Please Note: these slides make reference to work still in progress and under review, as well as to published findings. We encourage readers to check the final published versions of papers cited once they become available.

DELIVERING GREENHOUSE GAS REMOVALS WITHOUT UNDERMINING MITIGATION

A SUMMARY OF FINDINGS FROM THE ASSESSING MITIGATION DETERRENCE EFFECTS OF GREENHOUSE GAS REMOVAL TECHNIQUES (AMDEG) PROJECT

NILS MARKUSSON, REBECCA WILLIS, DUNCAN MCLAREN

ANDREW JARVIS, BRONISLAW SZERSZYNSKI, DAVID TYFIELD

PRESENTED AT 'GREENHOUSE GAS REMOVAL: TARGETS NOT OFFSETS' SEMINAR HOSTED BY THE GREEN ALLIANCE, ST MARTINS, LONDON JANUARY 21ST 2020

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OUTLINE OF PRESENTATION

What is Greenhouse Gas Removal (GGR) and why is it important?

What we mean by mitigation deterrence (MD), with examples of the problem

A historical perspective on MD and climate prevarication

Quantitative estimates of MD effects

Drivers of MD risk, a theoretical understanding

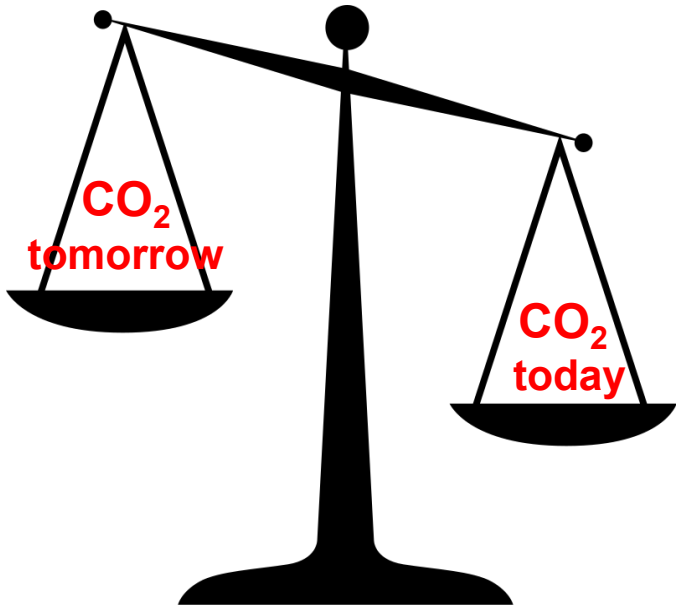
Political scenarios for exploring MD at workshops

