

An expert assessment of greenhouse gas removal options

Diarmaid Clery

Dr. Naomi Vaughan, Dr. Johanna Forster, Dr. Irene Lorenzoni,
Dr. Clair Gough and Prof. Jason Chilvers

Bringing greenhouse gas removal down to earth: stakeholder supply chain appraisals reveal complex challenges

Under review in Global Environmental Change

www.fab-ggr.org

FAB-GGR project

The Feasibility of Afforestation and BECCS for Greenhouse Gas Removal (FAB-GGR) is examining the **real world feasibility** and **consequences** of large-scale afforestation and BECCS.

- *PI:* Dr Naomi Vaughan, UEA.
- *Interdisciplinary:* earth system modelling, crop modelling, ecosystem service modelling, LCA, social and governance issues.

Project objectives:

1. To assess the nature and requirements of afforestation and BECCS supply chains that achieve global net greenhouse gas removal levels of 1 GtCO₂/yr and 10 GtCO₂/yr respectively.
2. To **explore the real world feasibility** of these 1 GtCO₂/yr and 10 GtCO₂/yr supply chains, by evaluating their associated wider consequential environmental, technical, economic, policy and societal implications and trade-offs.

Stakeholder workshops

1st Workshop (July 2017)

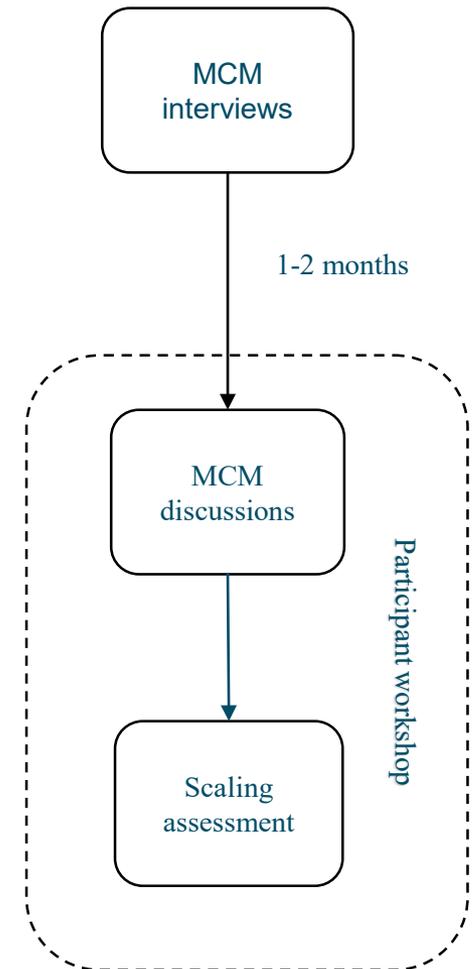
- Forster *et al* (2020) Mapping Feasibilities of Greenhouse Gas Removal: Key Issues, Gaps and Opening up Assessments. *Global Environmental Change* 63:102073 <https://doi.org/10.1016/j.gloenvcha.2020.102073>

2nd Workshop (November 2019)

- 1 day in London
- 22 participants: ~50% business & industry, ~25% NGO, ~25% policy
- 2 x Morning sessions (1¼ hours) and 1 afternoon session (2 hours)
- Present interim project results to stakeholders - for feedback to all WPs

