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Mercator Research Institute on
Global Commons and Climate Change gGmbH

Paris Agreement and the future of bioenergy

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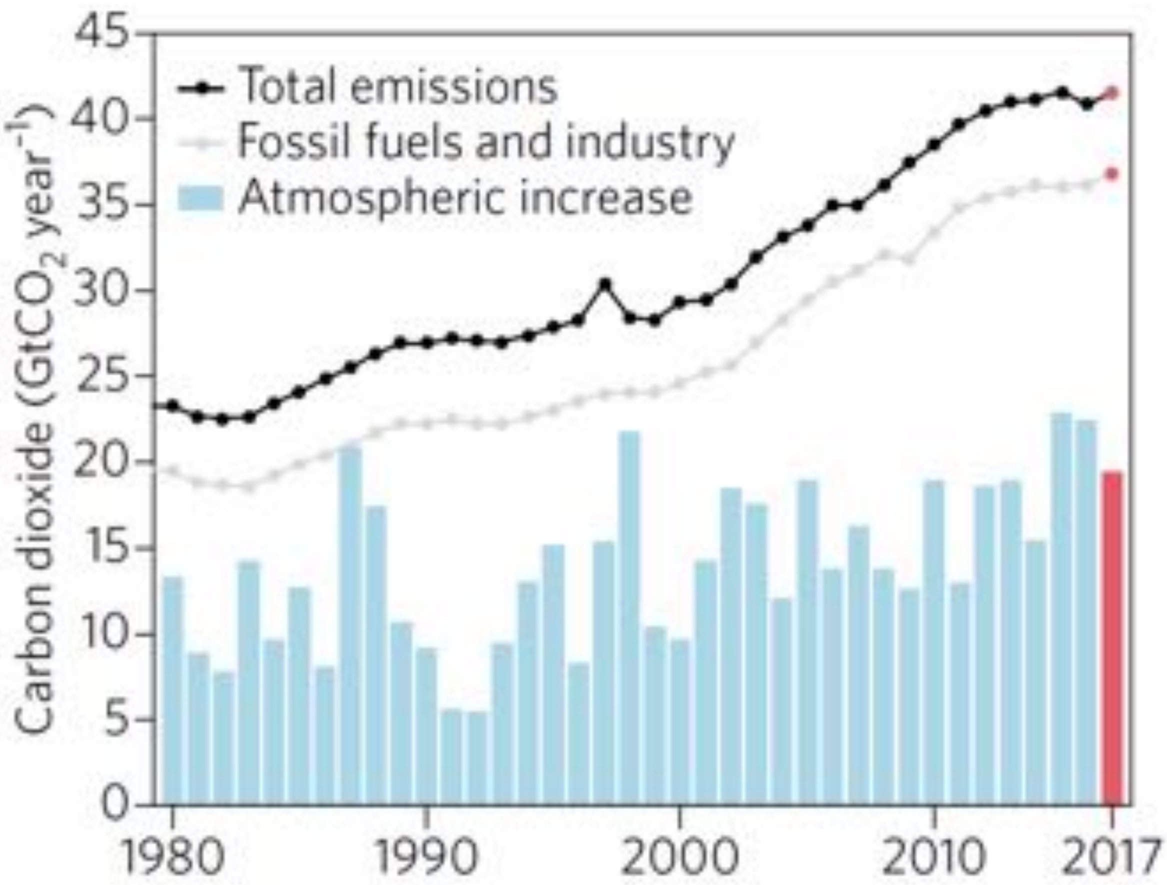
Overview