But, but, but … common arguments against MD

Deliberative findings on drivers, mechanisms and potential responses

Implications of MD for policy and research

Making better deliberation, lessons from our methods



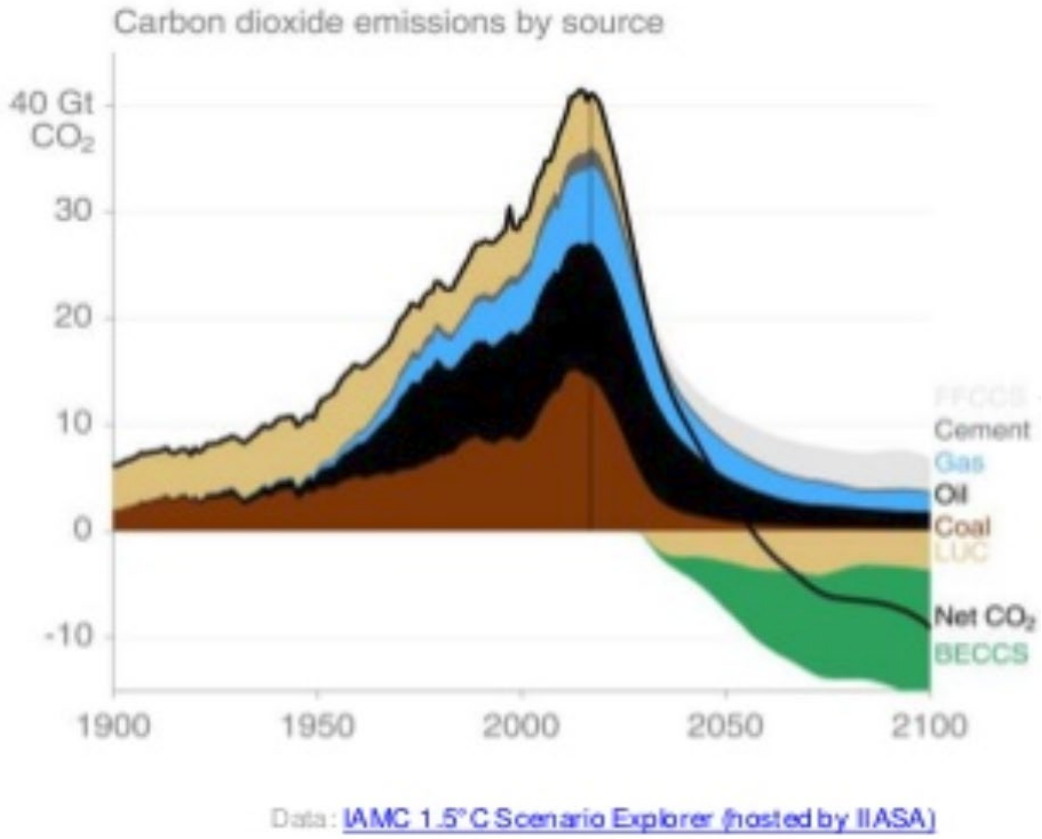
CARBON BUDGETING AND GGR

Safe budget is almost exhausted

Rapid decarbonisation is essential

GGR is almost certainly needed in addition to mitigation

Estimated remaining budget 80-176 Gt-C



INTRODUCING GGR

Definition

Large-scale means to remove greenhouse gases from the atmosphere and sequester the carbon

Cf. CDR, CR, NETs…

Techniques

- BECCS
- Enhanced weathering
- Soil carbon enhancement
- Direct air capture

- GGR as a category in itself




PERVERSE EFFECTS

Climate policies and technologies are not simply additive

They interact economically, politically and culturally – also before deployment

And they do so on a playing field distorted by sceptical vested interests

GGR promises are not only uncertain, they could also trigger unexpected and perverse responses

SEEING THE WOOD FOR THE TREES

- How humble tree-planting risks MD
- Publish claims in a prestigious journal
- Overestimate practical scope and impact, and underestimate cost
- See claims retweeted by public figures
- Largely ignore challenges from other scientists and experts
- Don’t worry as politicians, businesses and publics lap up the idea that cheap forest offsets will solve the problem

‘Falsehood flies, and the Truth comes limping after it; so that when Men come to be undeceiv’d, it is too late’ *(Jonathan Swift, 1710)*

