Low-carbon energy development scenarios for Africa: Trade of fossil energy carriers
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Abstract

In December 2015 the 196 participating at the COP21 meeting in Paris agreed to try to limit the global average temperature increase to 1.5 or 2.0Â°C.[1] As the rise in temperature already reached 1.13 Â°C this ambitious goal puts pressure on them to set more ambitious climate policy goals and a framework to lower emissions of greenhouse gases.[2] Beforehand they decided at COP19 to hand in intended nationally determined contributions (INDC) in which they suggest how much and by which means they seek to reduce their GHG emissions.[3]

Africa is among those regions which will face more than doubling of population by 2050 and an increase in wealth.[4][6] Both will increase energy consumption and thus require new energy production capacities to serve these needs. In order to find options to reach climate goals, various models are available to simulate the development of the energy market.[7] Various reports such as the IPPC annual report or the IEA world energy outlook are based on models as they provide a tool to evaluate different mitigation options.[8] Main goal of this literature study is to give an overview on the trade potentials off all main fossil energy carriers - natural gas, oil and coal for the 17 African sub-regions in TIAM-ECN. This includes capacities available today, planned extensions in the near future and projections of possible developments till 2050.

The model used for the project is TIAM-ECN, which is going to be adapted for performance on the African continent and has been used for several other tasks before. [9][12] The research is part of the three-year Project EU-Horizon2020 â€“ Transitions pathways and risk analysis for climate change mitigation and adaptation strategies (TRANSrisk) which is done in collaboration with 12 research institutes under the head of the University of Sussex. The project explores different pathways for transitions towards lower emissions and aims to analyse the associated risks, uncertainties, costs and also benefits. The idea is to identify low emission transition pathways which are technically and economically feasible and acceptable from a social an environmental viewpoint.

To evaluate these potentials, a focus was put on different modes utilized to transport fossil energy carriers. Not only traditional options, such as harbours and pipelines, but also new technologies such as floating terminals and production facilities were examined. In addition, countries with special situations are explained in detail. These include offshore gas discoveries in Egypt and Mozambique, as well as Botswanaâ€™s attempts to exploit its domestic coal reserves but also problems Nigeria or Libya face with attacks on their infrastructure from rebels or terrorists.