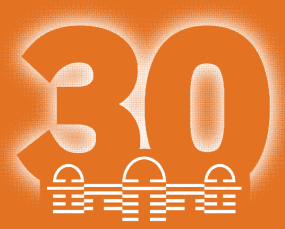


Celebrating 30 years of
integrated climate impact research
at the Potsdam Institute.

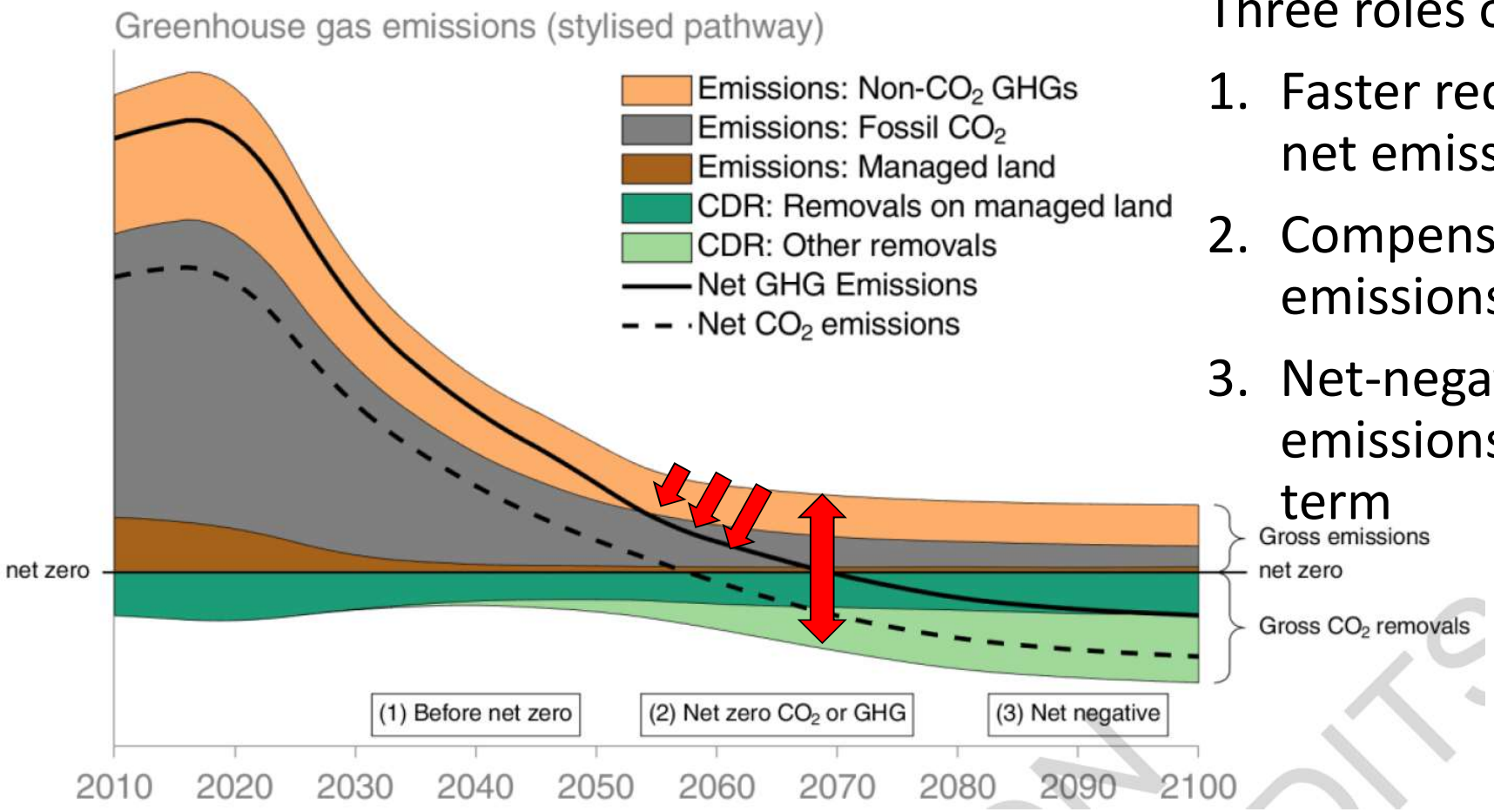
Carbon Removal in transformation pathways

