Potential benefits, risks, limitations, costs and uncertainties of BECCS

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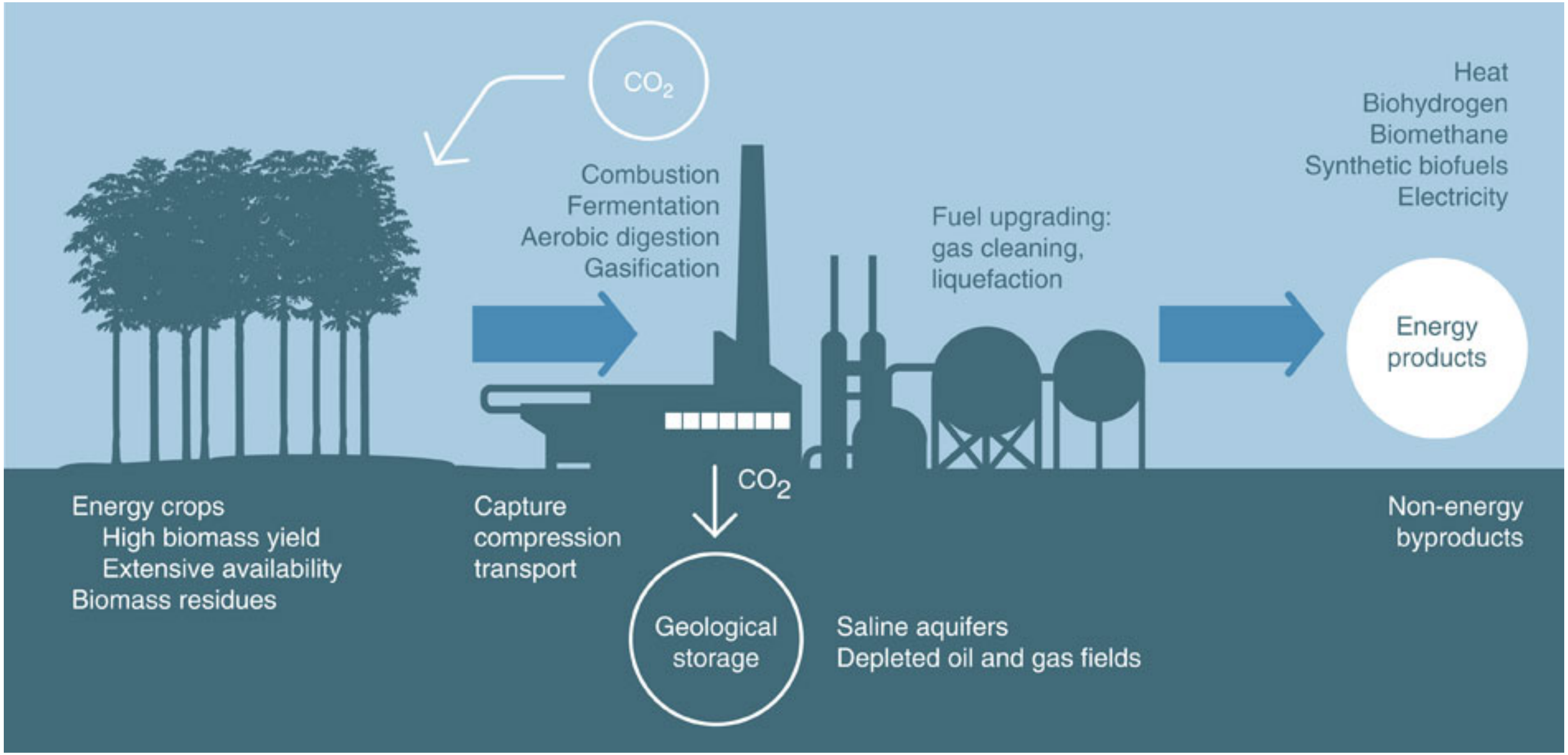
Webinar on Governance of BECCS

