

1. Introduction

Japan faces significant challenges in balancing energy security, economic growth, and environmental sustainability. The country's vulnerability to natural disasters, reliance on imported energy, and commitment to international climate agreements necessitate robust and adaptive energy policies (Moinuddin & Kuriyama 2019). In this context, scenario analysis has become an essential tool for energy and climate policymaking in Japan and beyond (Volkery & Ribeiro 2009; Lecocq et al. 2022). For example, scenario inputs into the formulation of the Strategic Energy Plans have been pivotal in shaping Japan's energy strategy. They provide a framework for evaluating different energy futures, including variations in nuclear energy reliance, renewable energy adoption, and carbon emission targets. Despite their importance, the use of scenario analysis in Japan has not been thoroughly examined. Here we critically review the use of scenarios in energy and climate policymaking.

2. Methods

This evaluation is based on a comprehensive literature review, encompassing a wide range of sources including academic journals, government reports, and policy documents. In addition to a broad-based review, we have selected three cases for detailed examination: the mid-term target committee (Fukui 2009), the 2012 deliberative polling procedures on energy and environmental options, and the discussion leading up to the 6th Strategic Energy Plan (2021).

3. Initial Results

The literature review reveals that scenario planning has played a crucial role in Japan's energy and climate policymaking. Scenarios have enabled policymakers to explore various energy mixes, assess the implications of different technological advancements, and evaluate the impacts of international climate commitments.

Key findings indicate that scenario analysis has been effective in:

- Providing a structured framework for addressing uncertainties and facilitating long-term strategic planning.

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- Guiding investments in renewable energy, energy efficiency, and emerging technologies.

However, the review also identifies challenges, such as:

- The need for more dynamic and adaptive scenarios that can respond to rapid technological changes and unexpected events.
- Insufficient consideration of ethical, legal, and societal implications or justic aspects of different energy and climate futures.
- A gap in communicating the scenarios' assumptions and limitations to the public and stakeholder engagement.

4. Conclusions

The evaluation underscores the significant benefits of using scenarios in Japan's energy and climate policymaking, particularly in enhancing strategic planning and stakeholder collaboration. However, there is room for improvement in making these scenarios more adaptive and effectively integrated into policy actions and more reflective of ELSI considerations. Future efforts should focus on developing more flexible scenario frameworks, improving transparency in scenario communication, and ensuring that scenario outcomes translate into tangible policy measures. By addressing these areas, Japan can strengthen its capacity to navigate the complexities of energy and climate challenges.

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