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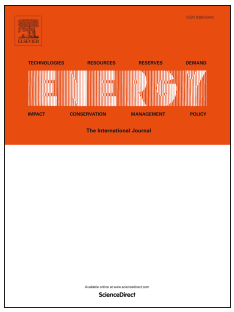

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ACCEPTED MANUSCRIPT

Comparing projections of industrial energy demand and greenhouse gas emissions in long-term energy models.

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Abstract

The industry sector is a major energy consumer and GHG emitter. Effective climate change mitigation strategies will require a significant reduction of industrial emissions. To better understand the variations in the projected industrial pathways for both baseline and mitigation scenarios, we compare key input and structure assumptions used in energy-models in relation to the modelled sectors' mitigation potential. It is shown that although all models show similar trends in a baseline scenario where industrial energy demand increases steadily in the short-term, after 2050, energy demand spans a wide range across the models (between 203-451 EJ/yr). In Non-OECD countries, the sectors energy intensity is projected to decline relatively rapidly but in the 2010-2050 period this is offset by economic growth.

The ability to switch to alternative fuels to mitigate GHG emissions differs across models with technologically detailed models being less flexible in switching from fossil fuels to electricity. This highlights the importance of understanding economy-wide mitigation responses and costs and is therefore an area for improvements. By looking at the cement sector in more detail, we show that analyzing each industrial sub-sector separately can improve the interpretation and accuracy of outcomes, and provide insights in the feasibility of GHG abatement.

Keywords

Industry, model comparison, integrated assessment models, energy efficiency, energy models, climate change mitigation

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