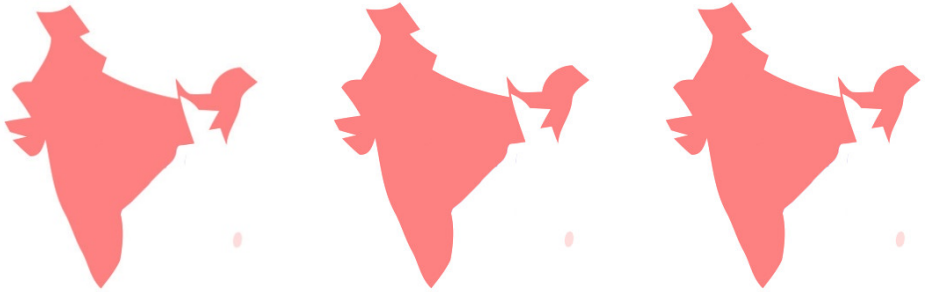
HACKING CLIMATE MODELS WITH BECCS

Models effectively ‘created a technology’ to meet shrinking carbon budgets

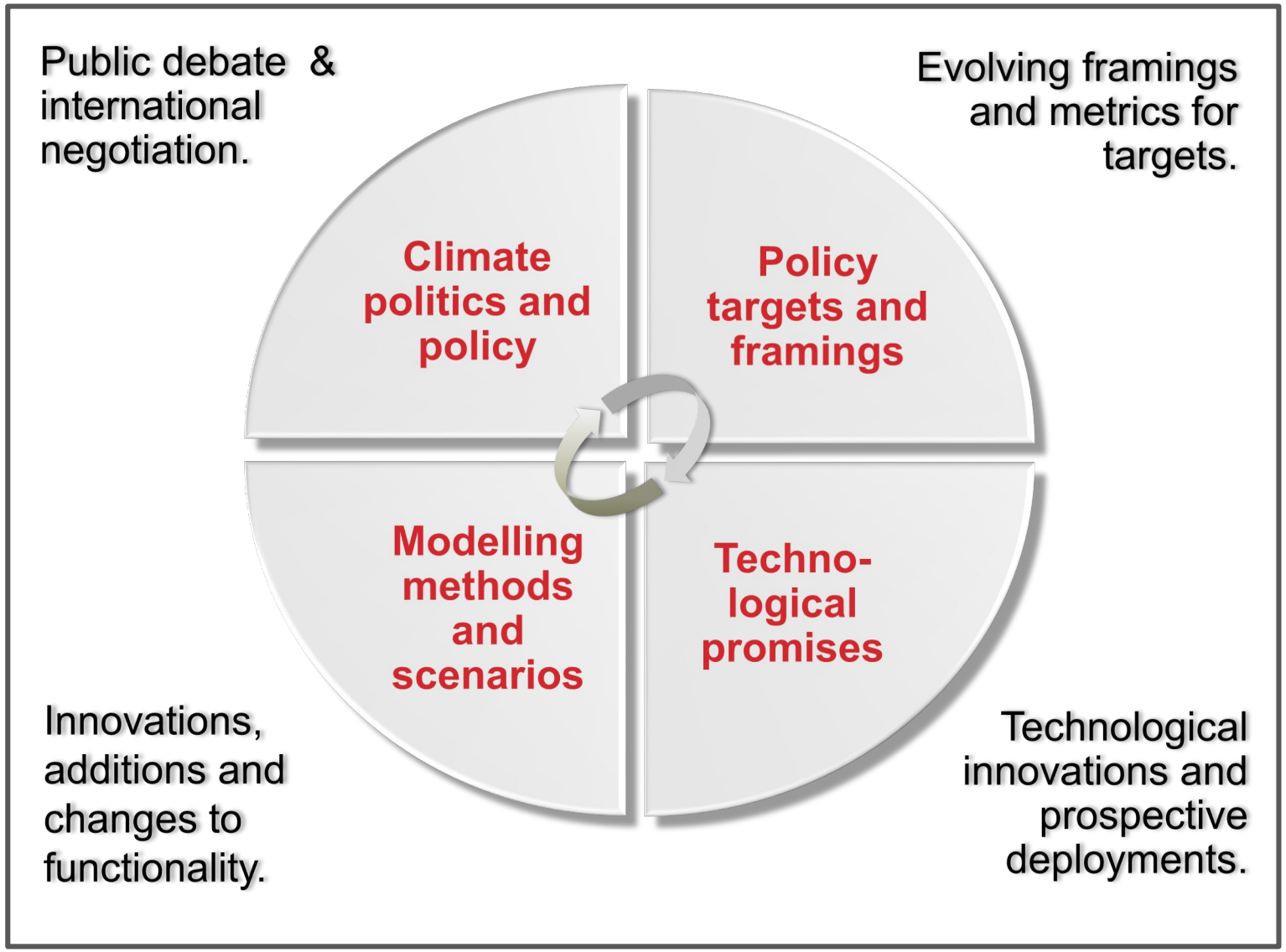
Building on promises of CCS (and capture readiness)

Made 1.5°C seem achievable even with continued procrastination

BECCS ‘deployment’ in models generated serious competition for land, water etc



TECHNOLOGIES OF PREVARICATION



Co-evolution of 4 elements

McLaren & Markusson (submitted)

TECHNOLOGIES OF PREVARICATION

Policy and target framing	Key event	Example of mechanisms and promises
Stabilization	Rio 1992	Early GCMs – broad set of techs
Percentage emissions cuts	Kyoto 1997	Early IAMS, SRES – growth – efficiency, fuel switching and CCS
Atmospheric concentrations	Copenhagen 2009	IAMS & RCPS – cost-optimisation – slow mitigation & BECCS
Cumulative budgets	Durban 2011, Doha 2012	C-budget models and inverted IAMS – GGR to balance residual emissions
Outcome temperatures	Paris 2015	SSPs, linked ESMs – GGR to reverse overshoots, SRM

DEFINING ‘MITIGATION DETERRENCE’

Our working definition

‘the prospect of reduced or delayed emissions reduction resulting from the introduction or consideration of another climate intervention’.

