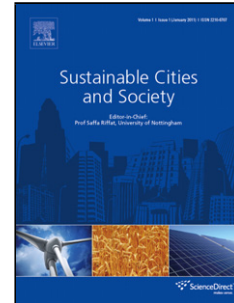


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Authors: Younes Noorollahi, Ryuichi Itoi, Hossein Yousefi, Mohammad Mohammadi, Ali Farhadi



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Modeling for Diversifying Electricity Supply by Maximizing Renewable Energy Use in Ebino City Southern Japan

Younes Noorollahi^{1*}, Ryuichi Itoi², Hossein Yousefi¹, Mohammad Mohammadi¹, Ali Farhadi,

¹ Department of Renewable Energies and Environment Eng., Faculty of New Sciences and Technologies, University of Tehran

Corresponding author e-mail: Younes@kyudai.jp

² Dep. of Energy Resources Eng., Faculty of Engineering, Kyushu University, Fukuoka, Japan

Highlights

- Higher renewable energies share provides reliable power supplies, and enhances energy security.
- Energy demand for Ebino city in south Kyushu is analyzed and forecasted for future years up to 2020
- Six different energy mixed scenarios are defined and computed.
- By applying best scenario, renewable energy share increases from 10 % in 2010 to 54.2 % in target year 2020

Abstract

Energy modeling is the forecasting and projecting of the energy supply and demand for the future. Models focus on predicting energy production, consumption, and costs for various energy resources. Particularly in developing a renewable energy resource based transition model is a critical task because of many uncertainties on computing of renewable resources. After Fukushima disaster and forced an energy system change in Japan by shutting down almost all nuclear power plants the electricity supply and CO₂ emission have to be managed by specific energy planning and transition to maximize renewable energy resources which are an important decision. The aim of this paper is to model the energy supply and demand in Ebino city south Kyushu, Japan. The maximum renewable energy supply and electricity demand of Ebino city are analyzed. Electricity demand of the city in 2014 was 162 GWh/year and CO₂ emission from electricity production was 84570 tons/year. Six different scenarios with a different share of renewable energies are proposed and modeled. Results show that by applying scenarios 5 and 6 renewable energy's share increased from 10 % in 2010 to 37.3% for scenario 5 and 54.2 % for scenario 6 in 2020 as a target year. Also in scenario 6 by running 20 MW of the wind and solar power plants in 2016 extra electricity can be transferred to the utility grid by 11.9, 13.6, and 14.8 GWh/year in 2016, 2018, and 2020 respectively.

Keywords: *Energy modeling, renewable energy resources (RER), sustainable city, Ebino, Japan*

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