EGU, Vienna, May 23rd 2022

Jessica Strefler, Potsdam Institute for Climate Impact Research

Leibniz Association

CDR in transformation pathways



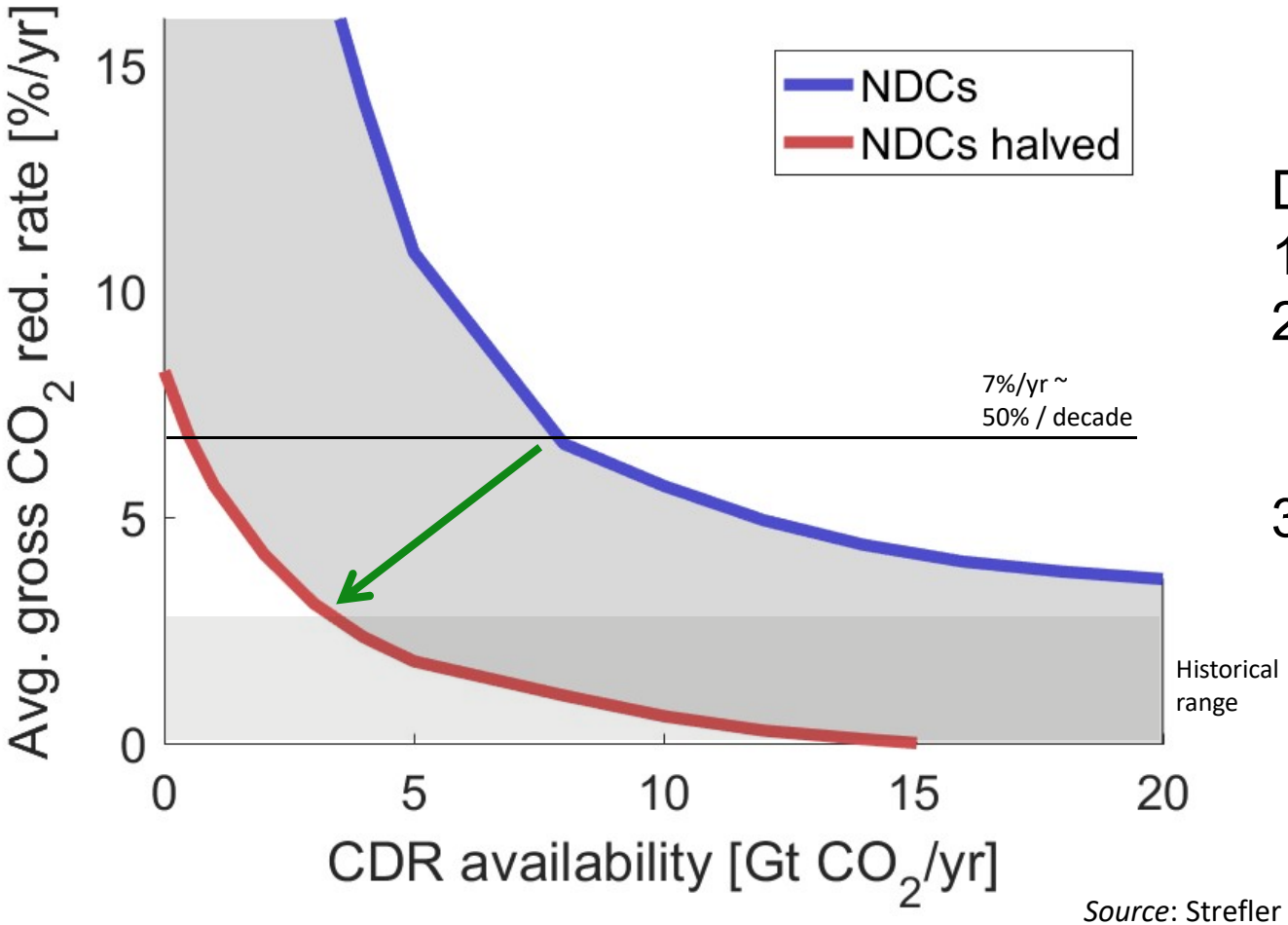
Three roles of CDR:

1. Faster reduction of net emissions
2. Compensate residual emissions for net-zero
3. Net-negative emissions in the long term

