

## Evaluating future land-use change scenario in the negative fossil fuel emissions

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Bioenergy with Carbon Capture and Storage (BECCS) is a key component of mitigation strategies in the future socio-economic scenarios to keep mean global temperature rise below 2 degree Celsius above pre-industrial, which would require net negative fossil fuel emission in the end of 21st century. Large scale BECCS requires additional production of biofuels, which could potentially cause substantial emissions from the land-use change. Developing sustainable low carbon scenarios require careful consideration of the land-use implications involving large scale BECCS. I use a global terrestrial biogeochemical cycle model and a global crop model to evaluate effects of land-use change in RCP2.6, which is a scenario with net negative fossil emission aiming to keep the 2 degree Celsius temperature target for upcoming Intergovernmental Panel on Climate Change Fifth Assessment Report. Our analysis reveals that first generation bioenergy crop production would not be sufficient to achieve the required BECCS of RCP2.6 scenario even when I consider the higher fertilizer and irrigation use cases. It requires more than doubling the area for bioenergy crops around 2050 assumed in RCP2.6, however, such scenarios implicitly induce large scale land-use changes that emit significant amount of carbon from deforestation. Otherwise land use conflict with food production is inevitable.

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