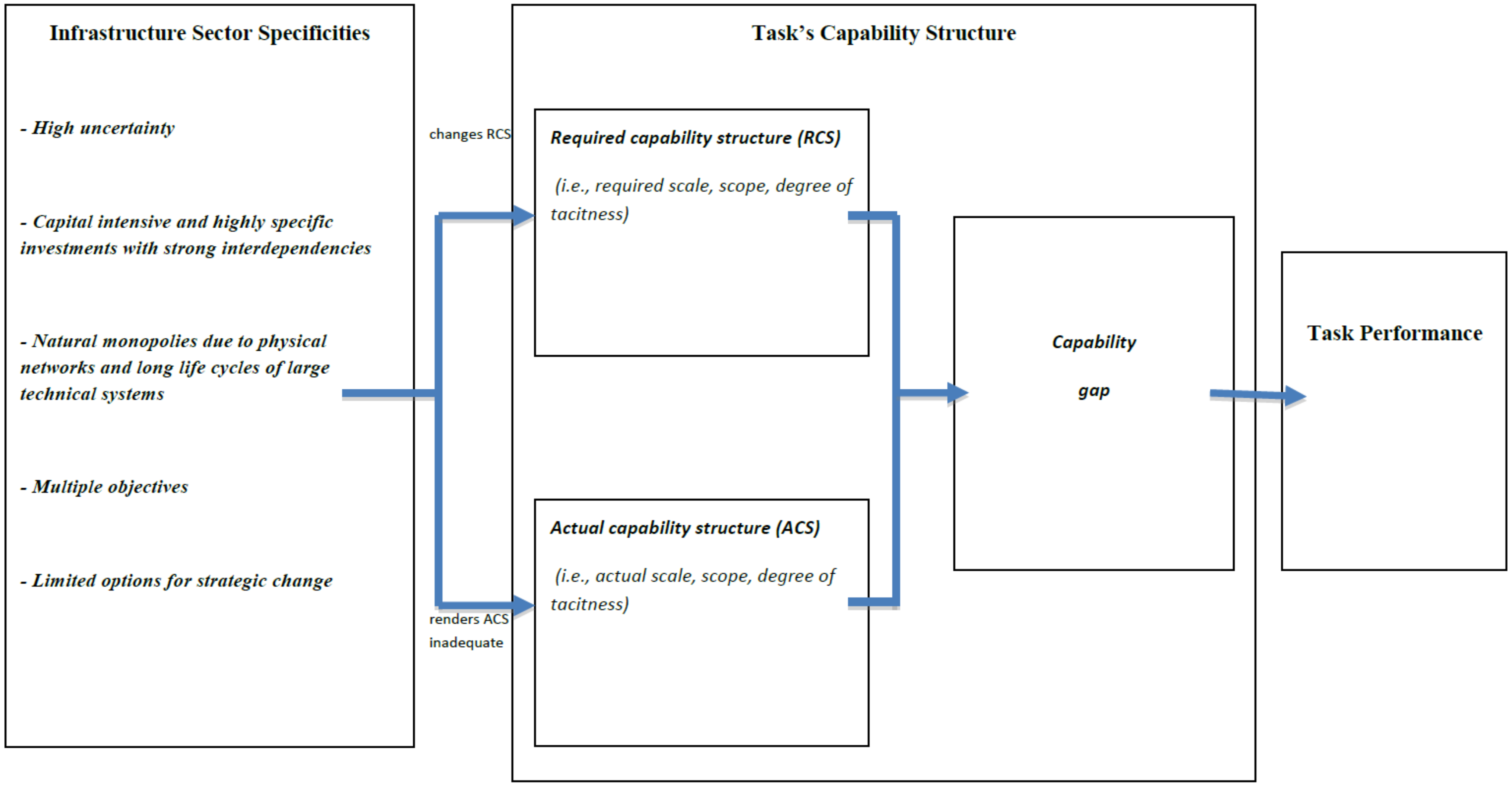
Centralized vs Decentralized Systems

- Target Cascading structure is composed of multiple levels.
- Linking variables and responses are identified.



Source: (Papalambros, 2023)

Extending Capabilities Perspective



Source: Worch, Truffer, Kabinga, Markard and Eberhard (2012b) p. 22.

Opportunities

- **Reform support and expertise will be required in the following areas:**
  - Just Energy Transition (JET) and Private sector-led investment ~ ZAR 1 Trillion/CHF 50,7 Billion
    - Distributed Generation and Distribution.
    - Deploying AI and Fintech solutions in generation and distribution revenue collection, respectively.
  - Establishing an Independent transmission system and market operator.
    - Transmission Grid reconfiguration ~ ZAR 180 billion/CHF 9,7 billion.
    - Establishing decentralized power markets and trading platforms.
  - Technology and investments in green hydrogen ~ ZAR 200 Billion/CHF 10,7 billion.
    - Unlocking the Green Hydrogen Value Chains
  - Capacity Building:
    - National Energy Regulator (NERSA)
    - Primary and Secondary Municipalities
    - Independent power producers
    - Prosumers and Small and Embedded Power Producers