C2G

2020

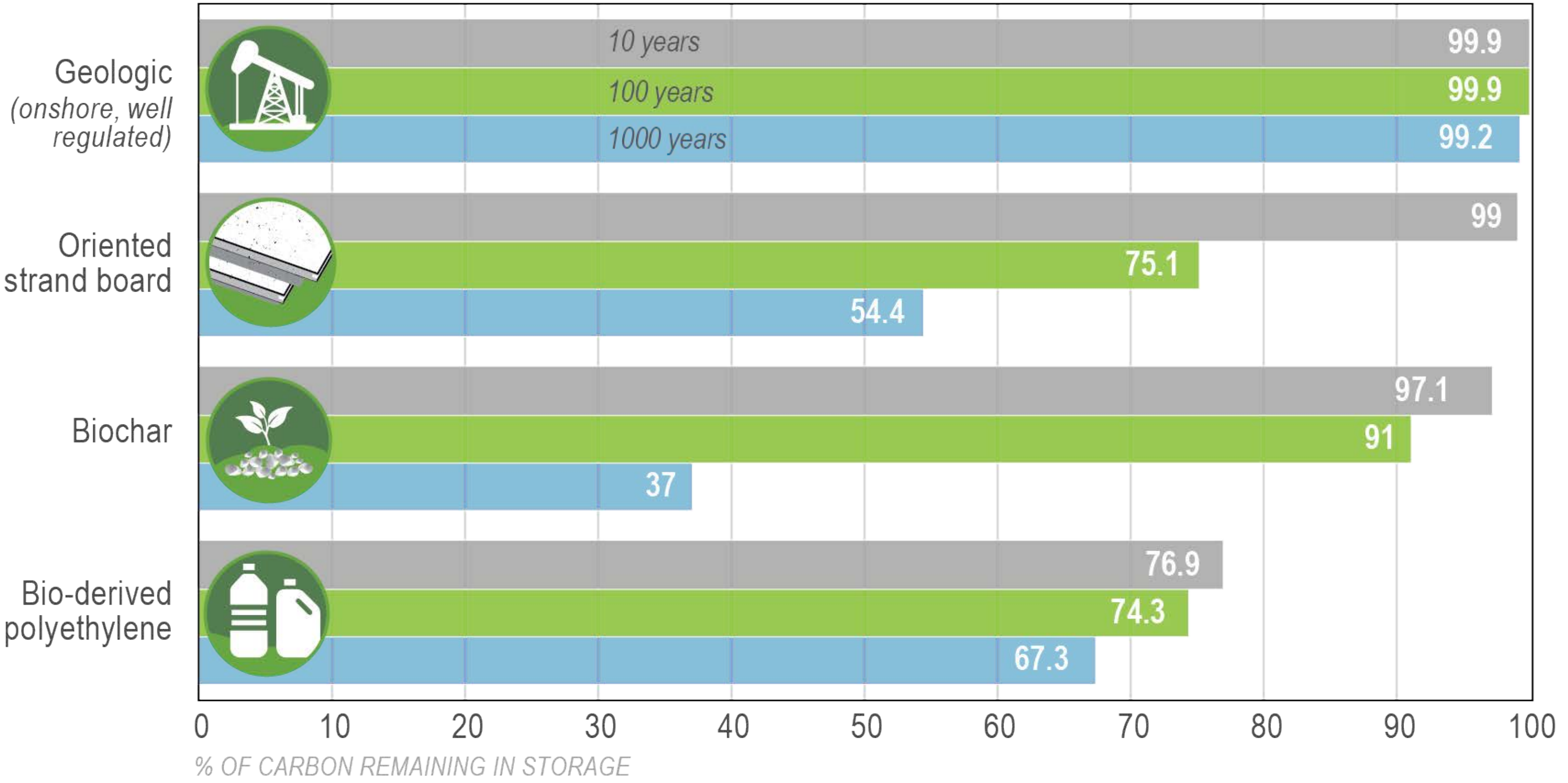
1) Biomass harvesting 2) Biomass capture & conversion 3) Energy and carbon products



Canadell and Schulze (2014)

