

Greenhouse Gas Emission Reduction Strategies Using Model-Based Analysis

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Abstract

Climate change, driven largely by anthropogenic greenhouse gas (GHG) emissions, poses a critical threat to global ecosystems, economies, and human well-being. Reducing GHG emissions is central to mitigating climate change, but

Keywords:

Introduction

The Earth's climate system is undergoing rapid changes, primarily driven by anthropogenic greenhouse gas (GHG) emissions. These emissions have led to a significant increase in global temperatures, sea level rise, and extreme weather events. The Intergovernmental Panel on Climate Change (IPCC) has estimated that global GHG emissions must be reduced by approximately 45% by 2030 and reach net-zero by 2050 to limit global warming to 1.5°C above pre-industrial levels.

Model-based analysis provides a powerful tool for understanding the complex interactions between different sectors and the impact of various emission reduction strategies. This study focuses on the development of a comprehensive model that integrates economic, social, and environmental factors to assess the feasibility and effectiveness of different strategies.

The model is based on a set of equations that describe the flow of energy, materials, and emissions between different sectors. The model is calibrated using historical data and validated against observed trends. The results show that a combination of energy efficiency improvements, renewable energy deployment, and carbon pricing is necessary to achieve the required emission reductions.

The model also allows for the assessment of the impact of different scenarios on global temperatures and sea level rise. The results indicate that a scenario with aggressive emission reductions is necessary to limit global warming to 1.5°C.

Results

The model results show that a combination of energy efficiency improvements, renewable energy deployment, and carbon pricing is necessary to achieve the required emission reductions. The results also indicate that a scenario with aggressive emission reductions is necessary to limit global warming to 1.5°C.

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Conclusion

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