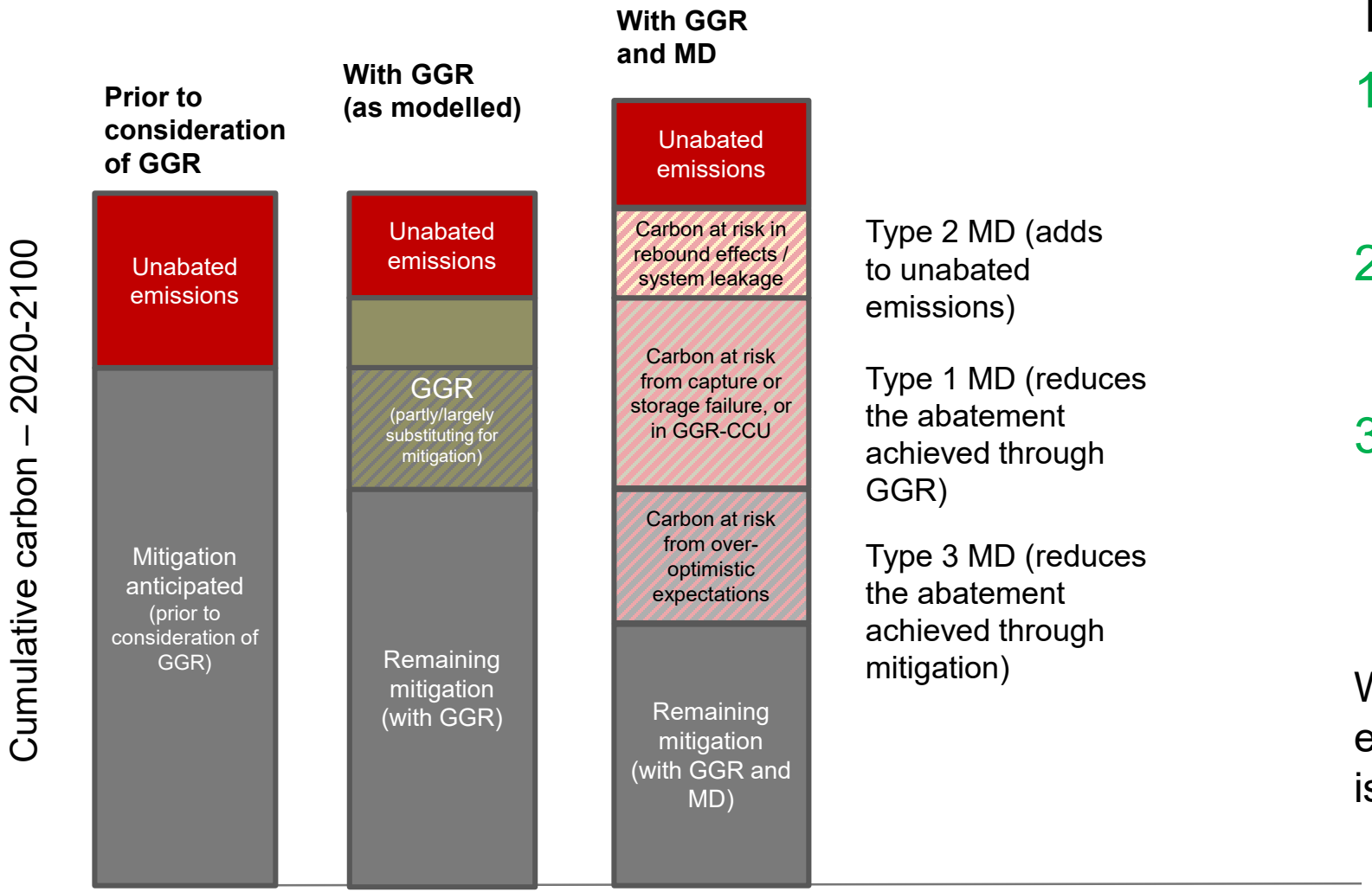
Contrasts with ‘moral hazard’