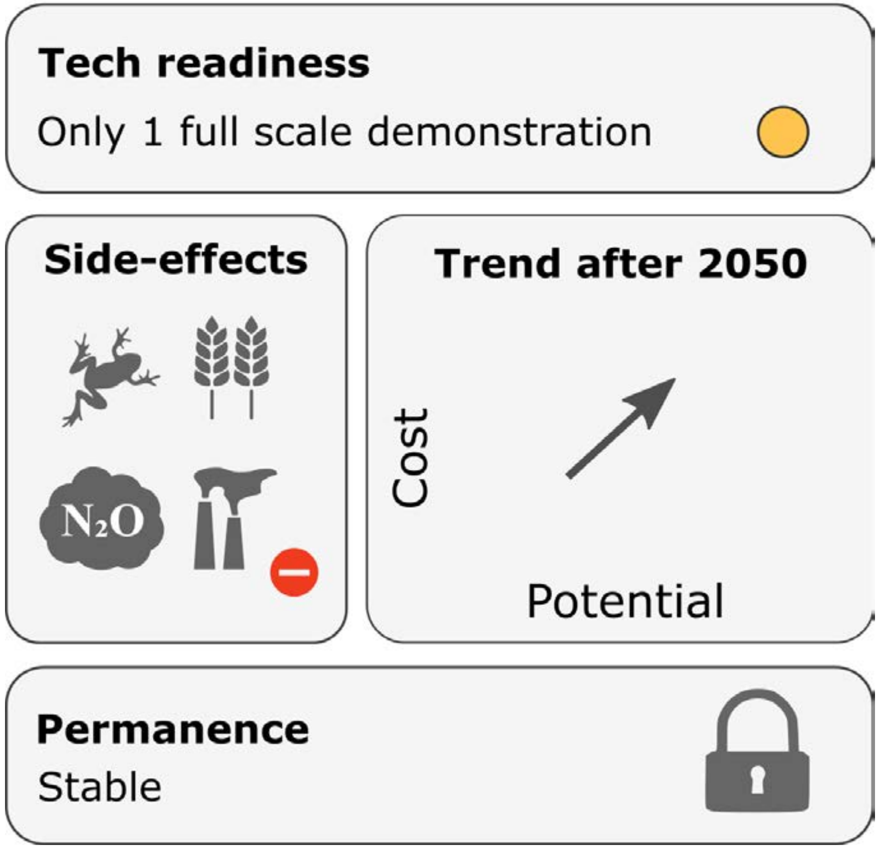
Goal: STORAGE IN LONG-LIVED PRODUCTS

- Geologic CO_2 sequestration
- Engineered wood products, like Oriented Strand Board (OSB)
- Biochar
- Bioplastics like bio-derived polyethylene