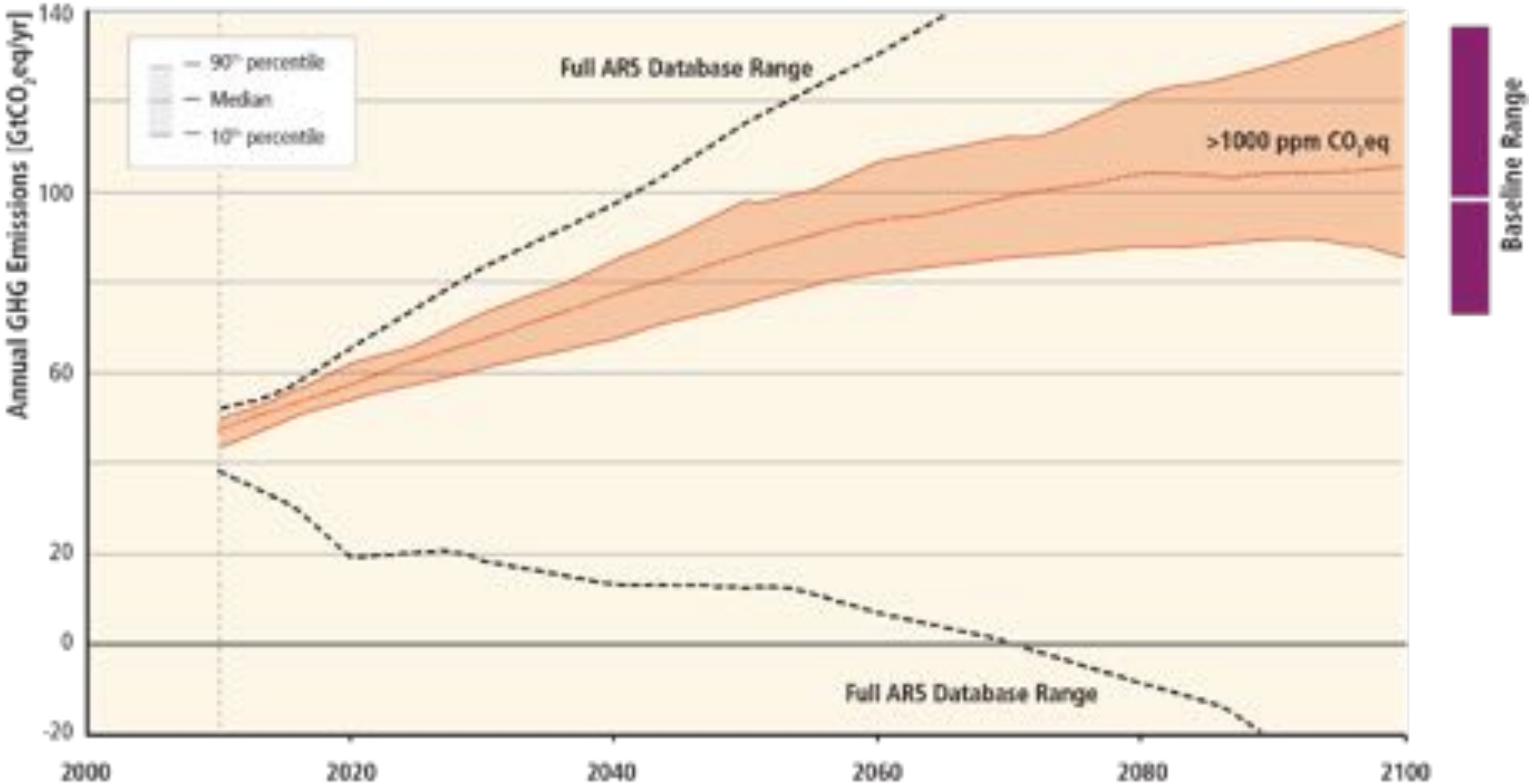
- Mitigation pathways consistent with 2°C limit
- The role of bioenergy in 2°C scenarios
- Enhancing mitigation to 1.5°C
- Negative emissions technologies

Emissions are rising, rising and rising.



Source: Peters et al. (2017)

Limiting warming to well below 2°C requires a fundamental transformation of the world economy



Source: IPCC (2014)

