Biomass Carbon Removal and Storage

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Air, Land, Rock & Water - CDR Webinar

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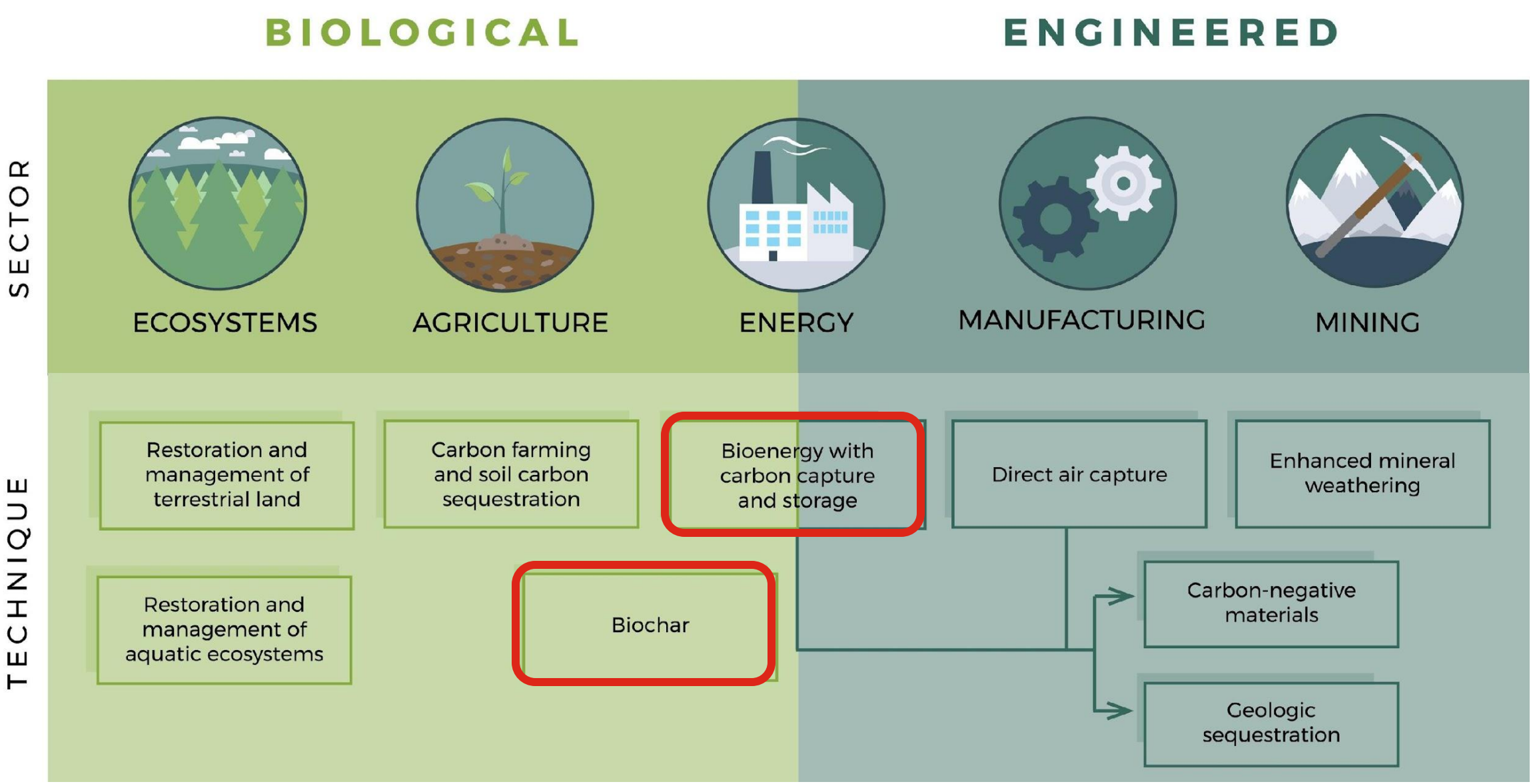
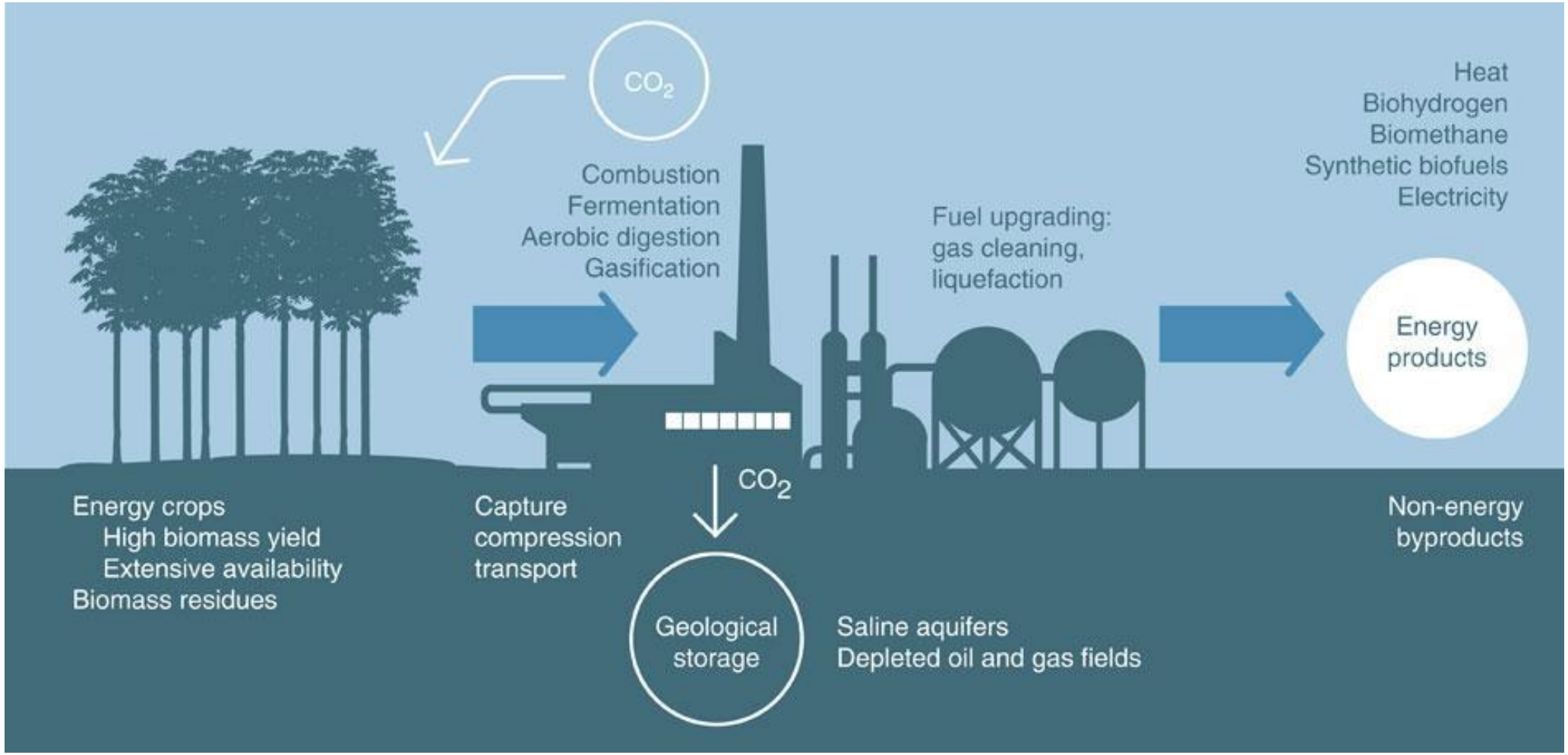