Single decision maker –> A distributed, collective phenomenon

Intended outcome –> In part emergent

Well known risks/chances –> Under conditions of deep uncertainty

ESTIMATING THE SCALE OF MD



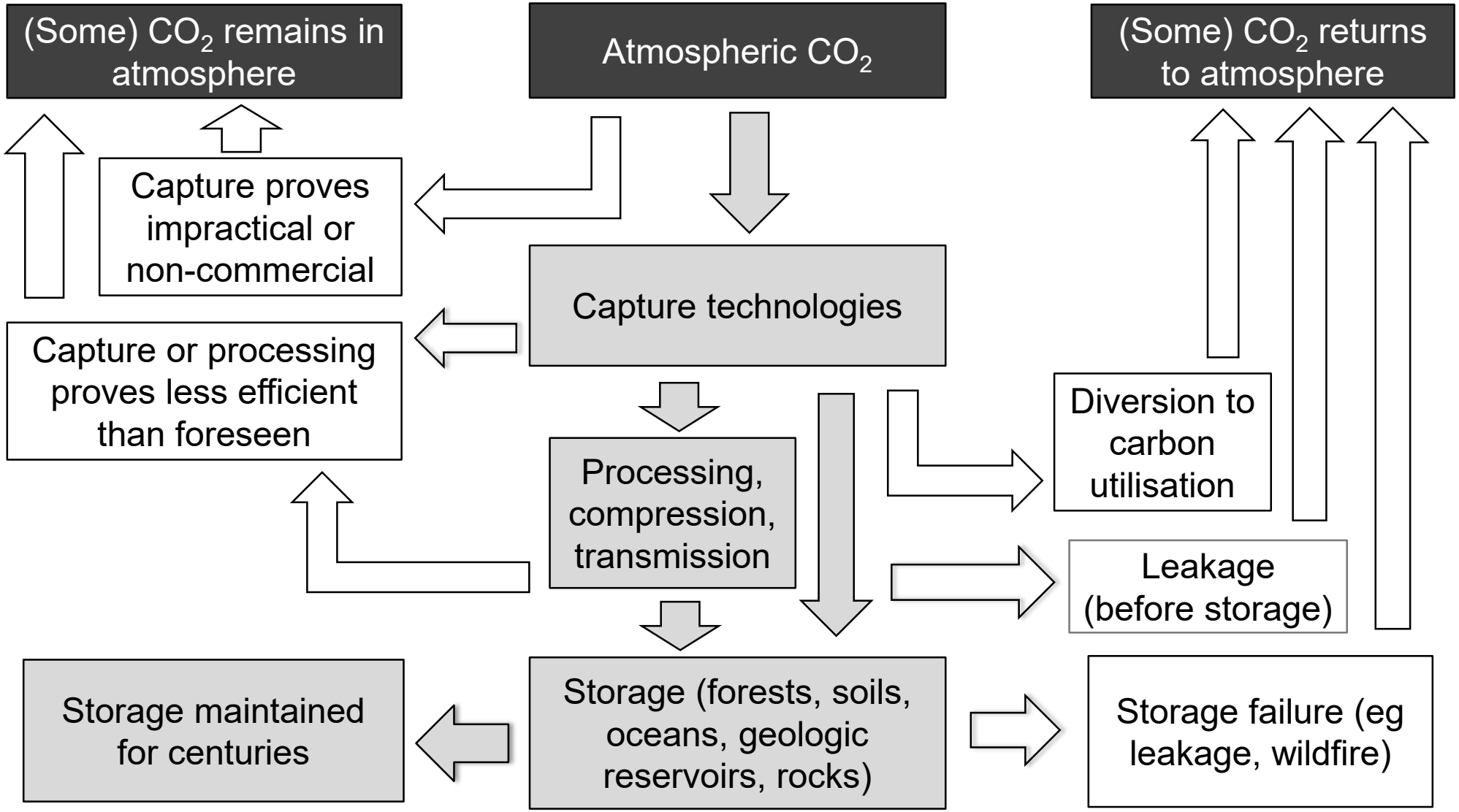
Types

1. After planning for substitution of (increased) residual emissions, GGR efforts fail
2. GGR deployment leads to unintended side-effects causing additional emissions
3. Over-optimistic assessments of GGR potentials leads to impractical expectations for offsetting.

Worst case scenarios, based on existing literature, show that the risk is material and substantial

McLaren D. (submitted)

POTENTIAL GGR FAILURE ROUTES



WORST CASE ESTIMATES
371-545 GTC CARBON AT RISK

	Low estimate	Central estimate	High estimate
Carbon at risk from GGR substitution & failure (Type 1)	50	156	229
Additional emissions from rebounds & other side-effects (Type 2)	25	71	134
Mitigation foregone in imagined offsetting (Type 3) – calculated as residual mitigation costing over $100/tonne-CO2	297	216	182
Total carbon at risk	**371**	**444**	**545**