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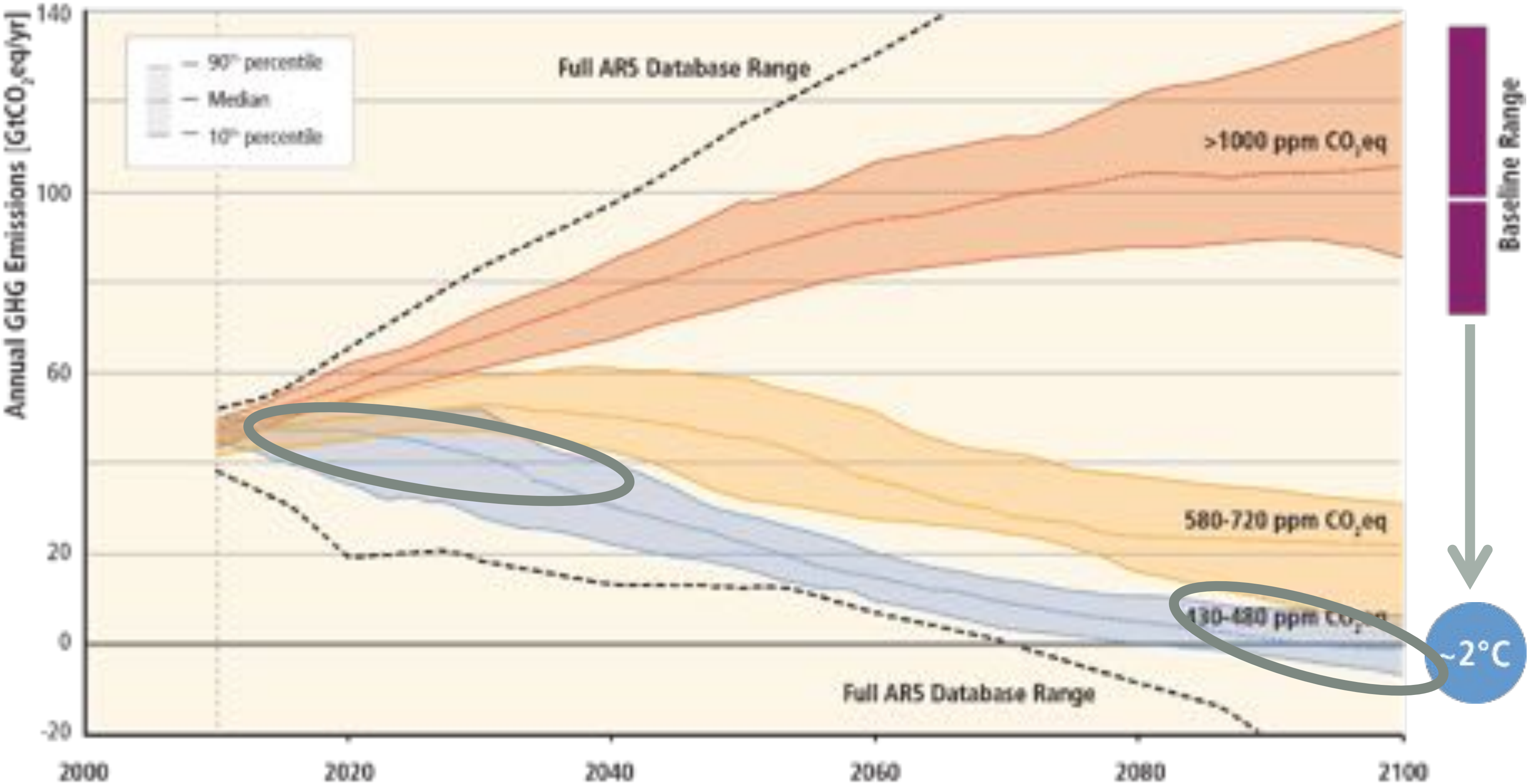
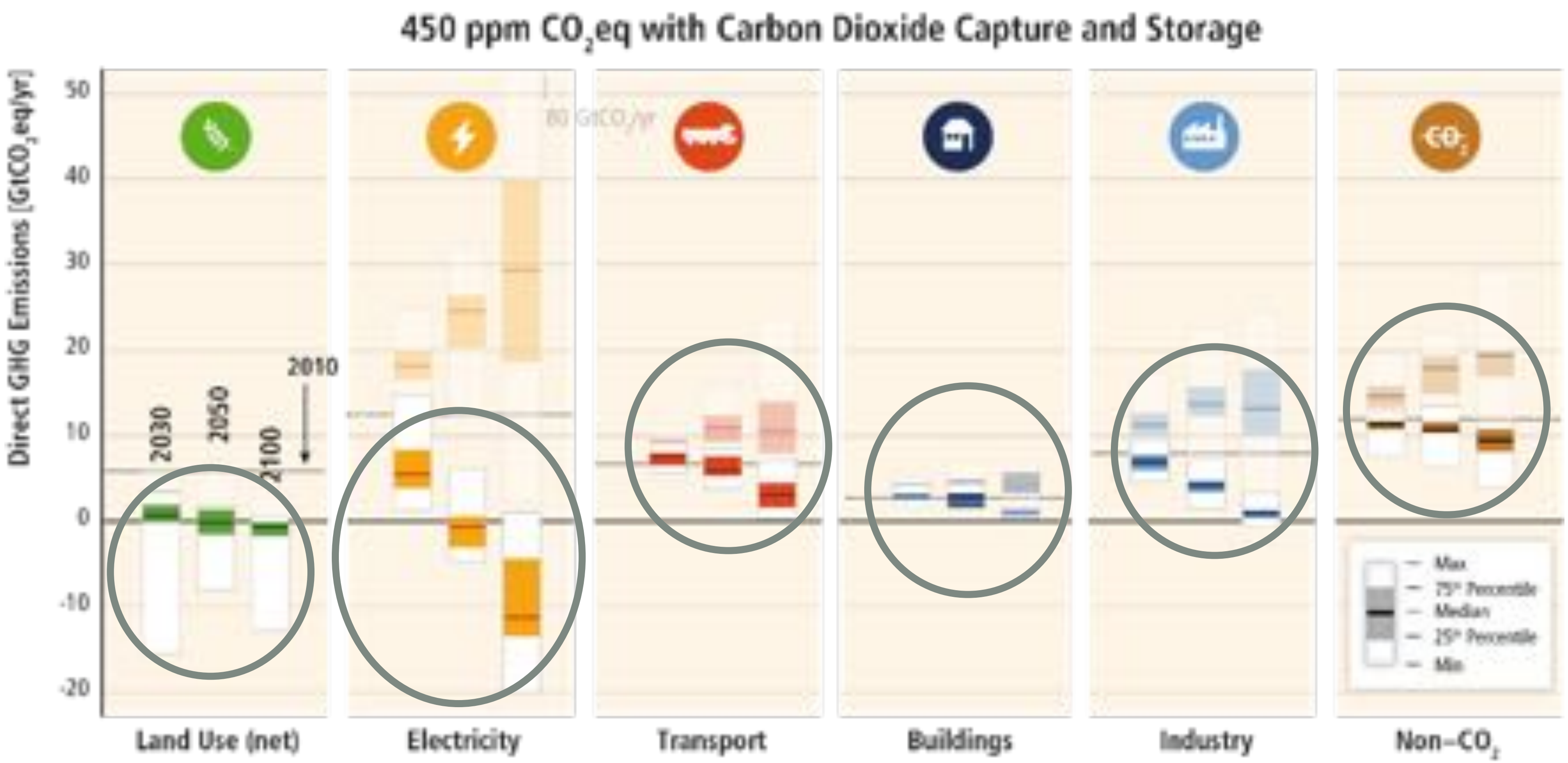