Dr. Jessica Strefler, PIK

Source: IPCC AR6 WG3 Ch.12, Box 8 Fig. 2

Minimum CDR requirement

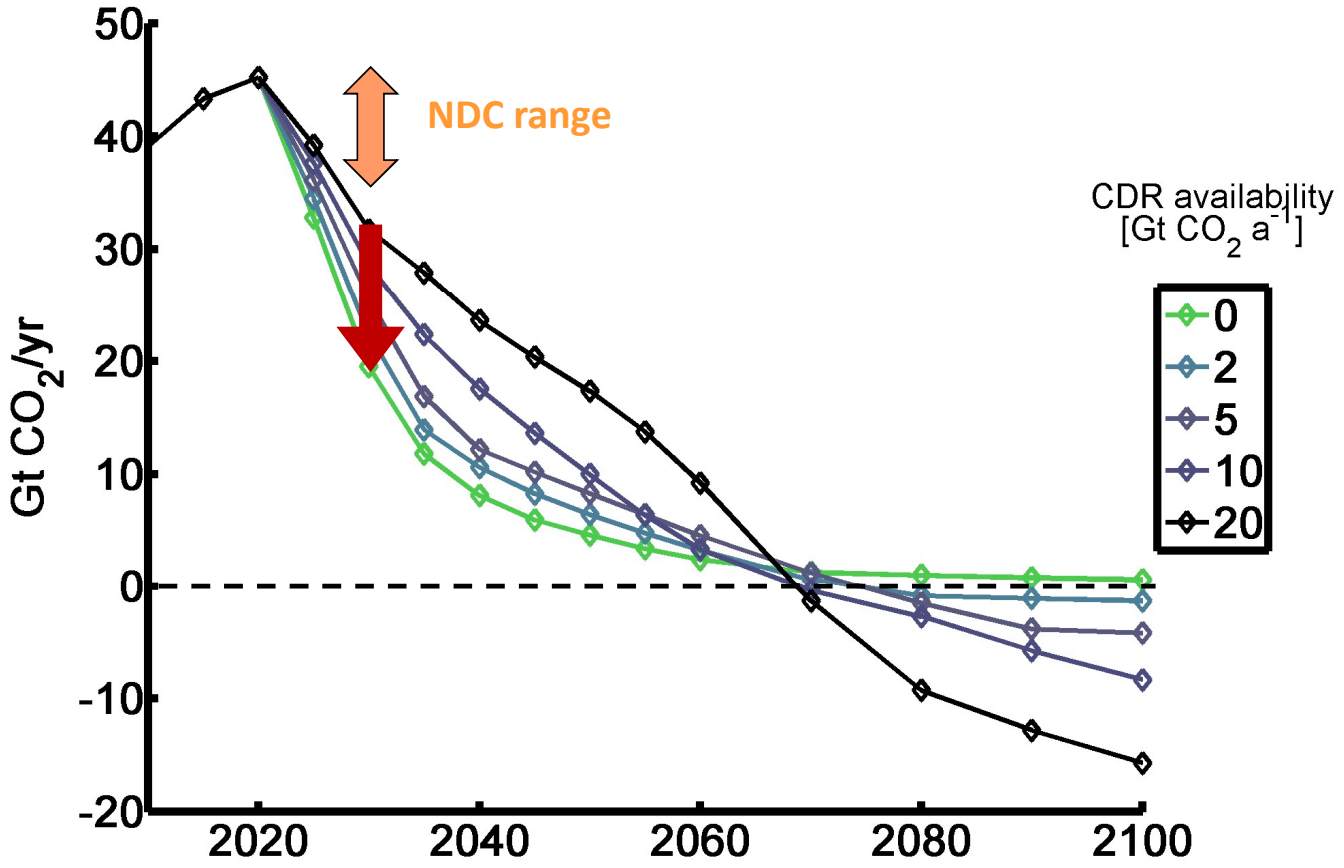


Depend on

1. Climate target
2. Short-term policy
   → Delay leads to higher CDR requirements!
3. Speed of transition

Source: Strefler et al., 2018 (ERL)

