Measuring Readiness to Adopt Low-Carbon Technologies in Africa

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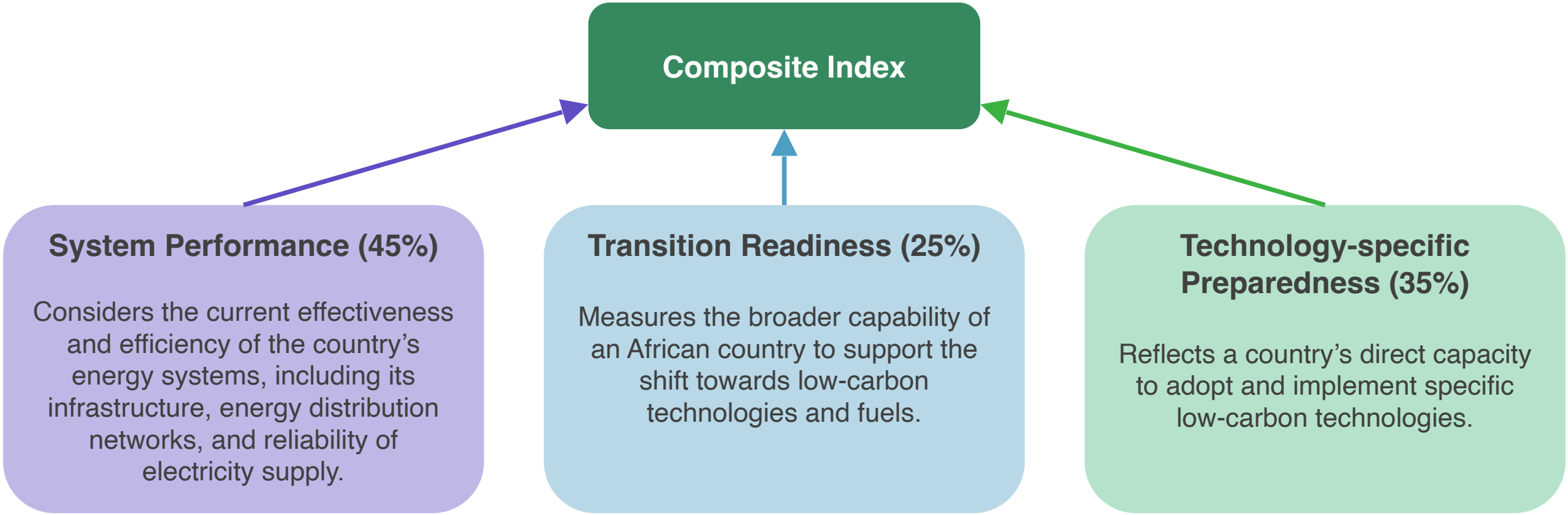
Recap: Methodology



Sub-dimensions

(equally weighted within System Performance and Transition Readiness)

System Performance

1. Economic development and growth
2. Environmental sustainability
3. Energy access and security

Transition Readiness

1. Regulation and political commitment
2. Capital and investment
3. Institutions and governance
4. Infrastructure and business environment
5. Human Capital
6. Power System Structure

Technology-specific Preparedness

1. Solar
2. Wind
3. Natural Gas
4. Geothermal
5. Nuclear
6. Hydropower
7. Biomass
8. Hydrogen
9. Carbon capture and storage

Determining Indicator Values

$$Indicator\ Score_i = \frac{value_i - min}{max - min} \times 100$$

- To determine our minimum value, we either use the lowest possible value for that indicator or select a value that is below the lowest value found for that indicator (globally and in Africa)
- To determine our maximum value, we either use the highest possible value for that indicator or select a value that is at or above the highest value found for that indicator (globally and in Africa)

Applying our Composite Index: Nigeria

Composite Index – Summary Findings

Dimension	Score	Weighted Score
System Performance	55.67	25.05
Transition Readiness	36.50	12.78
Tech-specific – Hydrogen	5.98	1.50
Tech-specific – CCS	5.71	1.43
Composite Index – Hydrogen	98.16	39.33
Composite Index – CCS	97.89	39.26
Composite Index – Hydrogen + CCS	98.02	**39.29**

System Performance– Summary Findings

Sub-Dimension	Score
Economic Development and Growth	56.01
Environmental Sustainability	52.37
Energy Access and Security	58.64
System Performance Index	**55.67**