BIOLOGICAL
ENGINEERED
SECTOR
ECOSYSTEMS
AGRICULTURE
ENERGY
MANUFACTURING
MINING
TECHNIQUE
Restoration and management of terrestrial land
Carbon farming and soil carbon sequestration
Bioenergy with carbon capture and storage
Direct air capture
Enhanced mineral weathering
Restoration and management of aquatic ecosystems
Biochar
Carbon-negative materials
Geologic sequestration

Lignocellulosic biomass

Bioenergy conversion with **Carbon or CO_2 storage**

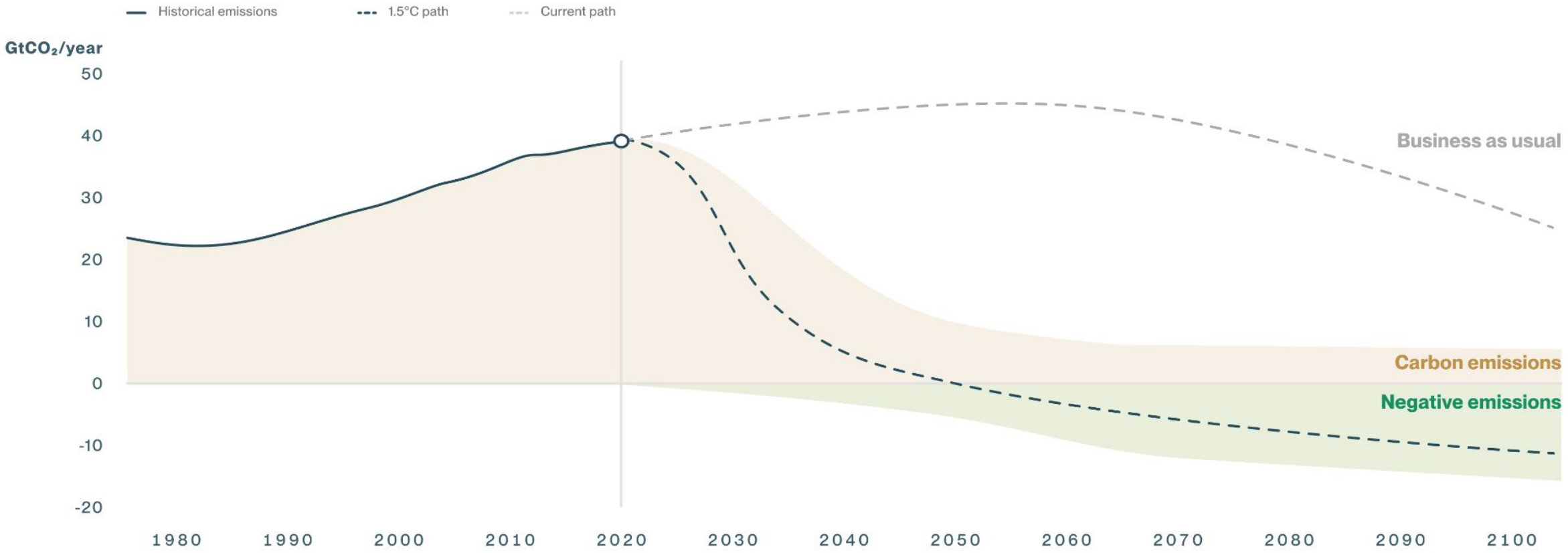
Energy and carbon **co-products**



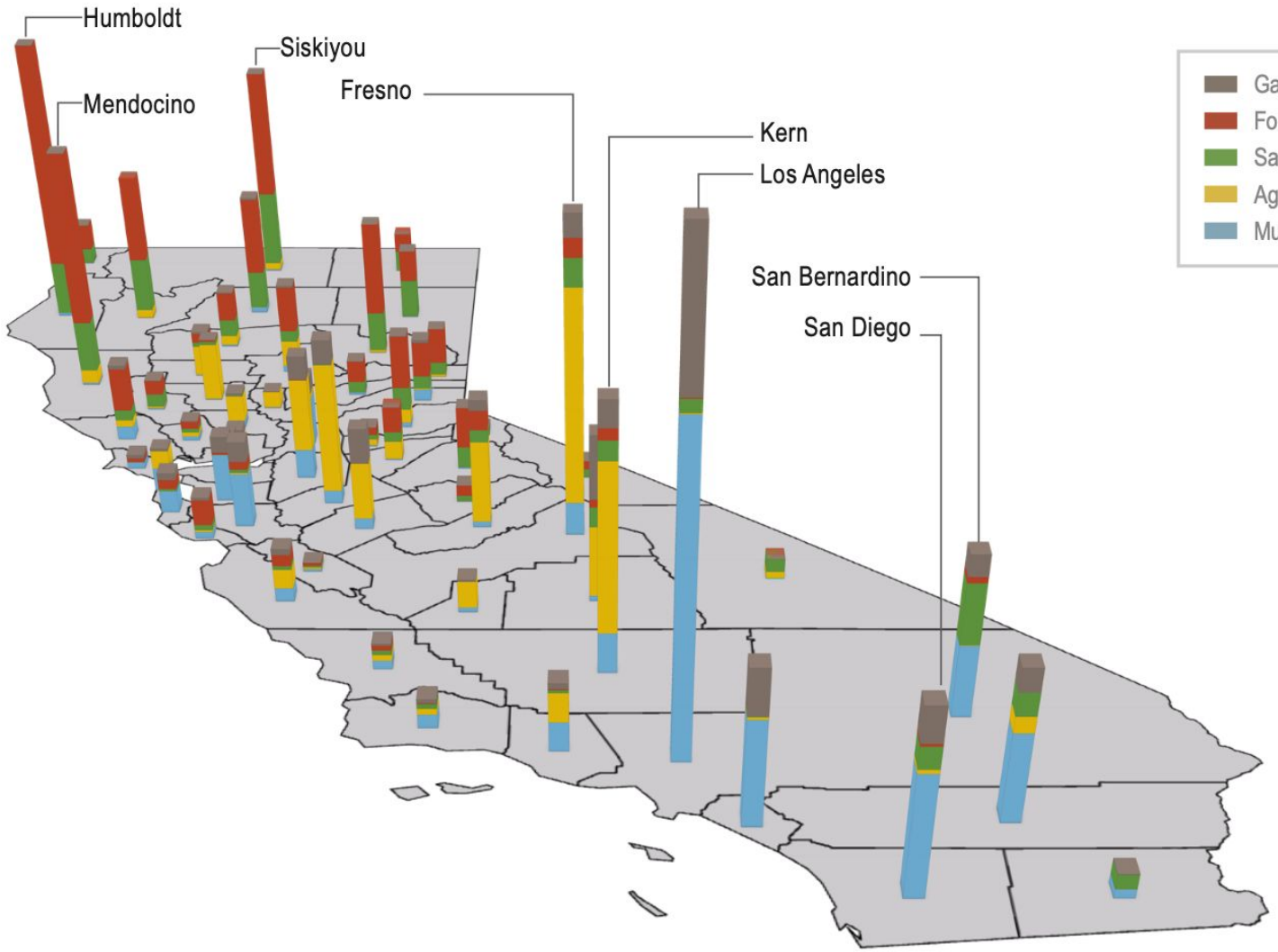
Canadell and Schulze (2014)

Removing CO_2 emissions is critical alongside reductions

> Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in carbon dioxide occur in the coming decades. **All pathways project the use of carbon dioxide removal to compensate for residual emissions.**"



Potential Role in California – "Getting to Neutral"



- Gaseous Waste
- Forest Management
- Sawmill Residue + Shrub & Chaparral
- Agriculture Residue
- Municipal Solid Waste

Three pillars to reach **125** *million tons of negative emissions*

25 Mton/ yr — *Capture & store carbon through* ***natural and working lands***

84 Mton/ yr — *Convert* ***waste biomass*** *to fuels and store* CO_2

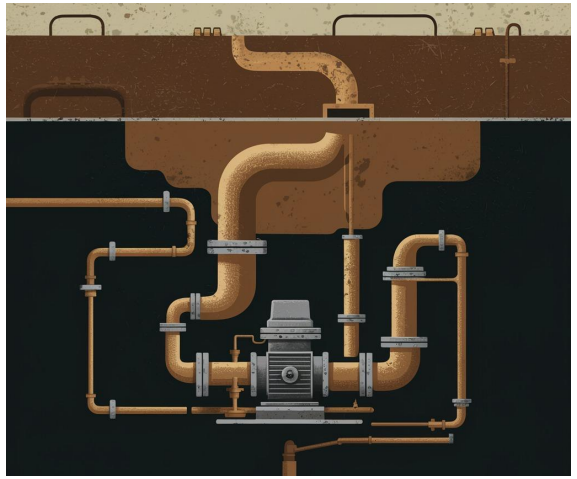
16 Mton/ yr — *Implement* ***direct air capture*** *and* CO_2 *storage*

Baker et al. (2020)

