



An optimal renewable energy mix for Indonesia

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Indonesia has experienced a constant increase of the use of petroleum and coal in the power sector, while the share of renewable sources has remained stable at 6% of the total energy production during the last decade. As its domestic energy demand undeniably continues to grow, Indonesia is committed to increase the production of renewable energy. Mainly to decrease its dependency on fossil fuel-based resources, and to decrease the anthropogenic emissions, the government of Indonesia has established a 23 percent target for renewable energy by 2025, along with a 100 percent electrification target by 2020 (the current rate is 80.4 percent). In that respect, Indonesia has abundant resources to meet these targets, but there is - inter alia - a lack of proper integrated planning, regulatory support, investment, distribution in remote areas of the Archipelago, and missing data to back the planning.

To support the government of Indonesia in its sustainable energy system planning, a geographic explicit energy modeling approach is applied. This approach is based on the energy systems optimization model BeWhere, which identifies the optimal location of energy conversion sites based on the minimization of the costs of the supply chain. The model will incorporate the existing fossil fuel-based infrastructures, and evaluate the optimal costs, potentials and locations for the development of renewable energy technologies (i.e. wind, solar, hydro, biomass and geothermal based technologies), as well as the development of biomass co-firing in existing coal plants. With the help of the model, an optimally adapted renewable energy mix – vis-à-vis the competing fossil fuel based resources and applicable policies in order to promote the development of those renewable energy technologies – will be identified. The development of the optimal renewable energy technologies is carried out with special focus on nature protection and cultural heritage areas, where feedstock (e.g., biomass harvesting) and green-field power plant sites will be limited – depending on the protection type and renewable energy technology.

The results of the study provide indications to the policy makers on where, how and which technologies should be implemented, and what kind of policy support would be needed in order to increase and meet the Indonesian renewable energy target and to increase the energy access for all.