System Performance: Sub-dimensional Analysis

- **Economic Development and Growth: 56.01**
  - Nigeria's energy sector somewhat contributes to and supports socio-economic progress
  - **Strength**: price of electricity is relatively cheap
  - **Weakness**: high power outages, self-generation, and fuel export dependency
- **Environmental Sustainability: 52.37**
  - Nigeria has a very modest commitment to preserving the environment while meeting energy demands, aligning with global sustainability goals
  - **Strength:** low carbon emissions and carbon intensity
  - **Weakness:** high air pollution and modest biodiversity impact
- **Energy Access and Security: 58.64**
  - Nigeria scored the highest in this sub-dimension
  - The effectiveness and stability of Nigeria's energy infrastructure is modest
  - **Strength:** low energy import dependence, increased financing for mini-grids, low coal power generation, grid integration with other countries in the West Africa region
  - **Weakness:** poor access to electricity and clean fuels/technologies in rural areas, no investment in smart grids, poor diversity of energy supply mix, very poor battery and energy storage

Transition Readiness for Nigeria– Summary Findings

Sub-Dimension	Score
Regulation and Political Commitment	83.00
Capital and Investment	44.45
Institutions and Governance	20.32
Infrastructure and Innovative Business Environment	29.86
Human Capital	24.18
Power System Structure	16.69
Transition Readiness Index	**36.74**

Transition Readiness: Sub-dimensional Analysis

- **Regulation and Political Commitment: 83.00**
  - Nigeria has strong regulation and political commitment to supporting energy access and achieving emissions goals
- **Capital and Investment: 43.01**
  - Nigeria shows modest levels of capital and investment supporting their energy sector.
  - Nigeria is well integrated within the African economy through the African Continental Free Trade Union, and its Central Bank is a member of the Pan-African Payment & Settlement System
  - Nigeria scored moderately on access and availability of climate-based financing and multilateral/bilateral financing at 37 and 33, respectively. However, investment in energy with private participation scored very low at 1.
    - From the examined multilateral and bilateral financial institutions, Nigeria received the most financing from the IFC, AfDB, and FMO. It also scored high (75) in the number of projects funded by the Green Climate Fund
- **Institutions and Governance: 20.33**
  - Nigeria scored relatively low in the strength of its institutions and governance practices.
  - Indicators that scored particularly low included the political stability of the country, regulatory quality, and government effectiveness.

Transition Readiness: Sub-dimensional Analysis

- **Infrastructure and Innovative Business Environment: 29.87**
  - Nigeria scored relatively low in terms of its infrastructure and innovative business environment.
  - Indicators that scored particularly low included the level of transportation infrastructure in the country and the innovative business environment.
- **Human Capital: 24.18**
  - Nigeria scored relatively low in terms of human capital.
  - Indicators that scored particularly low surrounded research and development (researchers per million inhabitants and R&D expenditure as a proportion of GDP) and employment in STEM occupations
  - However, it is worth noting that ILO was missing data for Nigeria for 3 indicators pertaining to education: total net enrollment in upper secondary school, public spending on education as a proportion of GDP, and percentage of graduates from STEM programs in tertiary education
- **Power System Structure: 16.69**
  - Nigeria scored low in its power system structure
  - Indicators that scored particularly low surrounded Nigeria's reliance on fossil fuels in its power mix and the low per capita electricity consumption

Technology-specific Preparedness for Nigeria – Summary Findings

Technology	Score
Solar PV	-
Wind (on-shore / off-shore)	-
Natural Gas	-
Nuclear	-
Hydropower	-
Hydrogen	**5.98**
Carbon Capture and Storage	**5.71**

Technology-specific Preparedness: Hydrogen

- While the Green Hydrogen Atlas found that Nigeria has high potential for producing green hydrogen, it **lacks a comprehensive hydrogen development strategy.** Currently, the current legal and regulatory framework for RE projects applies to green hydrogen as well, but that is insufficient if the country plans to develop its hydrogen production.
- Currently, there are **no hydrogen projects in Nigeria** (hence the lack of data on many of our indicators), but some companies have begun conducting feasibility studies, and Nigeria4H2 recently signed a deal with Germany (approx. €342,000) to investigate the potential of green hydrogen and define a possible transition path.

Technology-specific Preparedness: Carbon Capture, Utilization and Storage (CCUS)

- Currently, there are **no active CCUS projects in Nigeria**, but the International Finance Corporation (IFC) and the World Bank have begun to work with the Government of Nigeria (GoN) to develop a domestic market for CCUS for industrial emissions

- IFC will work with the GoN to identify the most promising sectors and private companies that can pilot new technologies for CCUS, **but no actual money has been invested yet**

- **Good news:** Nigeria's updated Nationally Determined Contributions set an unconditional target to reduce emissions by 20% relative to business-as-usual by 2030, **increasing its conditional target from 45% to 47%** (contingent on international support)

What’s next?

Next Steps and Recommendations

Explore additional indicators and seek ways to access data on variables that were previously hard to find or behind a paywall.

Consider applying non-linear formulas, such as logarithmic transformations, to certain indicators.

Develop a user-friendly model/tool that offers easier navigation and data access compared to Excel.

Questions?