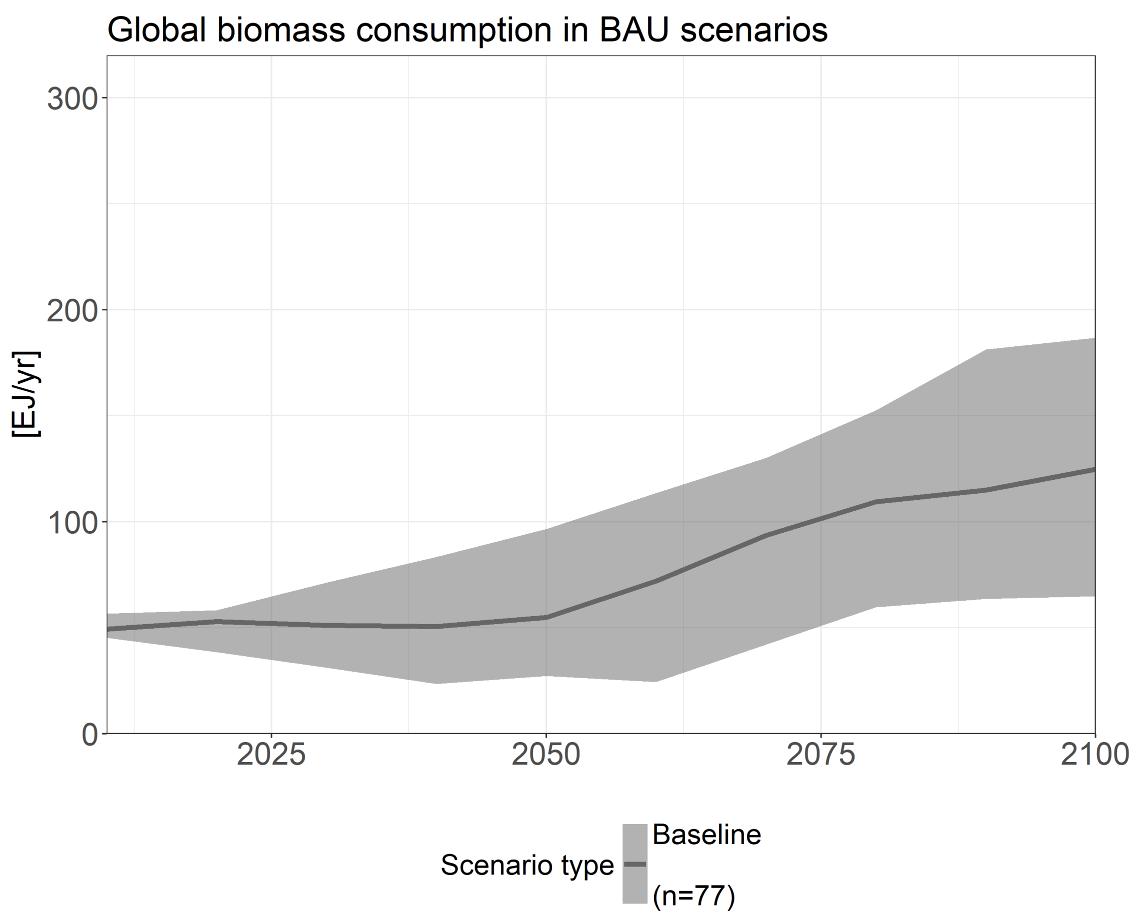
Source: IPCC (2014)

For 2°C, deep emission reductions are required in all sectors.



