

# The Potential and Limitations of Negative Emissions Technologies at a Small Nation Scale

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## Outline

Potential role of NETs in climate mitigation at nation state level based on available literature:

- Overview of the global NETs research relevant to Ireland: qualitative evaluation of opportunities and barriers
- Applying a quantitative model to estimate the *technical* potential for NETs in Ireland

## Qualitative Assessment of NETs suitability for Ireland

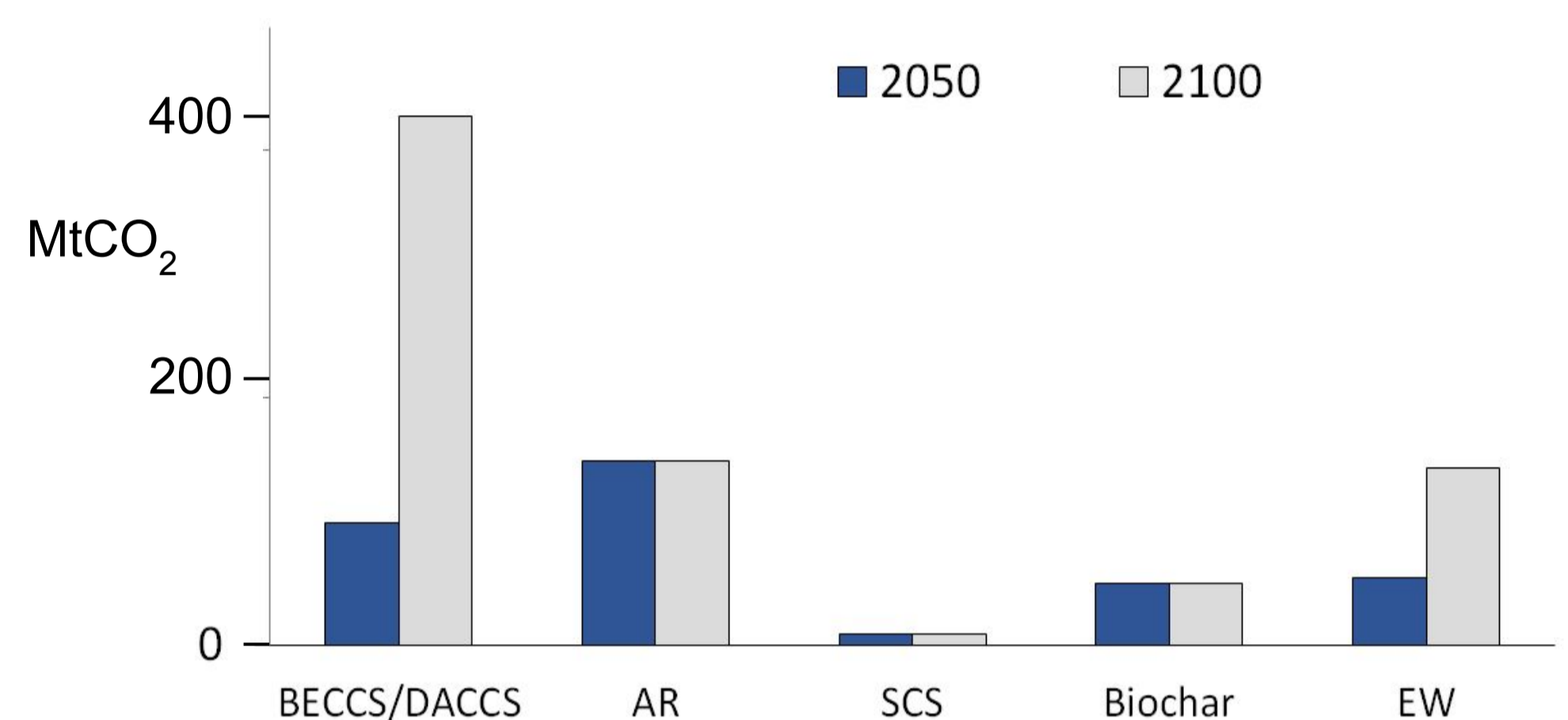
Ideal would be an all-green column

In fact: *all* candidate NETs involve difficult tradeoffs  
 (\* denotes high assessment uncertainty)

	SCS	Biochar	EW	Afforestation	BECCS	DACCS
Carbon removal	Medium *	Medium	Medium	Medium	High	Very High
Readiness	Very High	Very High	Medium	Very High	Medium	Very Low
Cost	Medium *	Medium *	Medium	Low	Medium	Very High
Vulnerability to re-release	High	High	Medium	Medium *	Low	Low
Vulnerability to future climate change	Very High	High	Medium	High	Medium	Very Low
Biodiversity Risk	Low	Low	Medium	High *	High	Low
Energy Penalty	Low	Medium	High	Low *	Very Low *	Very High
Land Pressure	Low	Medium	Low	High	High	Very Low

## Results: Cumulative Technical potential for NETs in Ireland

Methology based on Smith et al (2016)



Reference: Smith et al. 2016. Preliminary assessment of the potential for, and limitations to, terrestrial negative emission technologies in the UK. Environ. Sci.: Processes Impacts, 18(11), pp.1400–1405.

- [2015 nett emissions c. 42 MtCO<sub>2</sub> yr<sup>-1</sup>]
- Highest potential cumulative capacities: BECCS and/or DACCS
- **CCS investment needs to start early**
- Lower/vulnerable capacities for deployment-ready NETs: afforestation, biochar, soil carbon sequestration (SCS)
- **But: to align with Paris goals, overriding priority is rapid, near-term reduction of gross CO<sub>2</sub> emissions**

(First Rule of Holes: “Stop Digging”!)

NETs Class	Limitations/Challenge
Options ready to deploy now (Afforestation, SCS, Biochar)	Land use conflict/constraint Will saturate (c. 20 years?) Impermanent: easily lost
Options without saturation but with strong land use restrictions (BECCS, EW)	Land use conflict/constraint BECCS: CCS storage and infrastructure (No-harvest forest preparatory to BECCS?)
Options without saturation and only weak land use restrictions (DACCS)	DACCS estimated costs (very) high Contingent on CCS infrastructure, storage

**Mitigate NOW to minimize NETs exposure!**