

Multicriteria-based Decision Aiding Framework for Assessing Energy Policy towards Sustainable and Low Carbon Energy Paths

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Abstract

The adverse environmental consequences and diminishing trends of fossil fuel reserves make a serious need of vibrant and judicious energy policy for ensuring sustainability in the energy sector. Energy policy involves a number of stakeholders (e.g. investors, consumers, traders, government agencies etc.) and needs to incorporate the interests and requirements of all the key stakeholders' groups. This paper presents a methodological framework for formulating, evaluating, and promoting energy policies of a country in a transparent and representative way with clear scientific justifications and balanced assessments. Multicriteria decision analysis (MCDA) approach has been a widely used technique for evaluating different alternatives based on interest of multitude of stakeholders and goals. The MCDA approach provides decision model, which combines the criteria measurements with decision makers' (DMs) preferences to rank the alternatives based on acceptability. This paper utilizes SMAA (Stochastic Multicriteria Acceptability Analysis) tool, which can evaluate different alternatives by incorporating multiple criteria without requiring any preference information from DMs. We further extend this framework by incorporating LEAP model (Long range Energy Alternatives Planning System) to assess impacts of different policy elements. We demonstrate the application of this framework by an analysis of 4 hypothetical policy elements on a particular aspect (e.g. share of fuel sources for power generation) of Bangladesh's power sector. The illustration shows that REN-b (Renewable-biomass only) policy element is the most preferred alternative based on stakeholders' interests and sustainability criteria. This framework gives transparent procedures for promoting the energy policy that aimed at sustainable and low carbon energy future.