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Most Energy Transition Scenarios for Africa Ignore Development

Insufficient focus on economic growth threatens climate action

This memo is adapted from the 2023 Clean Air Task Force paper Climate Change and Economic Development in Africa: A Systematic Review of Energy Transition Research, co-authored by Hub Fellow Moussa Blimpo, Prudence Dato, Brian Mukhaya, and Lily Odarno.

The Context

There is broad consensus that the global economy must transition to net zero emissions in order to avoid the worst impacts of climate change — but the pathway to get there remains both uncertain and hotly contested. This is especially true for lower-income countries where endemic poverty makes economic growth and job creation urgent priorities. But energy transition projections for Africa rarely consider these economic goals, leading to modeled scenarios that are inconsistent with the continent's aspirations and the energy infrastructure it needs.

The Research

Our report analyzed the state of knowledge on energy transition modeling in Africa, with the central goal of assessing the extent to which it considers development. Over 150 peer-reviewed research papers published between 2000-2021 met our inclusion criteria, including (a) being model-based or scenario-based, (b) being concerned with the energy transition, and (c) covering part or all of Africa.

Key Findings

- **Development objectives are rarely considered.** Only 6% of research papers included economic growth and poverty metrics as outcomes of interest. (Figure 1).
- **The cost of the transition is rarely discussed.** Integrating large shares of renewables into the grid comes with significant system costs (beyond the costs of the technology itself). But only 4% of papers considered these transition costs.
- **Even the papers that considered development included only modest electricity consumption and economic growth projections.** The highest per capita electricity consumption projection for sub-Saharan Africa in 2050 is 1500 kWh, less than half the global average in 2017, and even significantly below the average in middle-income countries (Figure 2). These consumption outcomes seem to be based on the assumption that Africa's historically low economic development and electricity demand will not change much in the future. Some scenarios use Tier 2 of the World Bank's Multi-Tier Framework as an electricity consumption target, corresponding to

just 73 kWh per household. This enables people to use only low-load power appliances such as lights, a television, or a fan — and only assumes power is available for at least four hours per day. This is less than the average American or European uses in a week, completely insufficient to power economies or to achieve the living conditions that Africans aspire to.

FIGURE 1

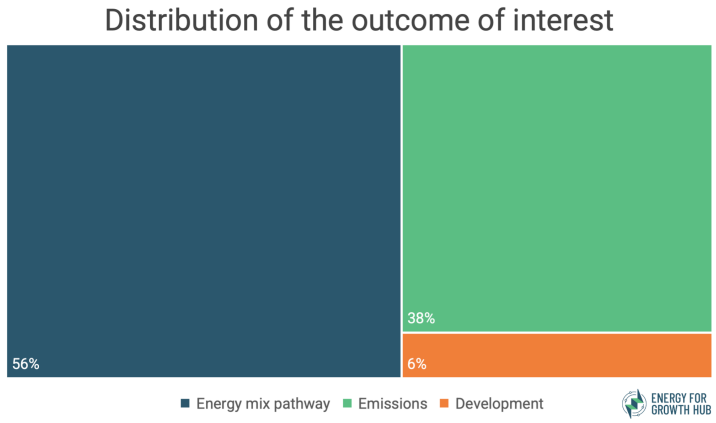
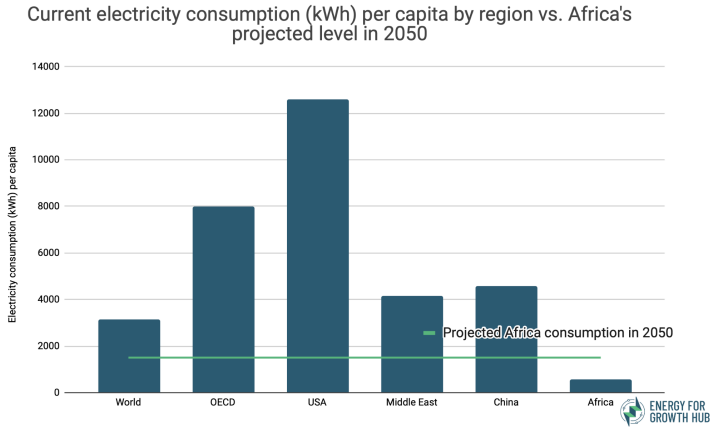


