Decision-Support Tool: SPRIng MCDA

http://www.springsustainability.org/?page=tools

Summary

SPRIng multi-criteria decision analysis (MCDA) was developed as a decision-support framework for assessing sustainability of nuclear power and other electricity options (wind, gas turbine, coal, solar PV, hydro, wave, oil, biomass, combined heat and power) . The tool is based on two MCDA models: the Fuzzy Analytical Hierarchy Process (Fuzzy AHP) and the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS).

Developer: University of Manchester in collaboration with City and Southampton Universities

Applicable sectors				Function			
All Infrastructure	Water	Energy	Organisations	Design Guide	Option Appraisal	Construction Guide	Op&M Guide

Countries	International
Deployment & developments	The products of the SPRIng project (i.e. SPRIng MCDA, Energy Technologies Lifecycle Assessment (ETLA) Calculator, SPRIng Report) are freely available to the public for non-profit purposes.
Guidelines for sustainable design	The tool does not provide sustainability guidelines for the different electricity generation options. However, it does contain an inbuilt database of indicator values for each option, supporting the analysis. Also, the SPRIng project has produced the SPRIng Report: *Assessing the Sustainability of Nuclear Power in the UK*, which provides guidelines on sustainability considerations (techno-economic, environmental, socio-political and ethical, integrated solutions) for the nuclear power sector.
Use with other tools	The tool is compatible for use with the ETLA calculator which estimates environmental impacts of future UK electricity scenarios up to 2070 [See Calculators section].
Level of support services	SPRIng is a UK research consortium led by academic institutions with partners from industry, government and NGOs. As such, the products of the work (SPRIng MCDA, ETLA Calculator, SPRIng Report) are freely available to the public for non-profit purposes, but are not accompanied by supporting services.
Sustainability criteria	The tool is based on sustainability indicators that are categorised under the four themes of environmental, social, technical and economic. They include indicators such as Capacity Factor, Capital costs, Time to plant start-up from start of construction, Recyclability of input materials, Freshwater eco-toxicity potential, Land occupation, Human health impacts from radiation.
Process summary & Design option appraisal functions	SPRIng MCDA is software-based and can run sustainability assessments based on two different methodologies, Fuzzy AHP and TOPSIS. With Fuzzy AHP, the user can choose to compare up to 5 electricity generation options (e.g. nuclear, wind etc.). The user then chooses up to 10 sustainability indicators that they wish to compare the generation options against. The software contains inbuilt values for each generation option for each indicator. The user has the option to modify these. The user is then prompted to carry out pairwise comparison of the indicators to express which they consider more or less important (a form of weighting). The user is then asked to carry out pairwise comparison of el. generation options against each indicator, indicating which option they think performs better, and with what level of confidence, and what level of optimism. The final results are displayed as a bar chart showing the relative sustainability performance of the different options. The TOPSIS analysis differs from Fuzzy AHP in that the user is asked to specify whether a minimum or maximum value is preferred for each indicator. The result shows the closeness of the compared alternatives to the ideal solution – the higher the value, the more sustainable the option.

Note: "Free to download" does not necessarily imply that it is free for commercial use.

Fee	Free to download.	**Level of materiality (tailoring)**	Materiality occurs through conducting pairwise preference comparison between the different sustainability indicators. The pairwise comparison provides a choice between 9 preference levels, from Absolutely strong preference (of one indicator over the other) to Absolutely weak. Then, Fuzzy AHP is applied to compute from these comparisons a ranking of all indicators according to their importance to the user.

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