



Changing land – changing climate: the potential of CO₂ sequestration through future land use change



1 Current situation

- Land on earth is scarce
- Through land use change:
1/3 of annual CO₂ emissions [3]

➔ Land management as a Climate Change response option

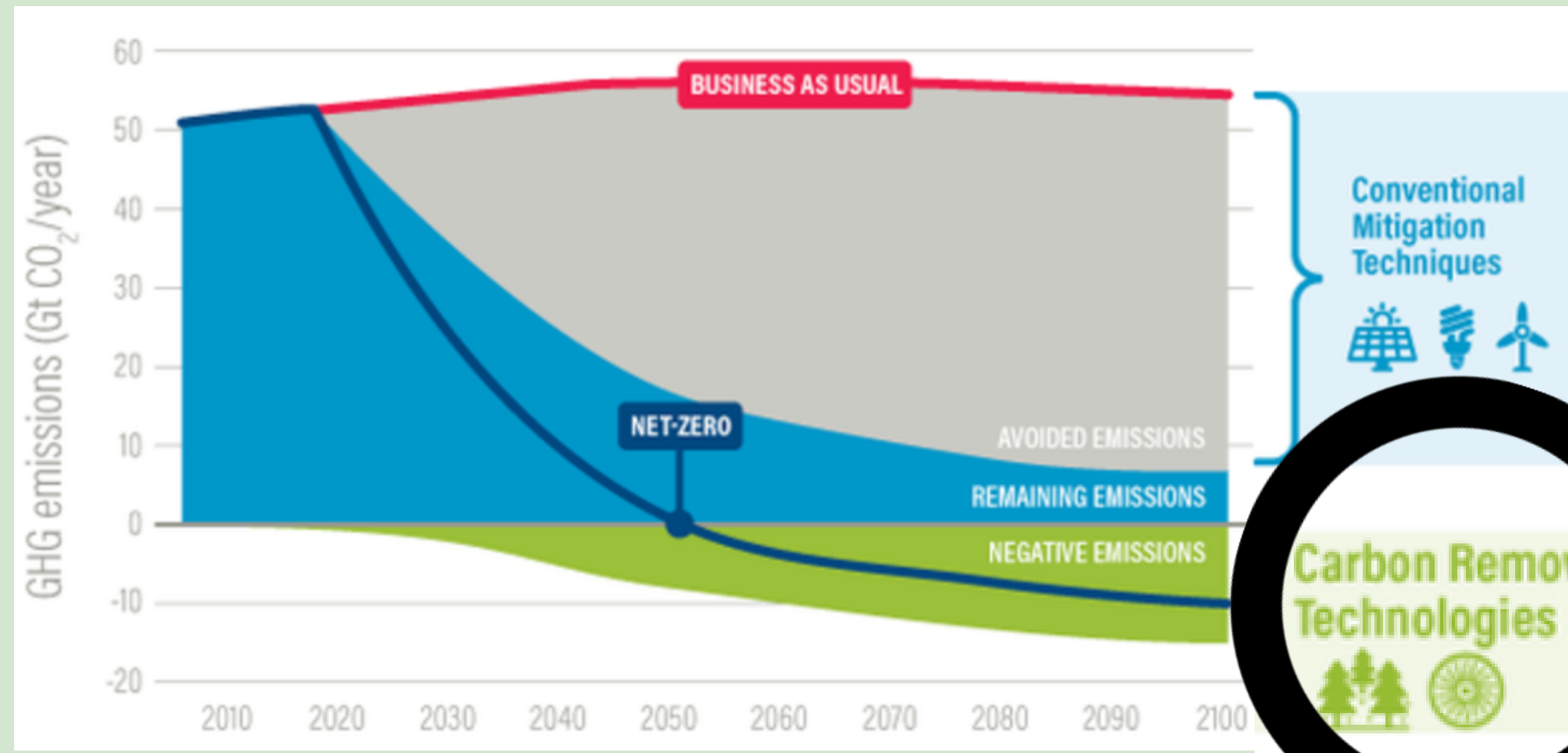


Fig 1: Possible mitigation options to reduce CO₂ emissions in the future

Which options in future land use offer mitigation potentials for increasing the terrestrial carbon sink?

2 Future Carbon Removal Possibilities

Afforestation Potential [1,2]

Estimated sequestration potential: up to 10 Gt CO₂/year

- + Fast method
Already available
Cost-effective technologies
Agroforestry possible
- Reversible process
Food security in danger
Limited land area available
Amplifying climate feedback in snow-covered areas

➔ highest mitigation potential

Agriculture Potential [4,5,9]

Here: peatland restoration + rice cultivation + mineral soils

Estimated sequestration potential
peatland restoration: 1.9 Gt CO₂/year
mineral soils: ~1 Gt CO₂/year
rice cultivation: 0.06 Gt CO₂/year

- + optimal conditions for carbon storage
food security guaranteed
- continuous management necessary on rice fields
CH₄ emissions could increase