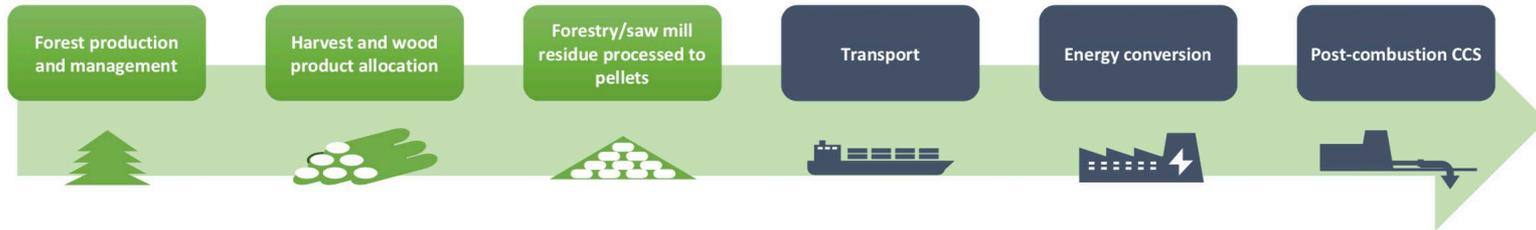
Participant engagement

1. Multicriteria mapping (MCM) interviews
 - Participants defined a set of **criteria** to assess the 4 supply chains.
 - Then scored against these criteria.
2. Breakout 1: Criteria mapping
 - Participants were asked to compare and discuss their criteria and scorings from the interviews.
3. Breakout 2: Scaling up assessment
 - Participants were asked to identify the main pinch points in our 4 supply chains, at a UK and global scale.



4 supply chains

3 x BECCS
Power with residues:



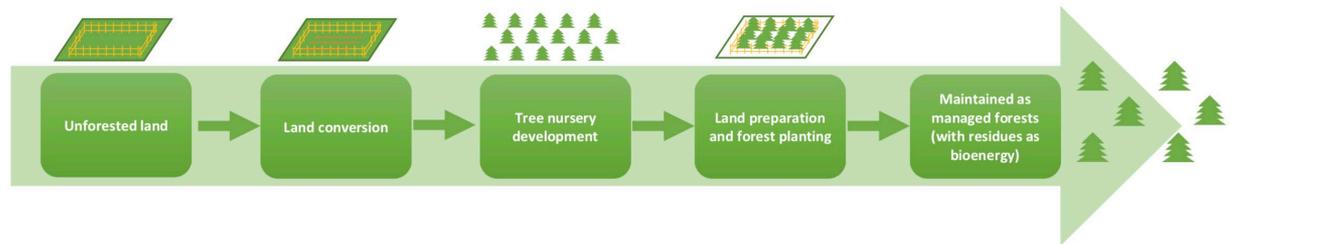
CHP with miscanthus:



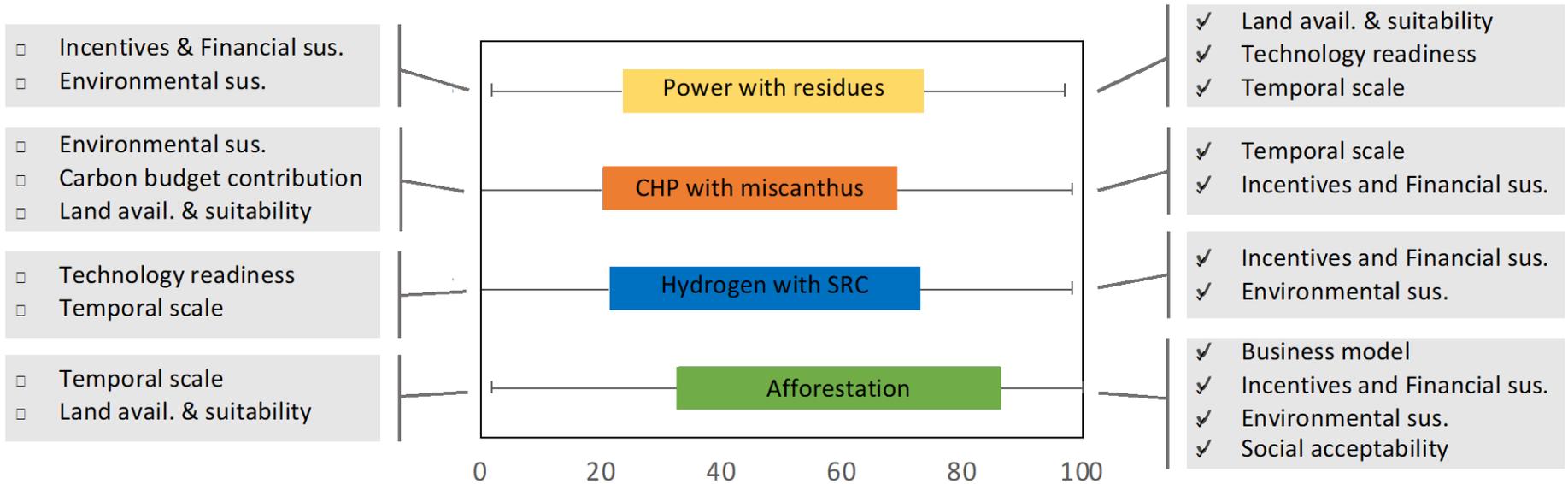
Hydrogen with SRC:



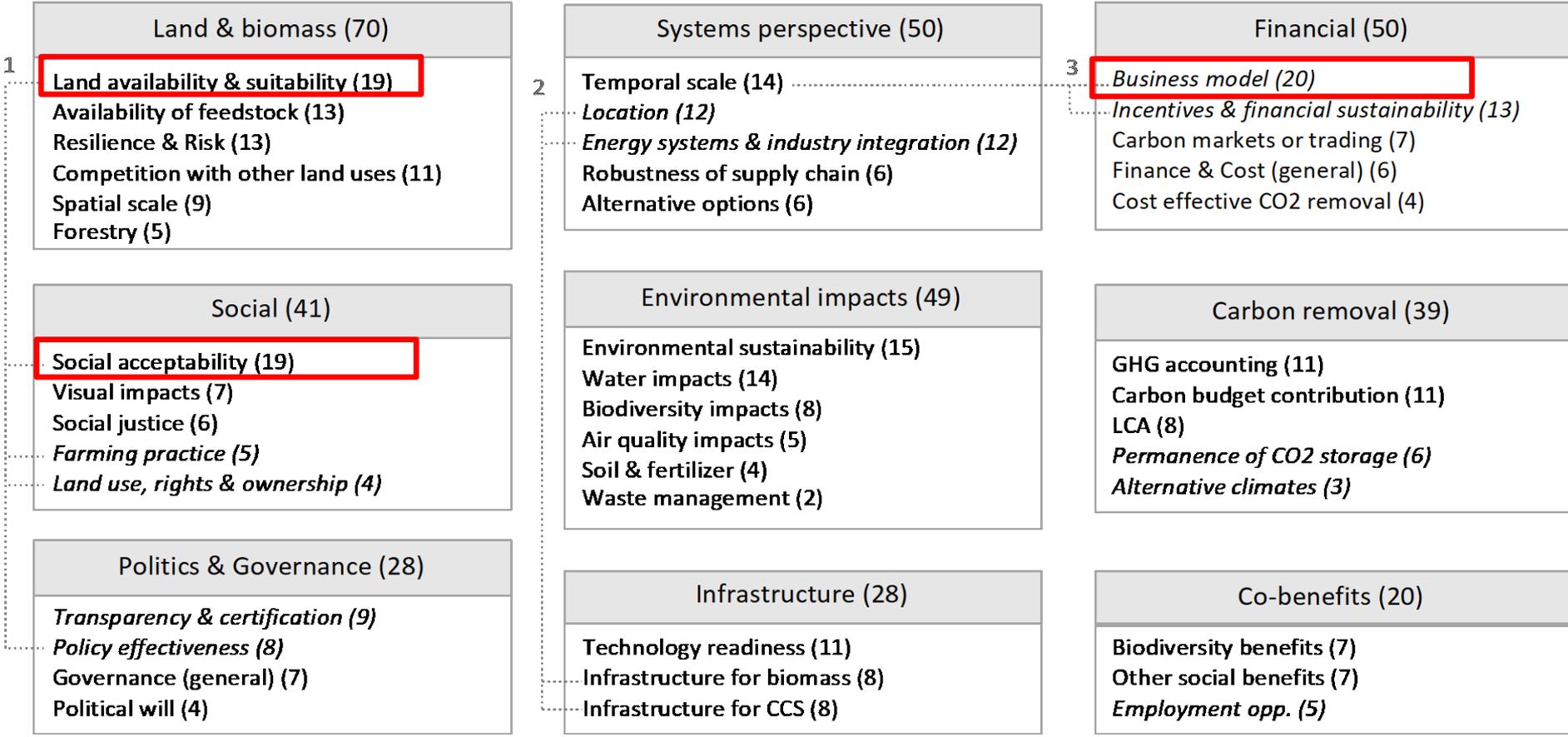
1 x Afforestation:



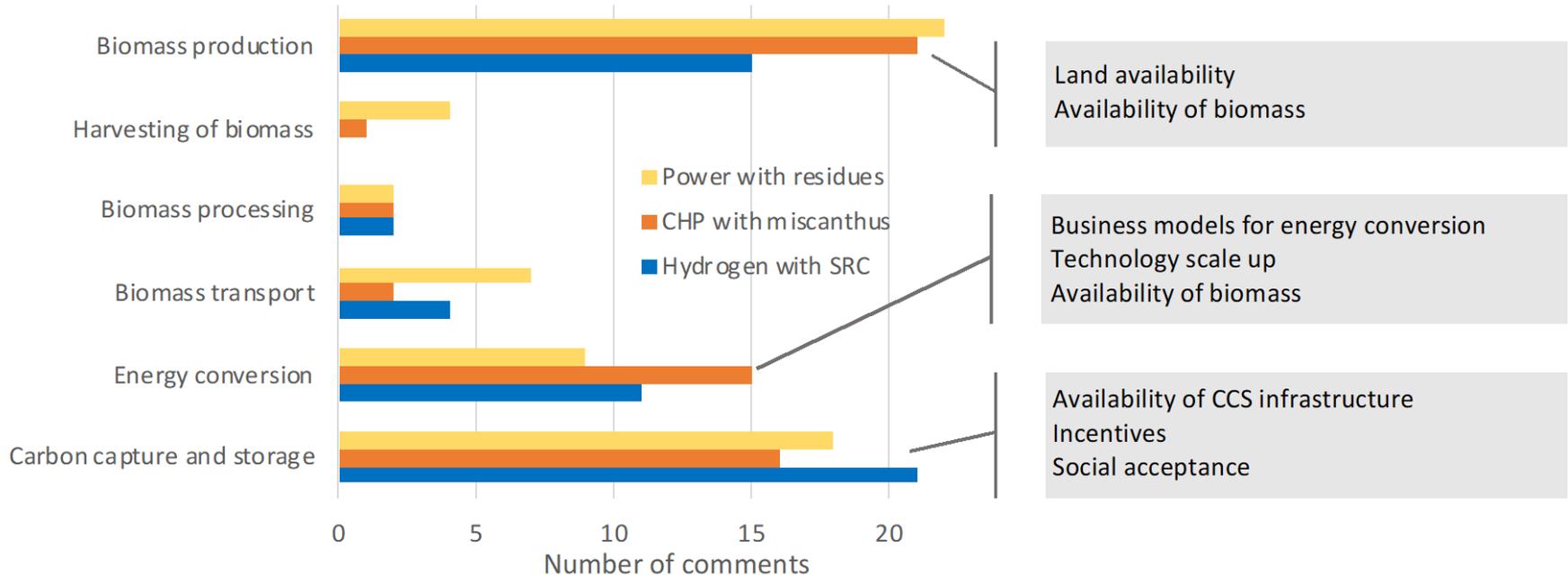
Multicriteria mapping (MCM) results



Criteria



Scaling exercise



UK scale:

- Willingness of landowners to convert land.
- Tree seed/nursery capacity.
- Policy & incentives required.

Global scale:

- Global cooperation on carbon removal strategy.
- Regulation.
- Resilience to future climates.

Conclusions

- This work pulls out the criteria that stakeholders deem important considerations for the feasibility of BECCS and afforestation.
- **Biomass, Land and CCS availability** are among the key criteria mentioned throughout the engagements.
- **Business models and social acceptability** also well covered, including farming.
- **Policy development and incentives required** - delivering multiple objectives where possible e.g. climate and biodiversity, energy and job opportunities.
- **Global cooperation.**
- A responsible assessment approach advocates complementary methods to IAMs.

d.clery@uea.ac.uk

www.fab-ggr.org

Papers

- Forster, J., *et al* (2020) Mapping Feasibilities of Greenhouse Gas Removal: Key Issues, Gaps and Opening up Assessments. *Global Environmental Change* 63:102073
<https://doi.org/10.1016/j.gloenvcha.2020.102073>
- Clery, D.S., *et al* (under review). Bringing greenhouse gas removal down to earth: stakeholder supply chain appraisals reveal complex challenges. *Global Environmental Change*