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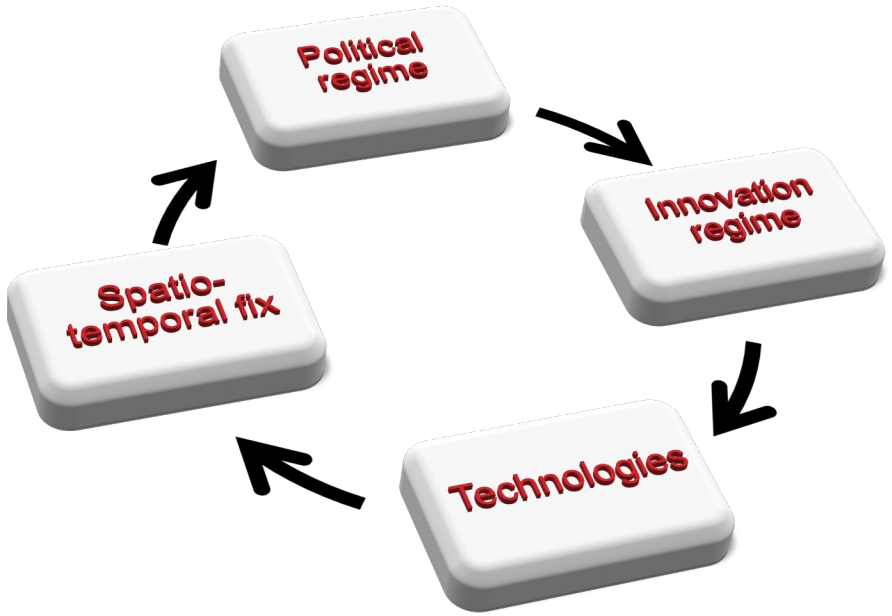
THE SCALE OF POTENTIAL MITIGATION DETERRENCE MERITS SERIOUS PREVENTIVE ACTION

	Estimated temperature exceedance °C		
TCRE (IPCC, 2018)	Low (371 Gt-C)	Central (444 Gt-C)	High (545 Gt-C)
0.73 (low)	0.27	0.32	0.40
1.65 (median)	0.60	0.73	0.90
2.57 (high)	0.94	1.13	1.40

This central estimate of almost half a trillion tonnes of carbon at risk therefore implies an additional 0.7 deg°C at a median estimate of climate sensitivity: an outcome of 2.2°C rather than 1.5°C, all else being equal.

CULTURAL POLITICAL ECONOMY OF CARBON REMOVAL

Co-evolution of promises, technologies and regimes



Carbon Engineering and Occidental: enhanced oil recovery using direct air capture

DELIBERATING FUTURES WITH POLITICAL SCENARIOS

Business as Usual Mixed economy, markets dominate. Liberalism and neo-liberalism co-exist. Institutions muddle-on, in mix of cooperation and conflict.	**Populism Unleashed** Political populism, post-truth, strong nationalism, tending to authoritarianism. Highly unequal, with powerful, interlinked corporate / political elites.
Neo-liberalism Renewed Strong world-order, with economic and political power shifted to China. New legitimacy for inequality. Likely high economic growth. Lots of innovation in markets and finance.	**Progressive Rebound** Mixed economy, scepticism of markets and technology. Reduced inequality. Institutions and movements strengthened. Greater cooperation internationally.

