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# Readiness of negative emissions technologies: Public perspectives

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Understanding
Risk

# GGR Technologies and their Readiness Level (TRL)

With some exceptions, generally the high TRL options also have limited longevity

The chart is a work in progress! Comments gratefully received…

Disagreement over the word ‘technology’. Is something a technology if it doesn’t exist yet? How about nature-based solutions?

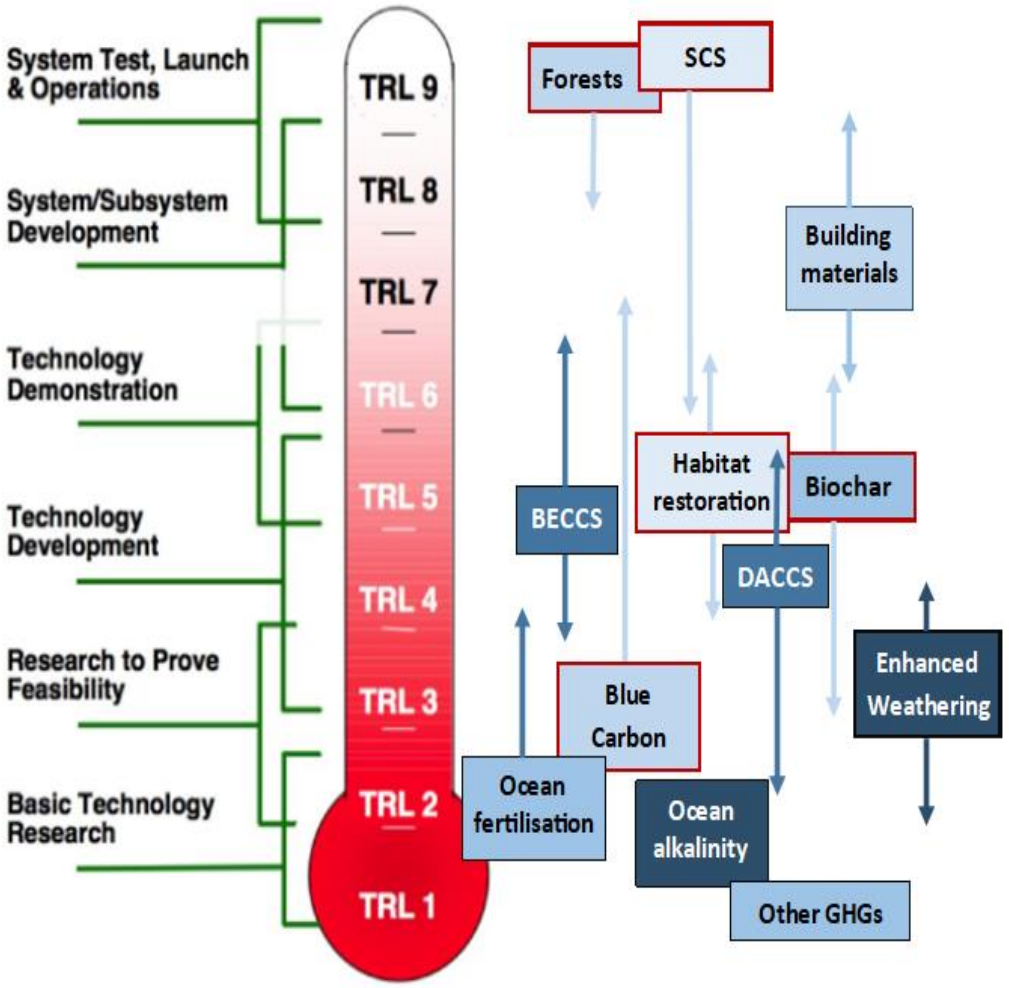



Chart adapted from NASA by E. Cox, showing TRL and longevity of storage for major GGR proposals. Darker blue boxes indicate longer CO2 storage, with shortest duration ~20 years (SCS), and the longest around 100,000 years. A red border indicates sequestration vulnerable to disturbance.

# Publics as a key component

- Publics can be important factors in business models
- Policy mandates: publics often perceived as *barriers.* But they can also be *enablers* of generous policy support

Strong public support for low-carbon energy supported solar subsidies, which led to rapid cost reductions and an exponentially growing market

# Many publics, many forms of demand-pull

- Publics can also be important market actors themselves
- What do we mean by ‘the public’? This terminology is poorly defined
- Our research focuses on ‘lay publics’ or ‘non-experts’. We conducted surveys, focus groups and questionnaires with publics (randomly selected using demographic quotas) in the UK and US
- However, we also spoke to farmers, who are one type of ‘public’. Farmers may be instrumental in determining the demand pull for several types of GGR
- Focused on three GGR techniques: BECCS, Direct Air Capture, and Enhanced Weathering

# Farmers' discourse

*"Got to be economic…" "What's it cost for one option versus the other?"*

*"Culturally, that's familiar to us – the methods that we farm."*

- Professional standing, e.g. sector, may be aligned with perceptions (Allison 1969; Cox 2016)
- Farmers' discourse very different; responding as economic actors
- Emphasised techno-economic considerations; other lay publics emphasised ethics and sustainability
- BECCS preferred: it's familiar, and farmers see a future market for biomass