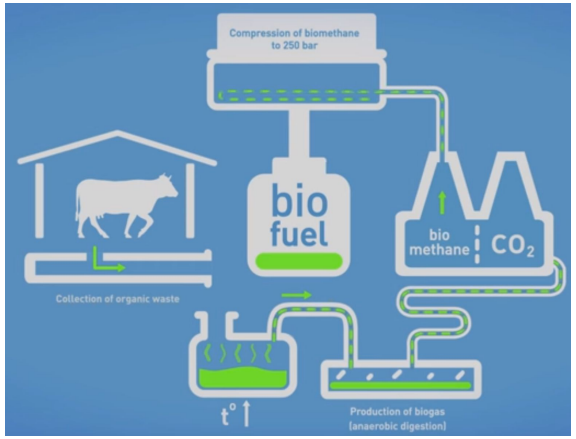
Ethanol biorefineries

Biochar

Lignocellulosic fuels



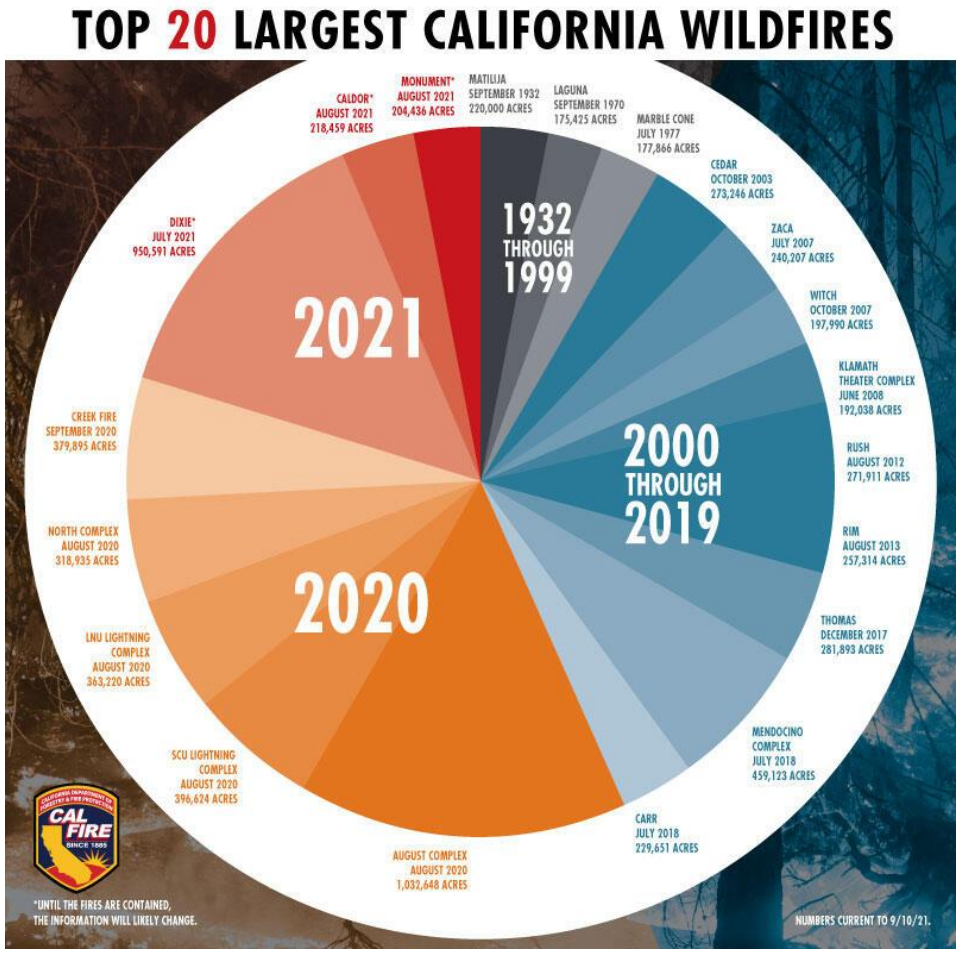
Bio-oil and slurry injection



Renewable natural gas

Pulp and paper

EX: Wildfire and carbon management in California forests



EX: Wildfire and carbon management in California forests

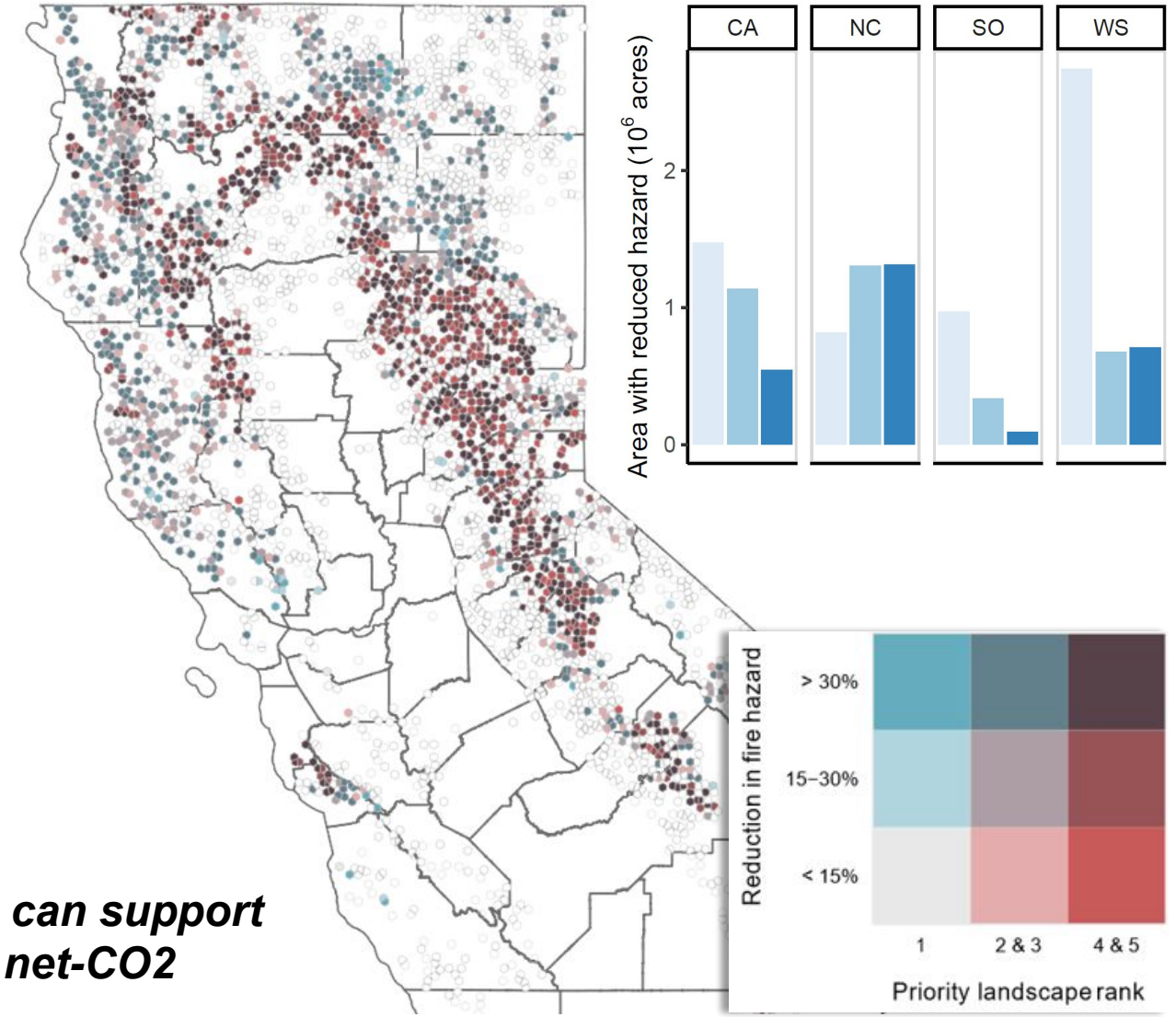
Wildfire hazard reduction

- 12.1 M acres hazard reduced
- 3.1 M acres of potential stand-replacing fire avoided

Carbon emissions reduction

- 6.5 $MtCO_2$/yr climate benefit relative to baseline
- 16.4 $MtCO_2$/yr climate benefit when new sawtimber is used for multi-unit buildings

Our results suggest that innovative wood use can support widespread fire hazard mitigation and reduce net-CO2 emissions in California.



Cabiyo et al. (2021)

The task at hand: developing a just implementation of biomass carbon removal in California

- How do we transition California's existing fleet from combustion-based biomass power to the next generation of technologies?
- How do we pursue environmental and social co-benefits while implementing carbon removal?
- How can we ensure that communities are engaged from the outset?
- How can we ensure that limited biomass resources are used for their highest and best use?