DELIBERATING FUTURES WITH POLITICAL SCENARIOS

9 Workshops, 5 face-to-face, 4 virtual

Stakeholders: tech experts, policy, civil society, media

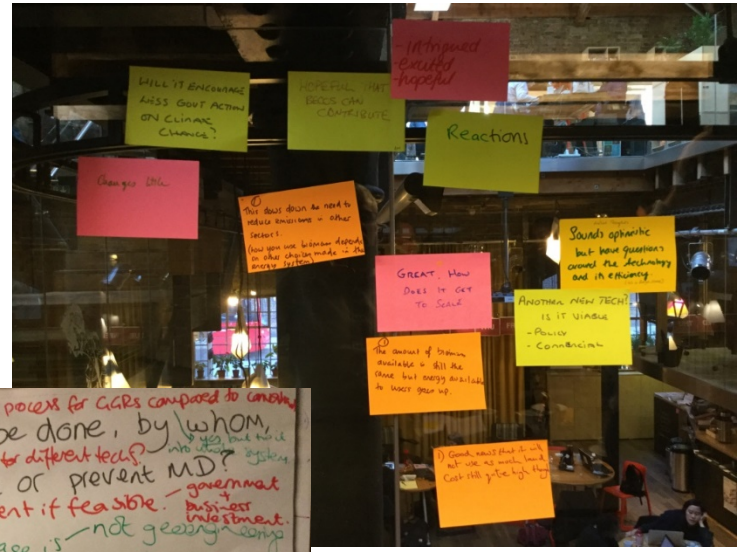
Also lay/student participants

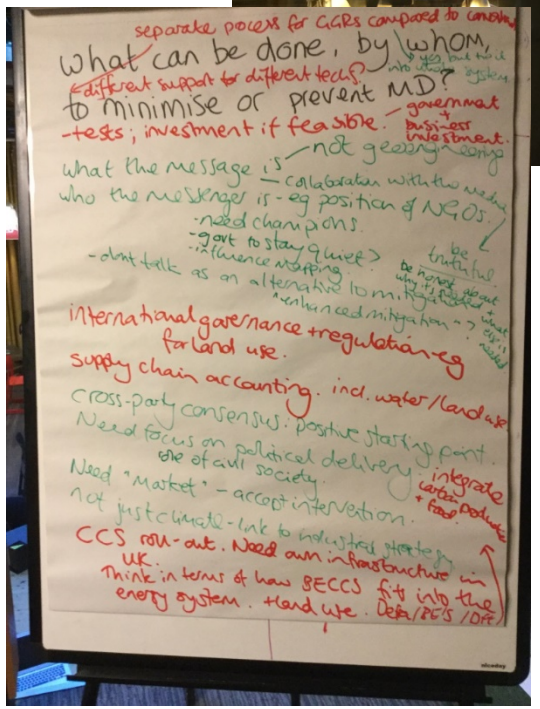
Focus on GGR generally, OR one specific technique

Always 2 contrasting political contexts – all with MD…

3 time horizons:

- **2020 (new GGR promises)**
- **2035 (MD effects undermine promises)**
- **2050 (underlying reasons for MD become clear)**





MECHANISMS OF DETERRENCE

Failed substitution: **Reasonable amount of GGR planned, but development and deployment does not pan out as hoped (too poor, too little, too expensive)**

E.g. diversion to carbon utilisation

Rebounds: **Deployment happens, but leads indirectly to additional emissions**

E.g. EOR or indirect land use changes

Imagined offsetting: **Overly optimistic amount of GGR assumed, and so not enough emissions reduction effort**

E.g. offsetting plans to enable sectoral growth

"if there's an easy option, which means you pay someone to plant some trees somewhere, you're going to take it"

"using the CO2 instead of actually storing it … and all that greenwashing"

"If you want to actually remove carbon you'll have to do something about the oil lobby so [GGR] won't just be for enhanced oil recovery"

"the industry comes up with a scheme that kicks everything into the future without appropriate safeguards in order to carry on doing what they've always wanted to do"

DRIVERS OF DETERRENCE

Social imaginaries and the attraction of delay – **easier to imagine the end of the world than the end of capitalism…**

Exaggeration and the power of promises **(not that promises are performative … the opposite in fact)**

Interests distorting rational substitution **(or 'where carbon trading goes wrong')**

Plausible routes to deterrence emerged in all the scenarios we discussed

Cultural, and political economy dimensions were invoked repeatedly

"The allure of negative emissions [is that] it delays action to the future"

"It's all spin: the technologies are not going to be realised"

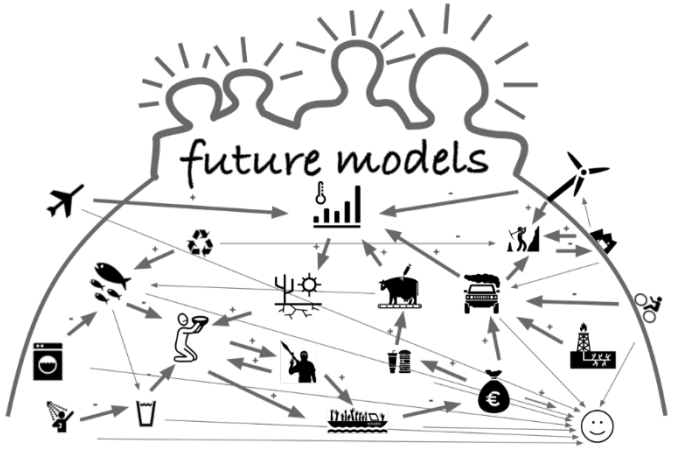
"a market is to make money for the traders it's not to reduce emissions"

BUT, BUT, BUT …
COMMON ARGUMENTS AGAINST

- **‘Both GGR and emissions reductions are needed’ … so there is no risk of substitution**
- **‘GGR is too limited or too expensive’ (and the political context too hostile) for substitution to occur (or matter)**
- **‘Someone would do something’ – before deterrence became too serious, or as climate impacts become obvious**

Rationalism in a ‘post-truth’ culture?