FIGURE 2

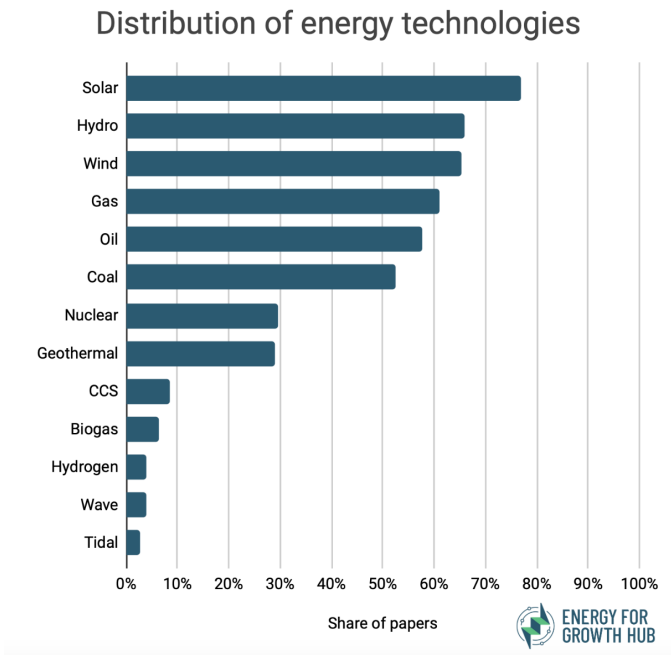


Why This Matters

- **Unambitious development parameters may result in inappropriate energy mix targets.** Because these modeling efforts typically include modest projections for economic growth (resulting in low projected power demand) and prioritize achieving net-zero emissions, they often suggest energy technology mixes that predominantly feature solar and wind to the exclusion of other technologies that might be needed in a higher-energy future. Various policy reports, including those from the International Renewable Energy Agency (2022), International Energy Agency (2022), and Skea et al. (2022) have highlighted that globally, energy technologies including nuclear, hydrogen, and fossil fuel sources equipped with carbon capture and storage will play vital roles in the low-carbon transition. But these technologies are least often considered in analyses of Africa's energy transition. (Figure 3).

- **In Africa, rapid economic development is the best response to climate change.** Climate change is already here, and its near- and medium-term impacts may be inevitable. For African countries, rapid development is the best response to climate change for at least three reasons. First, effective climate mitigation policies will require significant popular support, which is unlikely to happen with high unemployment and economic hardship. Second, deploying clean technologies at large scales will be crucial for getting to net zero emissions. Poor economies with weak energy systems cannot integrate large amounts of renewable power. Only a richer Africa will be able to adopt the variety of advanced technologies it needs. Third, the technologies that help make people resilient to climate impacts (including air conditioning, irrigation, and infrastructure) all require a productive economy and increased energy use.

FIGURE 3



Note: (i) Hydro: Among papers that consider hydro, 45% do not specify the types of hydro, while 55% differentiate the hydro energy technologies (with 46%, 39%, 19%, and 2% considering small hydro, large hydro, pumped hydro, and hydro import, respectively); (ii) CCS: None of the papers consider carbon utilization.

Recommendations

These findings should inform future energy modeling research and guide policy development in the short- and medium-term.

- **Decarbonization scenarios should emphasize development.** All net zero modeling of African energy systems should include scenarios consistent with the country's development goals. Energy transition research in lower-income economies — particularly in Africa — should also include more collaboration with development economists.

- **Decarbonization scenarios should be explicit about cost.** Scenarios should include more detailed discussion of the costs associated with specific transition paths.
- **Scenarios should be context-specific.** Country-specific (or otherwise context-specific) modeling will ensure that the energy transition is not a binding constraint to economic development.
- **Funders should support African research.** African governments and international partners committed to tackling both climate and development imperatives should support local (Africa-based) energy systems researchers and develop local capacity to inform and further enrich this space.