

ENERGY POLICY REFORMS IN SOUTH AFRICA: DIFFICULT DECISIONS IN THE TRANSFORMATION PROCESS AHEAD

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Overview

The Republic of South Africa is an important player in regional but also in global energy and climate policies and it is currently facing several strategic decisions with respect to its transformation process. Traditionally, South Africa's energy system was based on coal, which has contributed to 80% to total primary energy production, and 94% to electricity generation, respectively, in 2014 (IEA 2016). The construction of two new large-scale coal power plants, currently underway in the North of the country (Medupi and Kusile), of 10 GW of capacity indicates that South Africa will continue to rely on coal in the medium-term future. On the other hand, South Africa is currently pondering two important addition of its energy mix, i.e. i/ solar energy and ii/ nuclear power.

i/ Driven by international trends, solar energy has experienced an unprecedented price drop, and now contributes a real alternative for centralized, but also decentral electricity generation. Eberhard and Karberger (2016) estimates that average generation costs are currently in the range of 6-7 US cents /kWh, and falling, which makes them competitive in many locations in the country. South Africa has favorable natural conditions for solar radiation, and some studies estimate that the potential of solar to be as high as 63% of primary energy supply (Altieri et al. 2015). However, the regulatory framework for the solar roll-out has yet to be defined, and critical issues such as financing, distributional consequences, and the necessary infrastructural requirements need to be addressed (Eberhard and Naude 2016).

ii/ On the other hand, South Africa has also launched an important expansion plan for nuclear power, the capacities of which could increase by up to 500%, from currently 1.8 GW to about 10 GW, as stipulated in the expansion plan of the nuclear industry (van Wyk 2013). Traditionally, South Africa has relied on one nuclear power plant, located in Koeberg; in 2016, it supplied 15.2 TWh, corresponding to 7% of electricity generation. However, recently the government is negotiating several new development projects with international technology providers, and donors.

Methods

We carry out a political economy analysis of the main issues regarding the current and the future energy policy of South Africa (Schmalz 2017), and combine this with scenario analysis specific to the situation in South Africa. We also rely on additional quantitative scenario analysis provided by the energy system model GENeSYS-MOD (Löffler et al. 2017), to assess the economic costs of alternative pathways.

Preliminary results

Both the political economy and the scenario analysis are still ongoing, but we have carried out some tentative analysis of different energy policy pathways at the horizon 2030. They indicate that both approaches, the solar and the nuclear one, are capable of reducing the CO₂ emissions of South Africa considerably, but they have different economic and social implications. The solar pathway can contribute to decentral development, and help not only with energy production but also with improving electricity access of the poor. On the other hand, the nuclear route

requires mainly capital intensive investments, and a very stringent, centralized approach to energy policy. We will provide quantitative and qualitative evidence of both paths in the final version of the paper.

Conclusions

Energy and climate strategies belong to the most sensitive policy issues in South Africa, because they imply not only important economic stakes, but also touch on cross-cutting issues such as distribution between wealthier and less wealthy groups, energy poverty, and the strategic choices about the country's energy backbone, the coal industry. Using a political economy approach with some quantitative analysis, our paper develops strategic scenarios where South Africa's energy and climate policies might be headed, and what political implications on cross-cutting policy targets they imply for the economy as a whole. In addition to the sectoral developments, critical issues of South Africa's future energy and climate policy are distributional impacts, energy poverty, and access; attaining the climate policy goals (INCs as contributions to Paris Agreement) will strongly interfere with the development objectives of the country.

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