

**PREFERRED MODE
OF PRESENTATION:**

Oral Poster

PREFERRED SESSION:

Modelling Policy Incentives BECCS
 Weathering Forest Agriculture Soil/Biochar
 Air capture Other:

**THE POTENTIAL AND LIMITATIONS OF NEGATIVE EMISSIONS
TECHNOLOGIES AT A SMALL NATION SCALE**

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ABSTRACT

Removal of carbon from the atmosphere through negative emission technologies (NETs) may have the potential to contribute significantly towards achieving the Paris Agreement temperature goals. NETs is a rapidly expanding, diverse research area most often reviewed on large spatial scales. We selectively apply the research to the unique policy landscape of Ireland, a small, developed island nation in the EU. This work provides a model for facilitating a geographically explicit and policy relevant discussion on the potential role of NETs in climate mitigation at nation state level. We provide an overview of the global NETs research relevant to Ireland, a discussion of the general and nation specific policy barriers to NETs deployment and apply a model to estimate the potential national capacity of NETs.

Many aspects of the extensive international and general literature on NETs are directly transferable to the Irish context. We highlight and summarise policy relevant considerations under the categories of relative carbon removal capacity, readiness, cost, vulnerability to re-release of captured carbon, vulnerability to future climate change, biodiversity risk, energy penalty and land pressure of various NET options.

At a national level, additional considerations are identified in Ireland's current policy landscape and national research. Examples of limitations imposed by policies include land area conversion limits from the current EU Common Agricultural Policy and a previous, failed incentive scheme for bioenergy crop deployment that undermined farmer confidence. Future national research priorities were identified, particularly in relation to soil carbon saturation deficits, bioenergy productivity, geological carbon storage potential, and emission pathway and carbon budget modelling.

The indigenous NETs carbon removal capacity of Ireland is estimated using a model constrained by land area. Under relatively conservative land area availability we find there is significant carbon removal potential across a number of NET options. The highest potential cumulative national capacities are from bioenergy with carbon capture and storage (BECCS) and direct air carbon capture and storage (DACCS), neither of which are currently deployment-ready. Lower potential cumulative capacities were found for NETs that are deployment-ready: afforestation, biochar, and organic soil carbon management. These could provide immediate but saturation-limited and non-permanent carbon removal and storage. While NETs deployment has potential to moderate nett emissions somewhat in the future, this potential currently remains speculative and uncertain. Hence, to meet stringent emission targets, national mitigation policy needs to prioritise rapid, near-term emissions reductions.

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