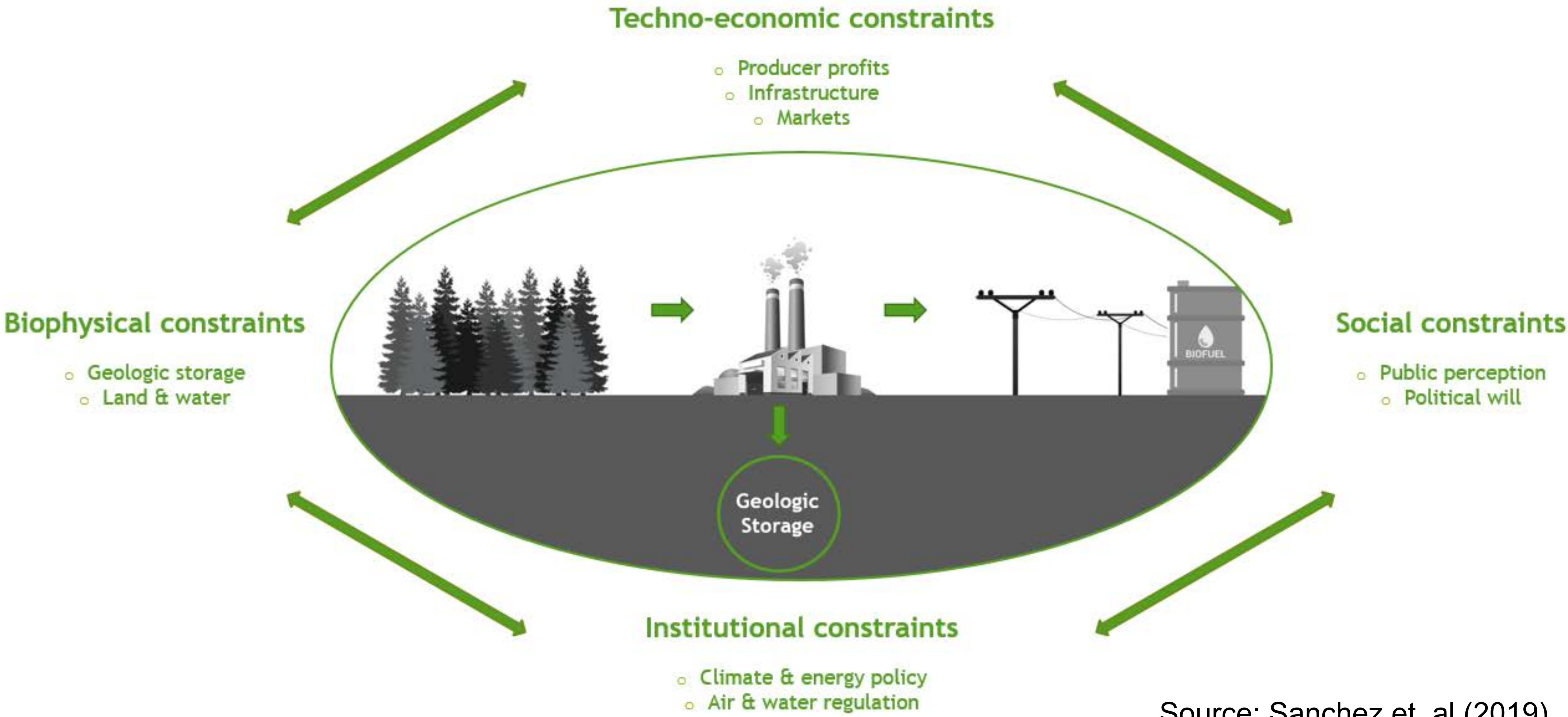


Source: Dees et al (2020) Under review.

BECCS: side-effects, readiness, permanence



- Variety of negative side-effects
- Land competition and indirect land-use change particular concern
- Future costs expected to be higher due to increased competition for land and biomass
- Innovation and deployment lagging far behind compared to what we see in scenarios



Source: Sanchez et. al (2019)

Governance: how *should* BECCS be deployed?

A process that

a) uses biomass to remove CO_2 from the atmosphere,

b) stores that CO_2 underground or in long-lived products, and

c) does no damage to – and ideally promotes – food security, rural livelihoods, biodiversity conservation and other important values.

Source: Sandalow et. al (2020)

THERE ARE MANY POTENTIAL SOURCES OF FEEDSTOCK FOR BECCS

- Waste biomass is preferred
  - low impacts on food and fiber production
  - includes agricultural, forestry, industrial and municipal wastes.
- Dedicated crops may be used in limited amounts.
  - constrained by land availability for food and fiber production.
- Managed forests may provide limited biomass.
  - must be carefully monitored and managed
- Micro- and macro-algae (seaweed) may provide increasing amounts of feedstock.




Using biomass for carbon capture and storage can create risks.

- Adverse impacts on food security
- Adverse impacts on rural livelihoods
- Ecosystem damages, including biodiversity loss
- CO_2 removal benefit reduced or eliminated due to indirect land use change

These are not technical issues.
These are social, operational and policy issues.

