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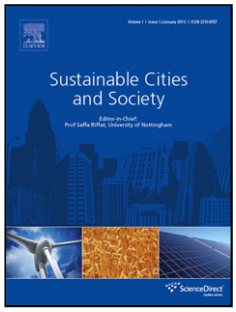

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ACCEPTED MANUSCRIPT

The impact of spatial population distribution patterns on CO_2 emissions and infrastructure costs in a small Japanese town

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Highlights

- 56 different patterns of scenarios are designed by using six parameters.
- All scenarios are evaluated from both viewpoints of CO_2 emissions and infrastructure cost.
- Compaction has a reductive effect on CO_2 emissions and infrastructure costs.
- Critical factors for CO_2 emission and infrastructure cost are population balance, population density and location of compact district.

Abstract

Recent years have seen a decrease in the population of Japan. If urban areas continue to expand to the suburbs with this depopulation, various urban problems will arise including increase in energy consumption and the cost of developing and maintaining infrastructure due to high dependence on car use in daily life and inefficient development and maintenance of urban infrastructure. To address this, a compact urban structure is proposed corresponding to the decreasing population especially in provincial small towns. However, it is not clear where denser urban areas are expected and how much of the population will remain located there. Consequently, this study aims to examine a preferable future population distribution pattern from the viewpoint of CO_2 emissions and infrastructure costs in Fuchu City, Hiroshima Prefecture, a provincial small town. This study quantitatively assesses the reductive effect of such a population compaction on CO_2 emissions and infrastructure costs. Results reveal that creating a compact urban structure will reduce CO_2 emissions and infrastructure costs, and the effects differ widely based on scenarios. Furthermore, the study considers the effects of

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