Next Step:
University Involvement and Coordination

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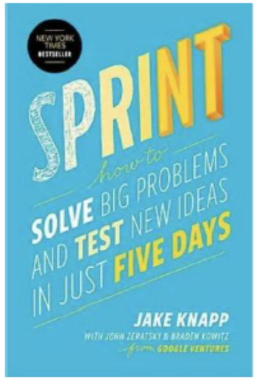
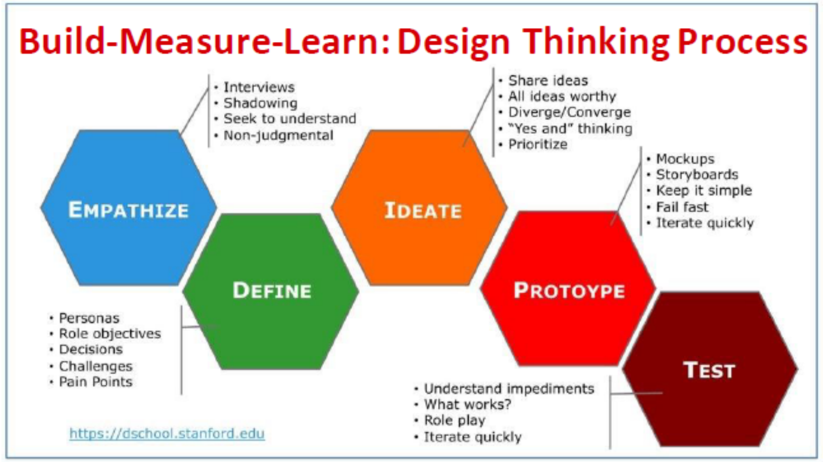
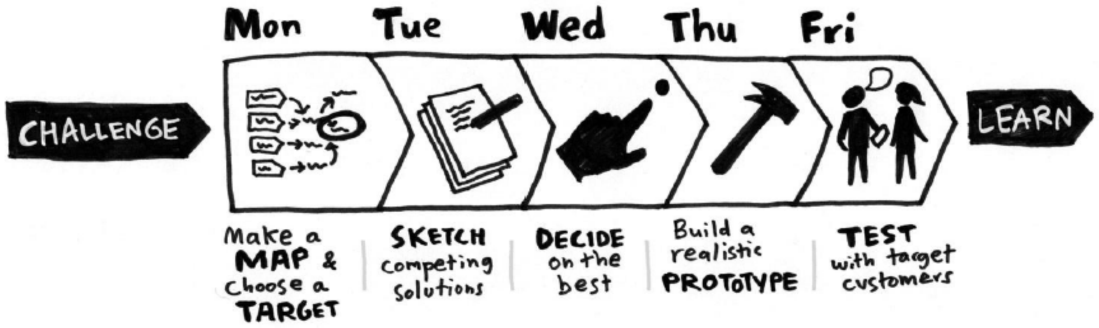
Action Research for Capability Building



- Implementing an **agil approach to build capabilities fast** with 12 partners (6 municipalities, 6 IPP)
- Developing **replicable**, easy-to-apply **guidlines for capability building** in municipalities & IPPs





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Next Step: University Involvement and Coordination

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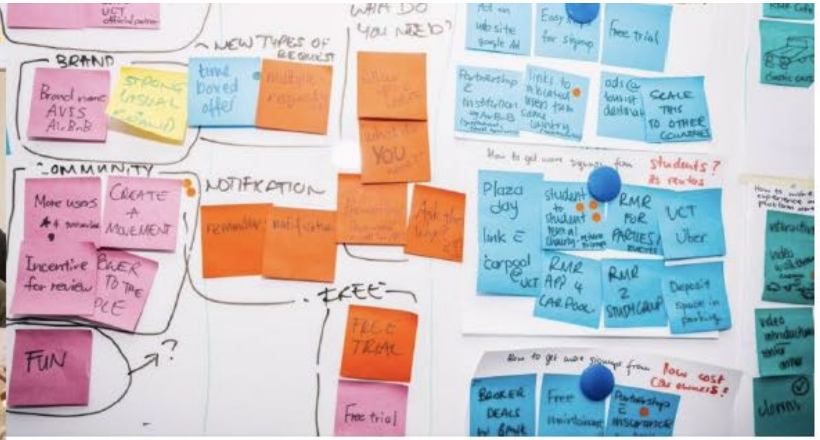
Action Research @ d-school Afrika



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Cross-Country Analysis of Energy Transitions

- **Similarities**
- ***Sustainability***
  - Climate Change (Decarbonization)
  - Capabilities (Municipalities, IPPs, SSEGs)
  - Business Models (Decentralized Power???)

- **Differences**
  - Extreme Urgency (constrained headroom to resolve frequent blackouts before May 2024 elections; slow economic growth, low investor confidence and investments; high youth unemployment; and high rate of inequality)

- **Similarities**
- ***Sustainability***
  - Climate Change (Decarbonization)
  - Capabilities (Cantons, Utilities, and IPPs)
  - Business Models (Decentralized Power)

- ***Differences***
  - Less Urgency (some headroom to make adjustments)

Discussion & Questions???