Source: IPCC (2014)

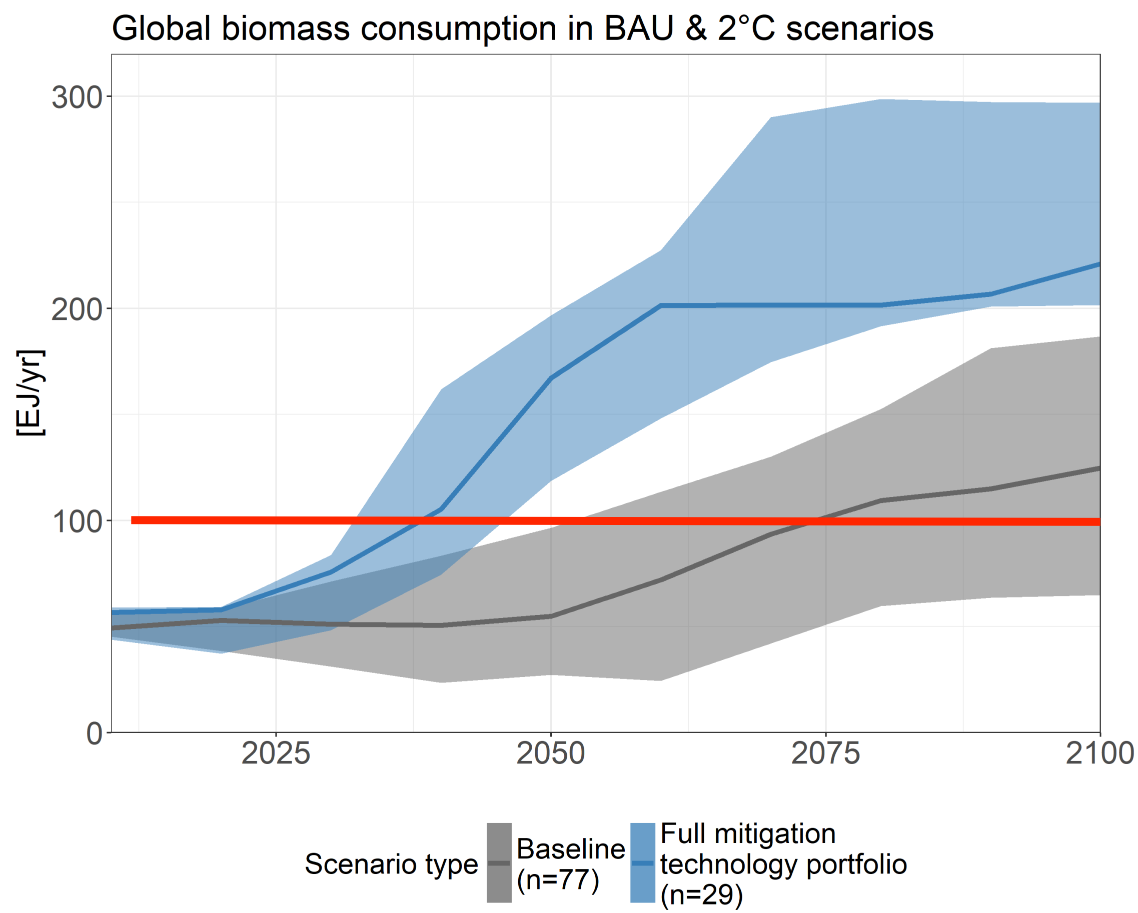
Bioenergy is important for climate change mitigation



- Bioenergy is heavily deployed even in business-as-usual scenarios

Figure: Jerome Hilaire
Data: AMPERE, LIMITS, ROSE, Rogelj et al. (2015); Luderer et al. (2013),

Bioenergy is important for climate change mitigation



- Bioenergy is heavily deployed even in business-as-usual scenarios
- Rapid bioenergy upscaling between 2030 and 2060 in 2°C scenarios
- There are 2°C pathways where bioenergy is constrained to no more than 100EJ/yr

