

Sustainability Science and the Management of Renewable Energy

Technologies

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Abstract

The emerging field of sustainability science recognises the important role of technologies in reaching the conditional goals of sustainable development. Research in sustainable technologies requires transdisciplinarity to determine the resilience, adaptive capacity, and complexity of social-ecological systems to assess the potential of such technologies for increasing the carrying capacity and improve the resilience of social-ecological systems. The paper provides an overview of the field of technology management as it relates to sustainability science in general and then addresses the primary objective of the conducted research, which was to introduce a model for prioritisation of assessable sustainability performance indicators to manage renewable energy technologies. The model is based on the Kolb learning cycle, and thereby acknowledges the vital need for continual interaction between different entities and components of typical social-ecological systems, where specific technologies are to be introduced, to understand the key interactions within the sub-systems, also termed holons, that need to be assessed. The model is demonstrated with a case study in a rural village of South Africa, where an integrated renewable energy technological system was implemented. The application of the prioritised indicators is compared with the perceived overall performance of the technological system. The study confirms that much research is still required to assess the true sustainability of introduced technological systems. Recommendations are made accordingly.