ACHIEVING SUSTAINABLE DEVELOPMENT GOALS IN NIGERIA'S POWER SECTOR: ASSESSMENT OF TRANSITION PATHWAYS TO EXPAND CAPACITY WHILE MEETING CLIMATE TARGETS

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Overview

One hundred million Nigerians, representing 60% of the country's population, have no access to grid electricity. It is estimated that 80% of those with grid access also use diesel- and petrol-based generators as an alternative to the unreliable grid supply. Nigeria's insufficient generation and transmission capacity and the high costs of self-generating power affect all aspects of the economy, from rural livelihoods to manufacturing and exports. Many parties are vigorously working on triggering a transformation in Nigeria's power sector that will achieve the 30-30-30 targets (30 GW of installed on-grid capacity by 2030, of which 30% of generation from grid-connected renewable energy) and the goal of universal electrification by 2040, chiefly via decentralised renewable energy solutions. Moreover, as part of its INDC (Intended Nationally Determined Contribution), Nigeria has pledged an 20% unconditional reduction on its Business as Usual (BAU) greenhouse gas emissions (GHG) by 2030, as well as a 45% conditional reduction. A considerable share of these reductions is foreseen to take place in the power sector.

Methods

With the help of the LEAP (Long-range Energy Alternatives Planning System) simulation and optimisation tool, this paper will assess the techno-economic feasibility of different pathways for capacity expansion and development of the generation mix, in terms of their effect on Nigeria's sustainable development and decarbonisation targets. LEAP, a software tool for energy policy analysis and climate change mitigation assessment, was used to inform Nigeria's INDC in 2015, as well as the (I)NDCs of over 40 other countries, especially in the developing world.

The paper will present a series of broad, transparent, and economy-wide scenarios for the Nigerian power sector up to 2040, the pathways that would lead to them, and a discussion of their implications and critical uncertainties. The build up of these quantitative scenarios will rely on a deep understanding of the realities of the sector.

Results

The results will be presented in the full conference paper. The outputs of the analysis will include:

- Business as Usual (BAU) scenario for capacity expansion and power mix.
- Optimal (least-cost, in terms of annual investment) scenario that meets policy goals (chiefly energy access and emission reductions) by 2030 versus BAU.
- Intermediate scenarios and/or sensitivity analysis over key variables (e.g. macro-economic assumptions, price of carbon, learning rates), to illustrate the impacts and trade-offs of different policy choices.
- Storylines that summarize the various quantitative 'futures' as qualitative narratives.

Conclusions

If Nigeria's power sector transition is delayed, population growth will overshadow the impact of policies, and power scarcity and energy poverty will rise rather than shrink by 2030. The achievement of related visions for the future (climate pledges, SDGs) will also be at risk. This paper will provide a foundation for an overarching roadmap that can accompany the energy transition towards the 2030 and 2040 visions for the power sector. Such a roadmap would guide decisions on, for example, what generation mix is most feasible and desirable, considering in particular the integration of large shares of variable renewable energy sources. It will moreover contribute to the emerging field of energy transition analysis in developing countries.