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Sustainable Power Generation Pathways in Malaysia: Development of Long-range Scenarios

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Abstract

Power generation in Malaysia significantly depends on three major fossil fuel sources such as coal, natural gas and fuel oil. Burning of these fossil fuels causes huge environmental challenges through greenhouse gases (GHG) emissions. At the same time, the usage of fossil fuels for power generation also severely affects the fossil fuel reserves as they deplete at a fast pace. In the current consumption trends, the reserve for natural gas is to be completely diminished by 41 years whereby crude oil by 29 years. As Malaysia is set to be a high-income nation by 2020, electricity demand would increase furthermore. In this perspective, Malaysia is looking for alternative fuels for electricity generation to deal with the challenges and leading to a sustainable power generation sector. Malaysia is endowed with a huge amount of renewable energy resources and these could be the potential alternative fuels for power generation. Application of renewable resources also results in several technical, financial and policy implications. Scenario building can assist policy makers to understand their implications and enable them to enact relevant measures. The purpose of this work is to develop a few power generation scenarios with various fossil and renewable sources for Malaysia. Three alternative scenarios, i.e. Maximum Renewable Energy Scenario, 50% share renewable based power by 2050 and Optimistic Energy Scenario were built based on latest information on renewable energy, energy efficiency technologies and policies. Simulation software called Long-Range Energy Alternative Planning (LEAP) was utilized to projecting those alternative scenarios from 2016 to 2050. This work found that these three alternative scenarios provide sufficient power supply while produce lower emissions and keep higher reserves. Policy makers can gain insights from these alternative scenarios and enact necessary policy measures to counteract the emission and fossil fuel depletion challenges.

Keywords
Sustainable, Electricity generation, Renewable resource, Scenario