# Farmers' attitudes

- Greater faith in expertise
- Familiarity was important across the groups; farmers conceptualise familiarity in techno-economic terms, but it's still a risk calculation
- Farmers are strong environmentalists, and there is a growing discourse around regenerative agriculture
- Self-selecting bias

*"I'd have to assume it's somebody who knows more than I do…"*

*"We've got a lot of concern now about how much phosphorous and phosphate we're sending down the Mississippi, now we're going to be adding more? What's this going to do to our environment?"*

*"I mentioned the $CO_2$ and his immediate response was, 'Higher $CO_2$ means better crop yields', then he turned on a table saw or something and was like 'get the hell out'"*

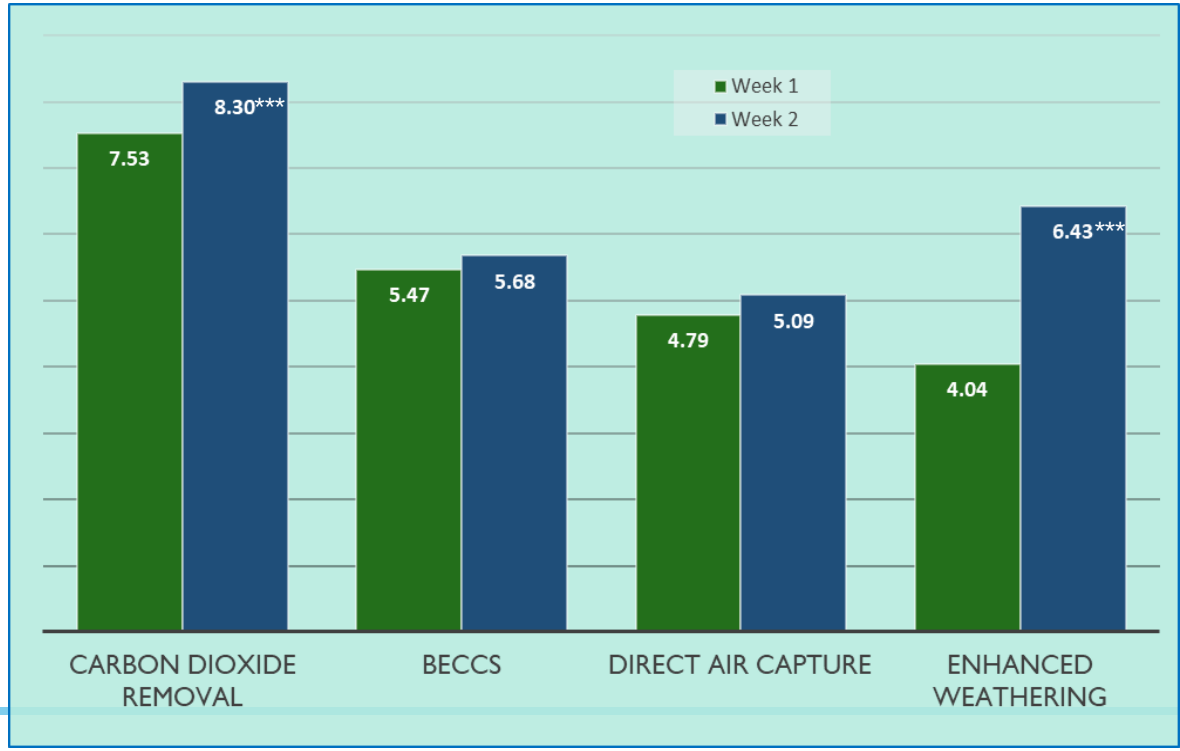
# Attitudes improve over time

- Questionnaire amongst workshop participants at two stages in the workshop; ERW ranked 1 to 10
- Often, further discussion increases negativity, and/or polarises (MacNaghten & Szerszynski 2013; Howell 2018; Thomas et al 2017)
- We found the opposite: attitudes to enhanced weathering improved significantly

*Workshop participants filled out a questionnaire at two stages in the workshop: at the end of week 1 (i.e. halfway through) and at the end of week 2, after the extended discussion about Enhanced Weathering.*

*Graph shows the mean scores, out of 10, for each technology (Cox et al., forthcoming)*

**** p=<0.001*



# Reasons for improvement

- No single determinant
- Possibility of using mine waste instead of virgin rock materials; benefits to crops; pH benefits to watercourses (but only amongst those receptive to expert assurances)
- Seemed more ‘viable’ or ‘feasible’; more info makes it seem more ‘real’? (cf. Bellamy et al 2016)
- Idea that it might already be being done in some way, trust in the actors involved (esp. Universities)

# Conclusions

- Markets for GGR will depend, in part, on publics
- Publics are diverse, and can include important market actors such as farmers
- Farmers, responding as ‘economic’ actors, had a very different discourse from other lay publics
- Accurate CBA and quantification of risks will be crucial. Need targeted research needed on areas of interest to important market actors?
- Cultural familiarity is important; for this reason, biomass-based GGRs are currently preferred by farmers
- Need to make abstract ideas more ‘real’; e.g. scenario exercises, site visits, real-time info, Virtual Reality

# Thank you for listening

Questions and comments please!