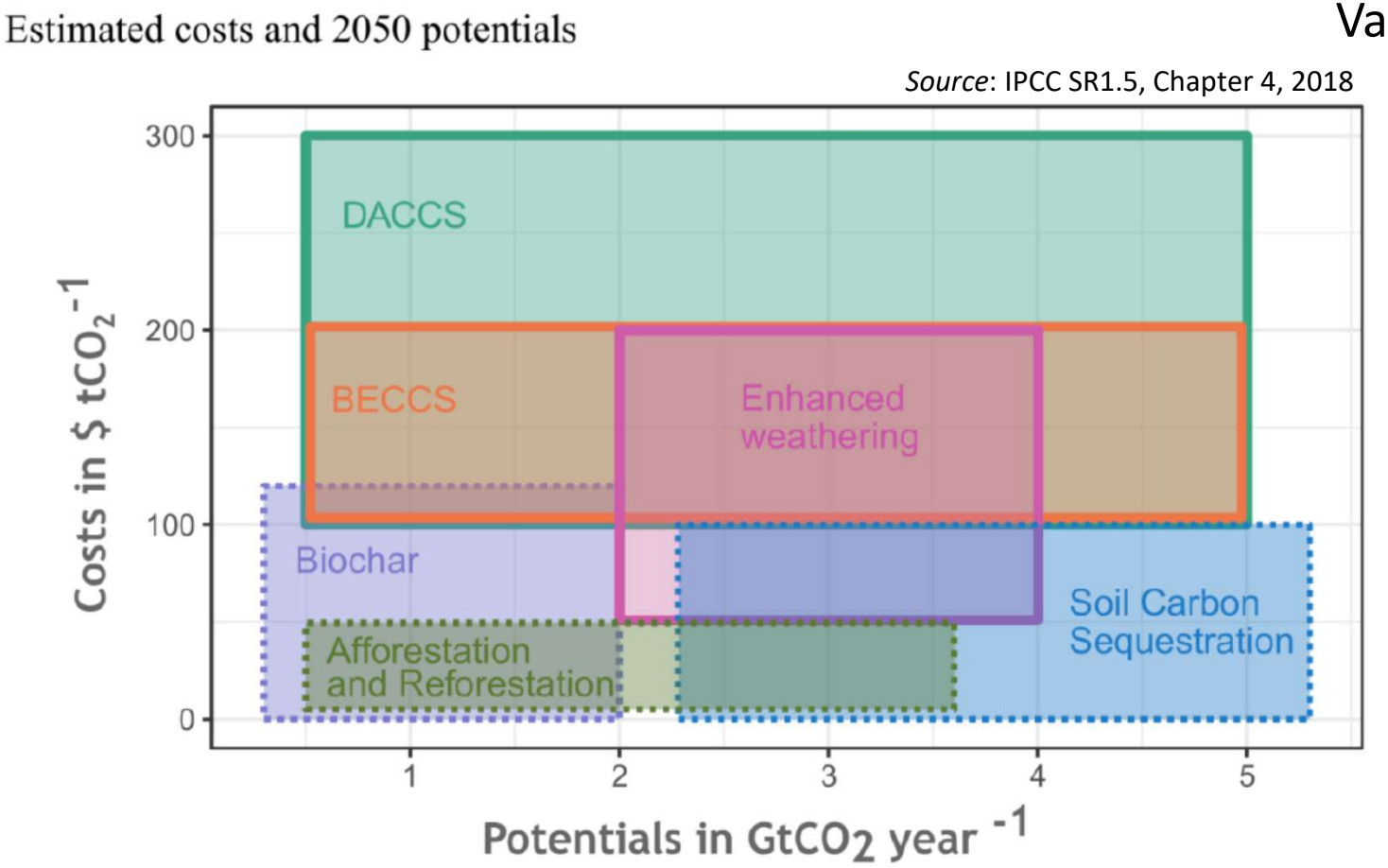
Short-term emission reductions



Source: Strefler et al., 2018 (ERL)

Dr. Jessica Strefler, PIK

CDR options have different costs and potentials



Source: IPCC SR1.5, Chapter 4, 2018

Various criteria

- Sufficient potential
- Technological readiness and economic feasibility
- Permanence of storage / risk of reversal → monitoring, reporting, verification
- Environmental co-benefits / adverse side effects → sustainability
- Social aspects
- Regional potentials → justice and fairness