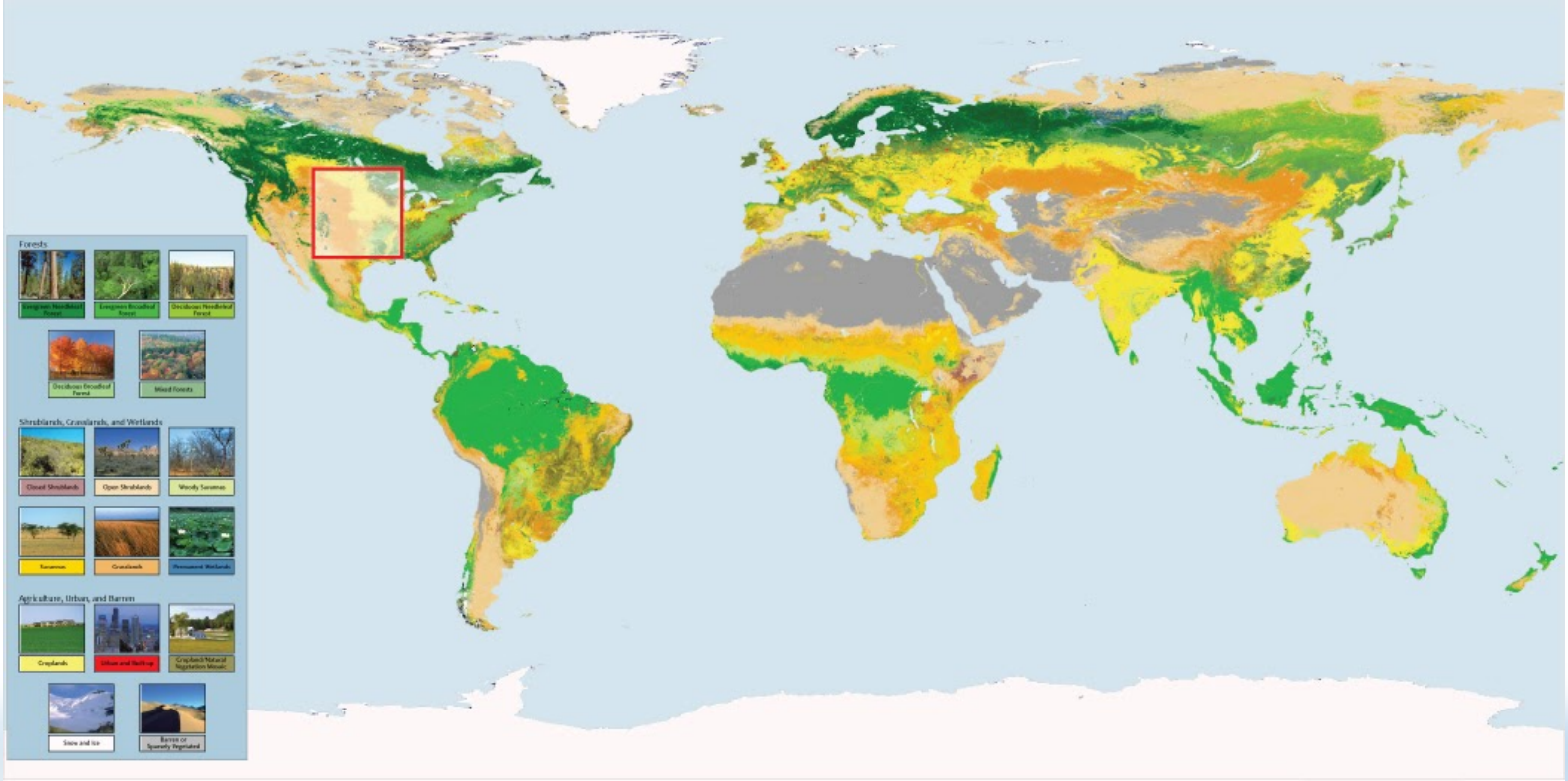
Three guiding principles

- *First, do no harm.*
- *Second, social acceptability is key.*
- *Third, technology development should reflect social priorities.*

Source: Sandalow et. al (2020)

FEEDSTOCKS ARE AVAILABLE FOR 2.5 TO 5 GTCO$_2$ REMOVAL/YEAR BY 2050

- Combining biofuel feedstock estimates with "capturable carbon" fraction gives a functional estimate.
- Realistic projections that preserve food and fiber production and ecosystem protection give 2.5 – 5.0 Gt/y of CO_2 removal.
- Higher estimates rely on large, unrealistic land-use change.



*Red square: 500 Mha, the area proposed for dedicated biomass crops by **unrealistically high** biofuel feedstock estimates.*

SOCIAL SCIENCES

- The most important issue is the biomass supply chain:
  - Who **controls** it?
  - Who **benefits**?
  - **Where** are those benefits found?

Opportunities and **risks** for local communities must be clearly determined.

SOCIAL SCIENCE RESEARCH PRIORITIES

- Draw from multiple connected disciplines including economics, political science and sociology
- Draw on related fields including agronomy, nutrition, hydrology and engineering
- Focus on characterizing and increasing "social demand" for BECCS and other forms of CO_2 removal

1. Synthesis research that looks at lessons on carbon sink enhancement, scaling up biofuels / the bioeconomy, and past and present energy transitions, including on the investment gap with CCS and clean energy technologies;
2. Regional and landscape-level analysis of carbon removal technologies;
3. Analysis of policymaker and citizen demand for and knowledge of negative emissions; and
4. Work on technology diffusion, adoption, and transfer into different socio-economic contexts.

Source: Buck (2018)

Sources

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