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Consideration of the Need for Net Zero Villages to Respond to Climate Change

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Abstract

Climate change is a challenge that all humanity must solve, and at the same time, it is a present-day obligation for future generations. To respond to these contemporary challenges, countries around the world are setting goals for Net Zero and promoting various strategies to minimize carbon emissions before 2050. However, detailed implementation plans for this related strategy are insufficient, and implementation plans for Net Zero in major sectors such as energy, transportation, and villages are needed. The purpose of this study is to explore the need for and possibilities for a Net-Zero Village that can lead to Net Zero at the village level. We derived characteristics through analysis of greenhouse gas flows emitted from the village and discussed the possibility of Net Zero based on this.

Key Words: Climate Change; Mitigation and adaptation; Net zero; Villages planning; Greenhouse gas emissions

Introduction

Currently, humanity stands on two paths. One way is to enter the Hothouse Earth region, a stage where the global temperature rises by 4-5°C compared to before industrialization through continuous emission of greenhouse gases, and the other way is to stabilize the climate to a controllable level. He warned that once the hot house Earth stage is entered, it will not be possible to return to the previous state of balance even if various efforts are made on the human level to reduce greenhouse gas emissions. In addition, to prevent entry into the hot house district, it is necessary to drastically reduce greenhouse gas emissions, plant plants that can absorb them, and protect existing forests to balance global energy [1-3]. With the implementation of the Paris Agreement under the Climate Change Agreement, the world is transitioning toward a new direction of 'Net Zero by 2050', a stronger goal than before. Additionally, efforts are being made globally to minimize the increase in global average temperature for human survival. The goal of the Paris Agreement is to keep the increase in global

average temperature below 2°C compared to pre-industrial levels as suggested in the Kyoto Protocol, but it is set to be limited to 1.5°C or less, and each party agrees to actively work toward this goal. This study seeks to discuss the necessity and possibility of the Net Zero Village that can be implemented in human living units for Net Zero.

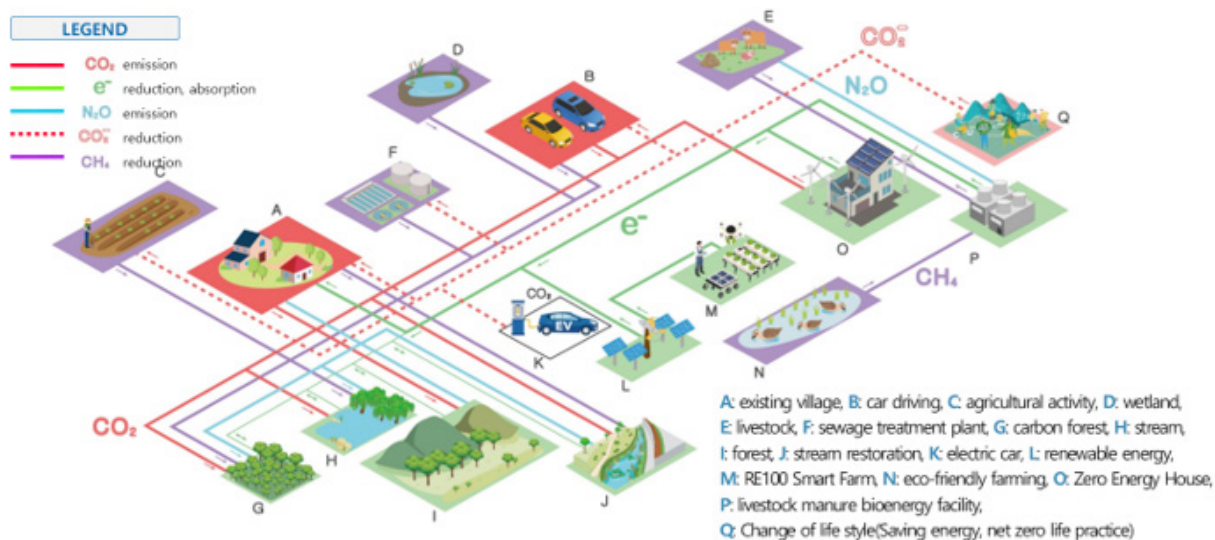
GHG Flows at the Village Level

Greenhouse gases generated at the village level, which are the basics of human life, can be abbreviated as three greenhouse gases, such as CO₂, CH₄, and N₂O, and the flow of emissions, absorptions, and reductions is shown in a schematic diagram as shown in Figure 1 [4]. The red solid line is the path of CO₂ generated within the village and is generated from homes and road transportation, and the red dotted line shows the flow in terms of lifestyle conversion that can minimize CO₂ emissions from homes and road transportation. As the proportion of eco-friendly cars used at home increases, CO₂ and N₂O emissions generated from fuel combustion when driving can be reduced, and the use of eco-friendly fertilizers when cultivating



rice has the effect of reducing N_2O emissions. In addition, artificial efforts to improve lifestyles related to energy generation within the

home have a reduction effect compared to existing greenhouse gas emissions, so this is denoted as 'CO₂-'.



* **Source:** By referring to Davis et al.(2020), the author rewrites the village-level mechanism.

Figure 1: NZV GHG schematic flow chart.

The purple solid line shows the flow of CH₄ generated in the village, which is emitted through fertilizers used during agricultural activities. Even in sewage treatment plants that treat sewage and sewage generated within homes, CH₄ is emitted into the air according to the water purification mechanism. Since the RE100 smart farm is a concept that produces its energy, it was assumed that greenhouse gases were not emitted or absorbed. The green solid line indicates energy production, which is generated through renewable energy such as solar energy, and in the case of livestock waste energy facilities, energy is generated through hydrogen energy production using livestock waste generated within the village. In addition, green infrastructure such as forests, wetlands, carbon forests, and rivers are expressed with a thin green solid line as they absorb greenhouse gases.

Conclusion

Based on the greenhouse gas emission flow occurring in these villages, it can be judged that carbon mitigation and adaptation will be possible directly and indirectly when creating the Net Zero Village. Additionally, a significant result of this study is that it can contribute to Net Zero through a change in human lifestyle for Net

Zero. In addition, it can provide basic data for research on village-level planning elements that can contribute to Net Zero.

Acknowledgments

None.

Conflicts of Interest

The author declares no conflict of interest.

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