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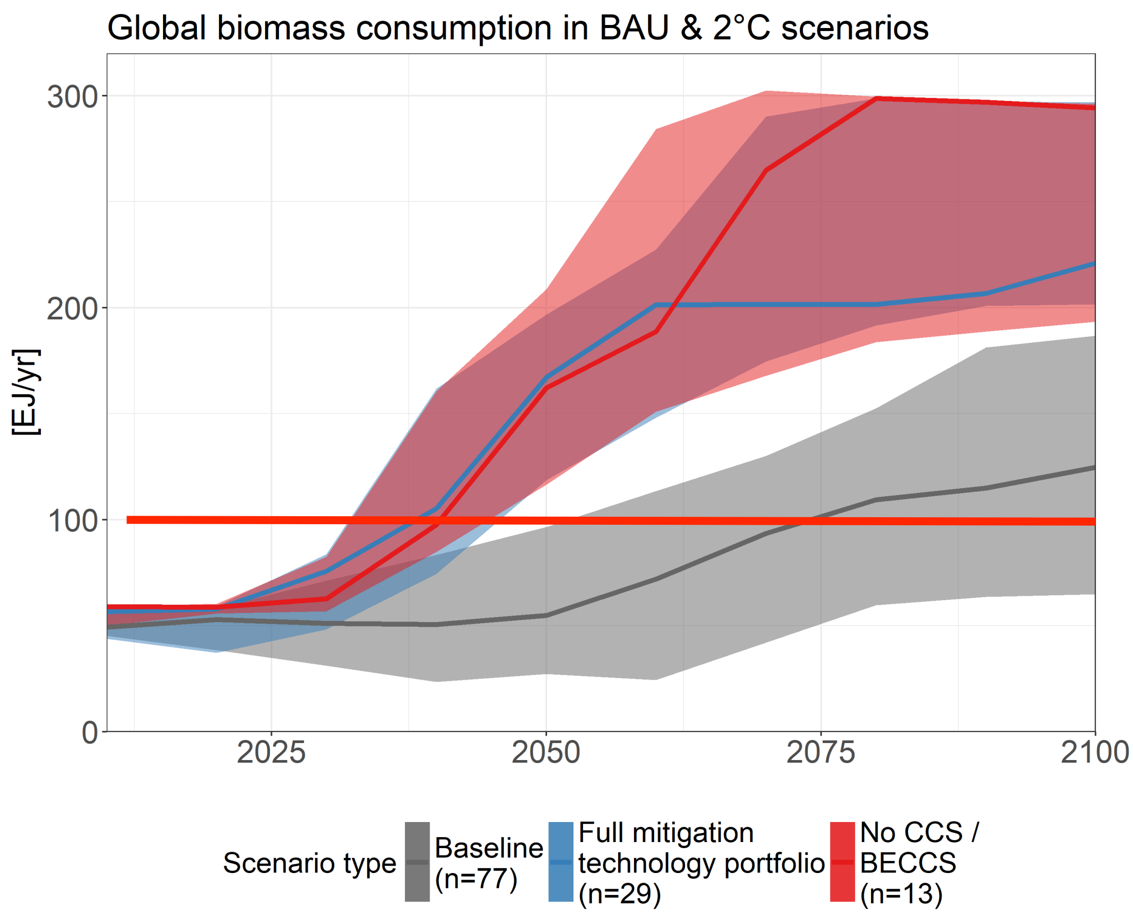
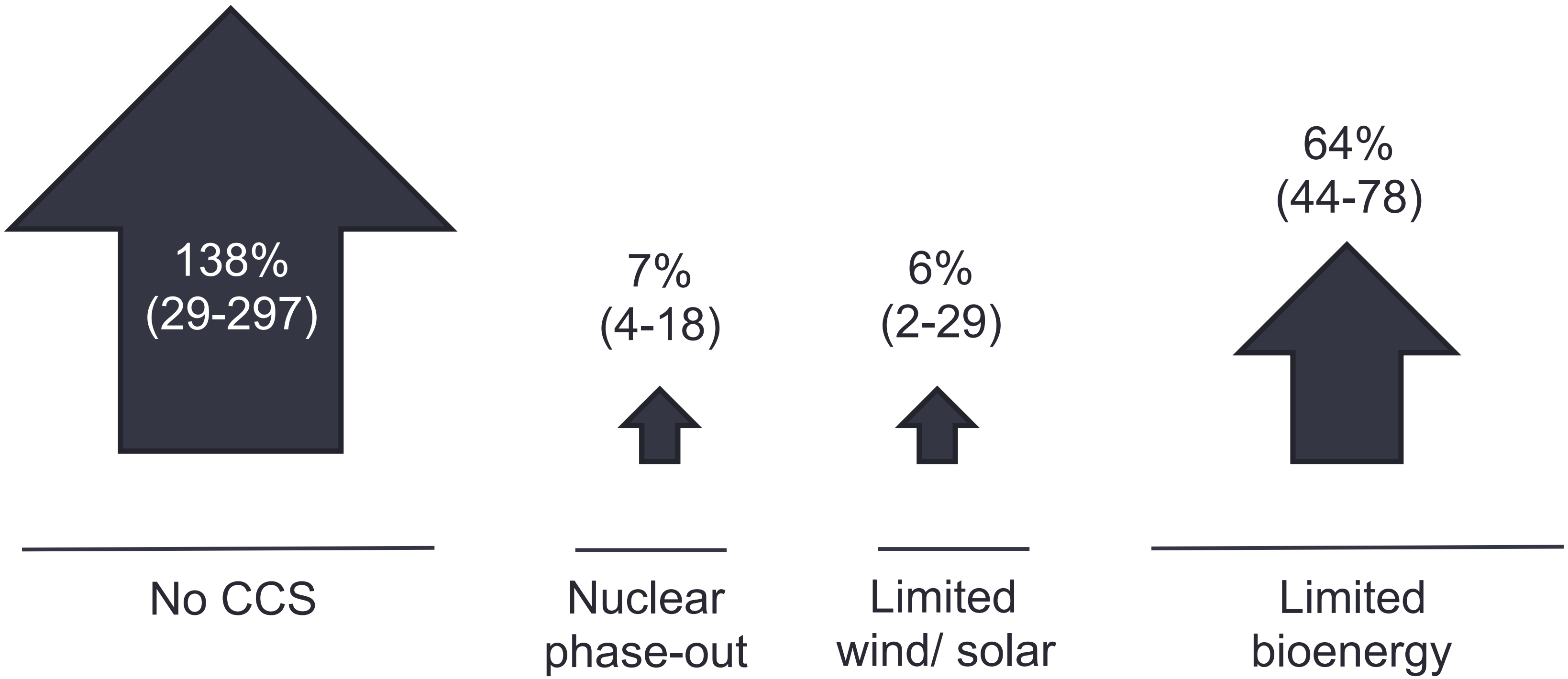
Bioenergy is important for climate change mitigation



