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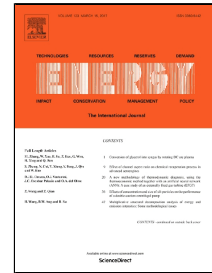
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Prospects of Renewable Energy Sources in India: Prioritization of Alternative Sources in Terms of Energy Index

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Abstract

The growing energy demand in progressing civilization governs the exploitation of various renewable sources over the conventional sources. Wind, Solar, Hydro, Biomass, and waste & Bagasse are the various available renewable sources in India. A reliable nonconventional geothermal source is also available in India but it is restricted to direct heat applications. This study archives the status of renewable alternatives in India. The techno economic factors and environmental aspects associated with each of these alternatives are discussed. This study focusses on prioritizing the renewable sources based on a parameter introduced as Energy Index. This index is evaluated using cumulative scores obtained for each of the alternatives. The cumulative score is obtained by evaluating each alternative over a range of eleven environmental and techno economic criteria following Fuzzy Analytical Hierarchy Process. The eleven criteria's considered in the study are Carbon dioxide emissions (CO₂), Sulphur dioxide emissions (SO₂), Nitrogen oxide emissions (NO_x), Land requirement, Current energy cost, Potential future energy cost, Turnkey investment, Capacity factor, Energy efficiency, Design period and Water consumption. It is concluded from the study that the geothermal source is the most preferable alternative with highest Energy Index. Hydro, Wind, Biomass and Solar sources are subsequently preferred alternatives.

Keywords: *Renewable energy alternatives, Fuzzy Analytical Hierarchy (FAH) process, Energy Index*

Highlights:

- FAH process is used to obtain cumulative score for each renewable alternative.
- Cumulative score is normalized by highest score of ideal source.
- Energy Index shows how best a renewable alternative is.
- Priority order is obtained for alternatives based on Energy Index.
- Geothermal is most preferable source followed by Hydro, Wind, Biomass and Solar.

Nomenclature:

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