➔ high mitigation potentials

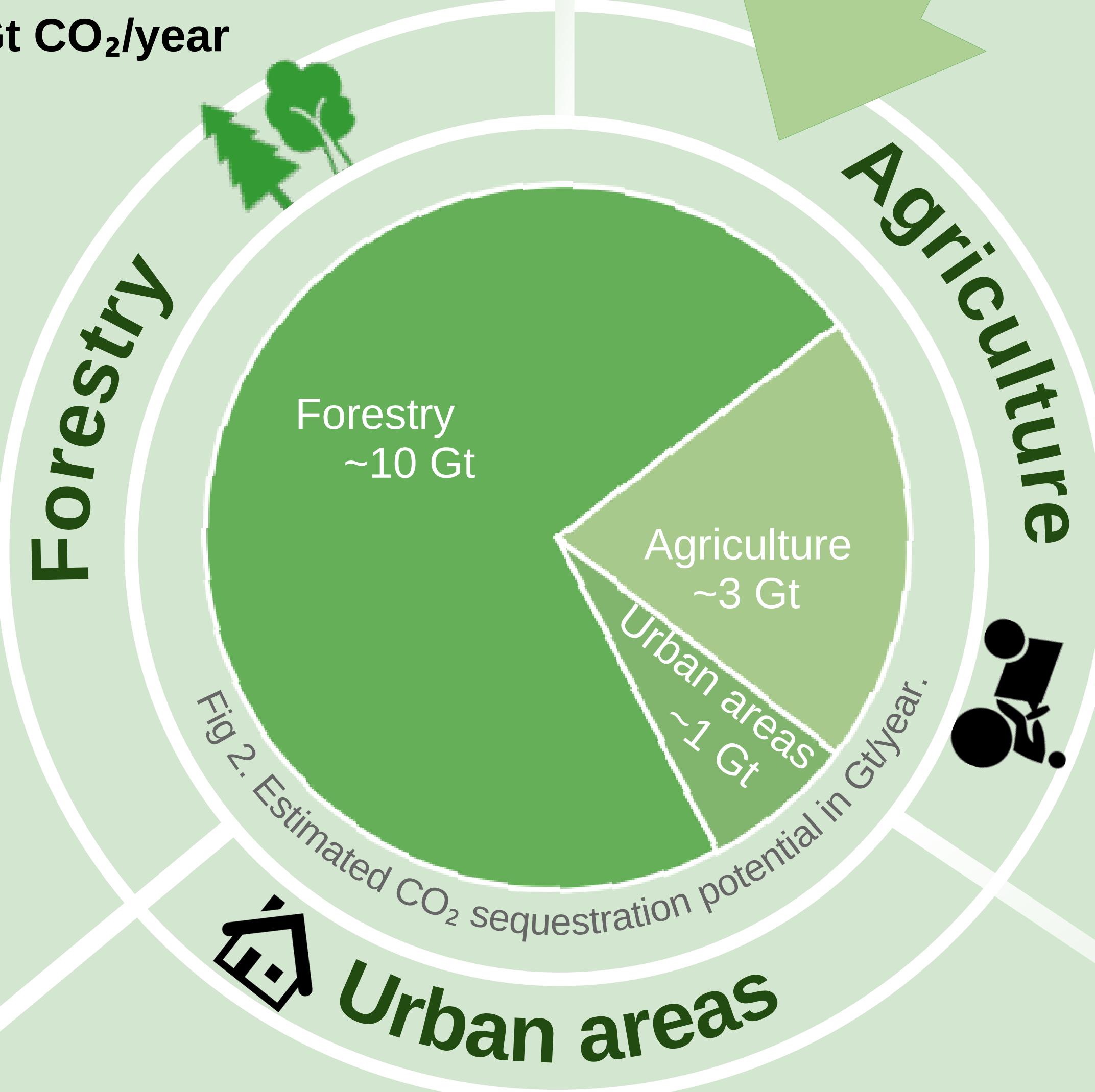


Fig 2. Estimated CO₂ sequestration potential in Gt/year.

DISCLAIMER
This is just a selection of possibilities!
There are many more ideas out there.

Green facades [8]

Estimated sequestration potential:
5.5 kg CO₂/m²

- + raising awareness
cooling effect
amplified water cycle
filtering dust & air pollutants
increased well-being of (urban) population
- not applicable to old buildings
Maintenance necessary

➔ low mitigation potential

Biochar Potential [6,7]

Estimated sequestration potential: 1 Gt CO₂/year

- + produced with organic material/agricultural left-overs
carbon sequestration in resistant form
multi-use applications
- heavy metal contamination possible
fine ash as dust source
benefit depends on the soil condition

➔ medium mitigation potential

3 Summary

- ➔ Increasing the terrestrial CO₂ sinks via land use change have a high potential to mitigate Climate Change
- ➔ Carbon Removal Possibilities can help mitigate 12-15 Gt CO₂/year until 2100 [Fig 1, 2]
- ➔ Together with reduced CO₂ emissions due to conventional mitigation techniques, a CO₂ neutral life is possible by 2100 [Fig 1]

References

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- [4] Rajkishore, S. K., et al. (2015). Carbon sequestration in rice soils—A review. *The ecoscane* 9(1&2): 427-433, 2015
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- [9] Lal R, Negassa W, Lorenz K (2015). Carbon sequestration in soil. *Current Opinion in Environ. Sustainability*, 15:79-86

Figures

- [Fig. 1] World Resource Institute (2020) <https://www.wri.org/insights/6-ways-remove-carbon-pollution-sky> (17.06.2021)
[Fig. 2] Koch V, Schäfer AK (2021) estimated CO₂ sequestration potential of different future land use types. Created by the authors

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