Assumptions, imaginaries and susceptibility …



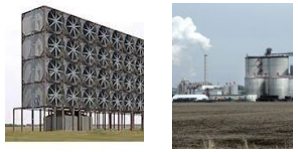
VULNERABILITIES

Are some technologies, or political settings more vulnerable to MD?

- **Some specific technologies were seen to be too limited in scope or too expensive to generate credible promises**

- **Those where outcomes are harder to verify or more diffuse over time, may be more susceptible**

- **Expensive, high capital technologies may be particularly vulnerable to diversion to CCU**



Different techniques face different mechanisms, but none are immune

Similarly for political regimes – eg authoritarian setting subject to exaggerated claims, progressive setting vulnerable to public opposition – but attraction of delay was universal

INTERVENTIONS TO PREVENT OR REDUCE DETERRENCE

Leadership for a separate GGR portfolio strategy

Ambitious **targets** that allow for redundancy and failure

Strengthen **delivery** (with targeted incentives, enhanced MRV etc) to reduce risks of failure

Regulations to constrain, limit (or eliminate) carbon markets/trading

Measures to increase the political **costs of delay** (eg sequential time limited emissions budgets)

Face down the power of **incumbency** with regulation for corporate accountability etc, addressing fossil and financial interests

Deflate exaggerated promises (research, demonstration and monitoring/reporting/ verification (MRV))

Separation in policy/targets/accounting to minimise substitution

Change the **culture** around climate change & technology (through education, media reform etc)

SEPARATION AND OTHER POLICIES

Explicit separate targets and accounting for emissions reduction and negative emissions

Dedicated support for removals/storage, and strengthened monitoring and verification measures

Implies special care in designing 'net-zero' policies (with awareness of MD mechanisms and drivers)

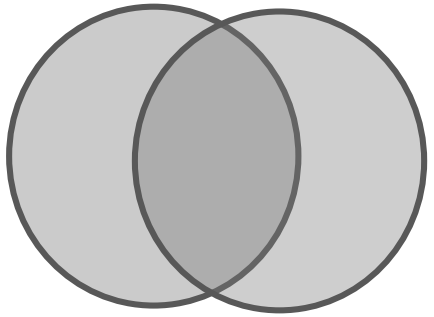
Recognition that *models*, and policy presumptions about *market mechanisms* may both be implicated in MD

This means getting the pricing *mechanism* right (not just the 'price')

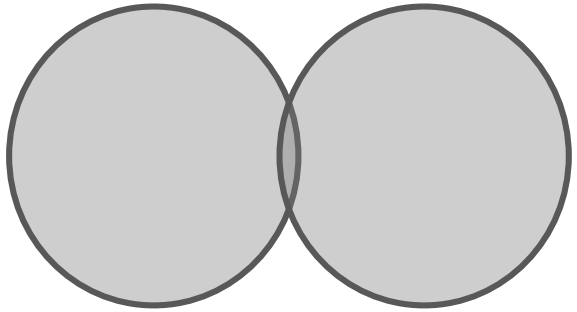
All part of a specific GGR strategy including anti-MD measures.

More focus in climate policy and research on the cultural, social and political reasons why effective responses are not adopted (more HASS, to better complement the STEM)

Substitution



Separation



McLaren et al 2019. Front. Clim.

POWER OF DELIBERATION

'Unsettling throughout'

'Triggered a strong emotional reaction'

'Are all your utopias so grim?'

'I was starting to question all the beliefs I came in with'

'Can't you give us something better .. something more comfortable?'

'Engaging, multi-dimensional, and provocative'

EXPLORING FUTURES - ASSESSING OUR METHODS

Our sessions:

- **Centred uncertainty as condition, not problem**
- **Stimulated some reframing and reflexive participation**
- **Engaged with questions of power as well as knowledge**
- **Constituted a more questioning public**
- **Demonstrated that such complex deliberation is feasible in virtual settings as well as face-to-face**

HOW SHOULD WE RESPOND?

Take the problem seriously – it's not just a knowledge deficit to be overcome by shouting louder

Recognise that models, and policy presumptions about market mechanisms may both be implicated

Try to understand the appeal of further excuses for delay, and avoid feeding them

More detailed analysis of the potential political and psychosocial mechanisms by which they may emerge

Further deliberative work with stakeholders, here and internationally, to try to broaden understanding and improve responses

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