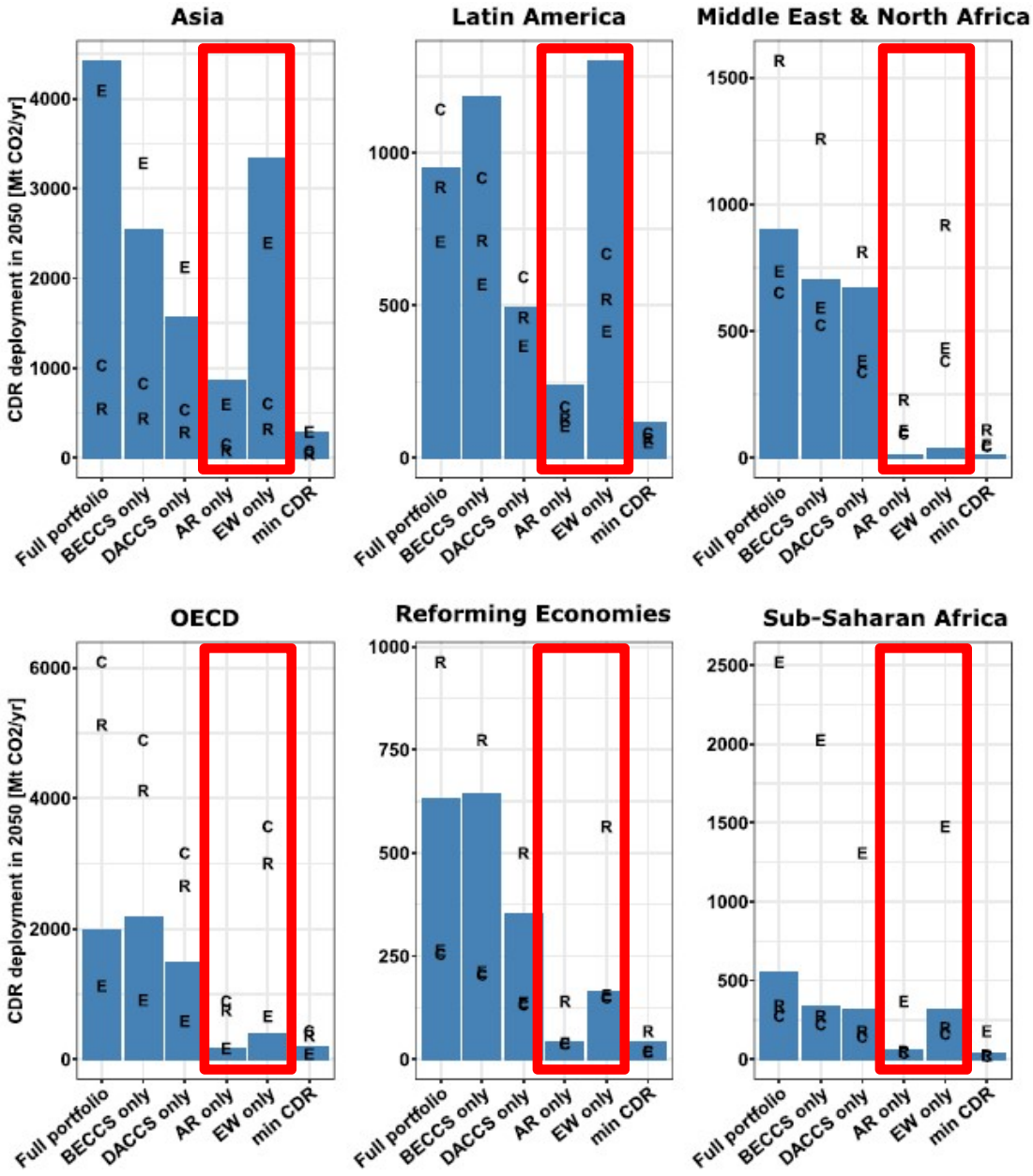
Development of a portfolio reduces risks of single options

Regional deployment

Regional potential varies between options

EW and AR have a strong regional imbalance

→ Development of portfolio of CDR options can balance regional deployment



Source: Strefler et al. 2021, Environmental Research Letters

Summary

- CDR is necessary to compensate residual emissions to achieve net-zero.
- CDR availability is limited and can only compensate the last few percent.
- CDR requirements depend on the climate target, short-term policy, the speed of transition, and the residual emissions.
- Techno-economic, permance, institutional, social, environmental, regional and justice and fairness issues need to be considered.
- Development of a portfolio of options reduces risks.