- Bioenergy is heavily deployed even in business-as-usual scenarios
- Rapid bioenergy upscaling between 2030 and 2070 in 2°C scenarios
- There are 2°C pathways where bioenergy is constrained to no more than 100EJ/yr
- Bioenergy is versatile. Relevance regardless of „negative emissions“

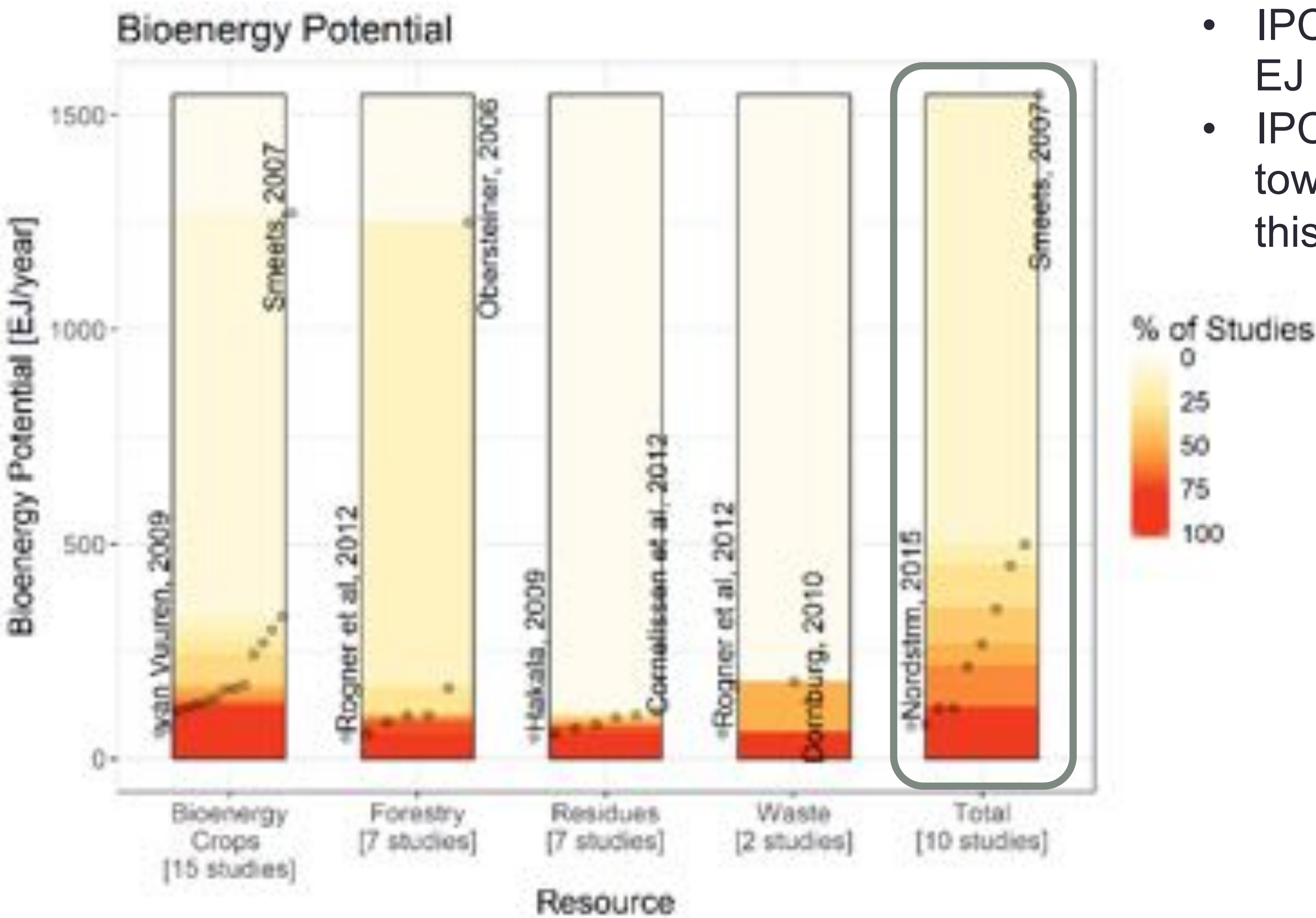
Figure: Jerome Hilaire
Data: AMPERE, LIMITS, ROSE, Rogelj et al. (2015); Luderer et al. (2013)

Constraints on bioenergy availability increases mitigation cost



Source: IPCC (2014)

Severe disagreement in scientific community what a sustainable level of bioenergy deployment is



- IPCC SRREN: 100-300 EJ
- IPCC AR5: points towards lower end of this range

Source: Fuss et al. (re-submitted)

Even faster bioenergy upscaling in 1.5°C scenarios

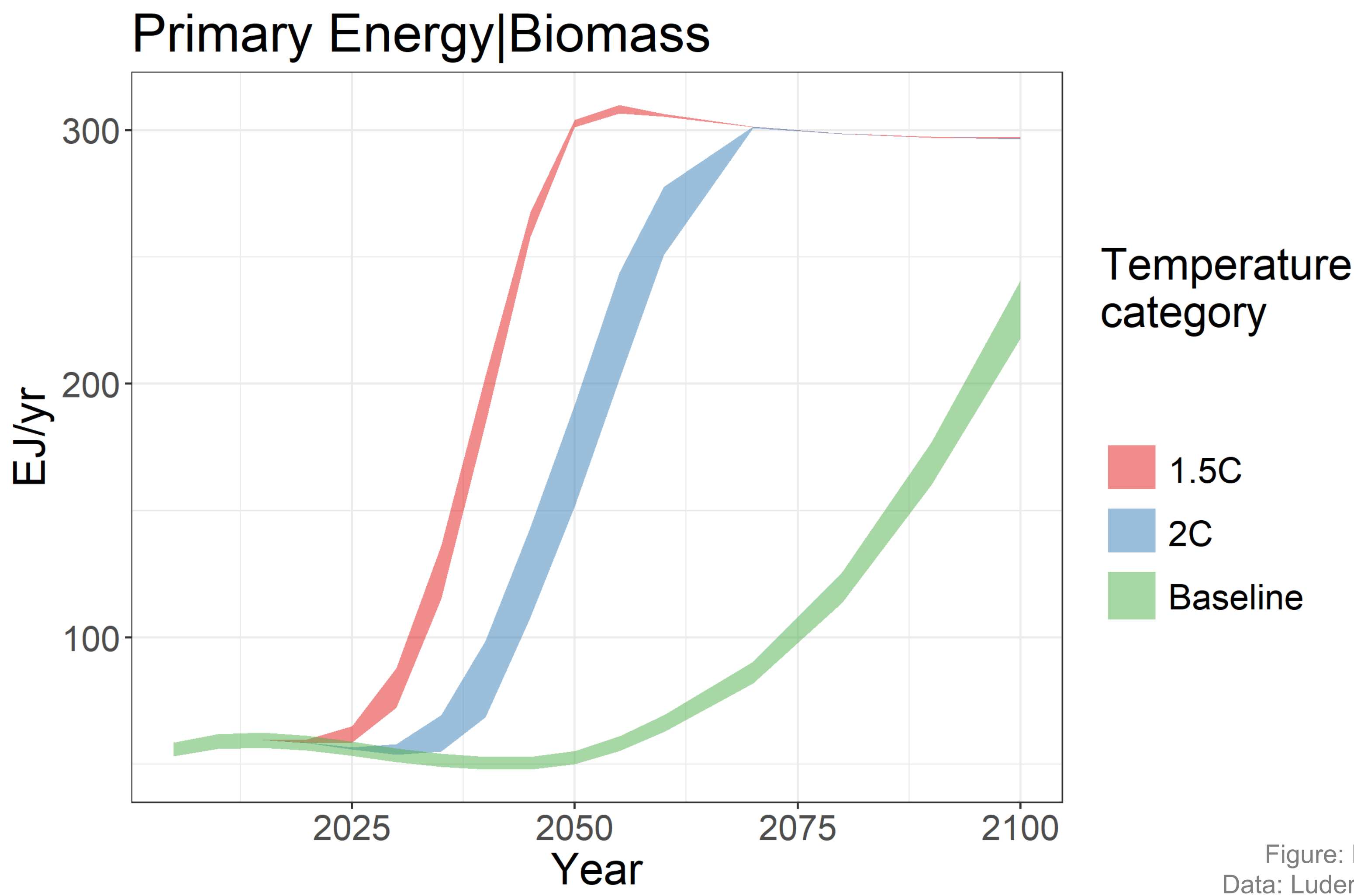
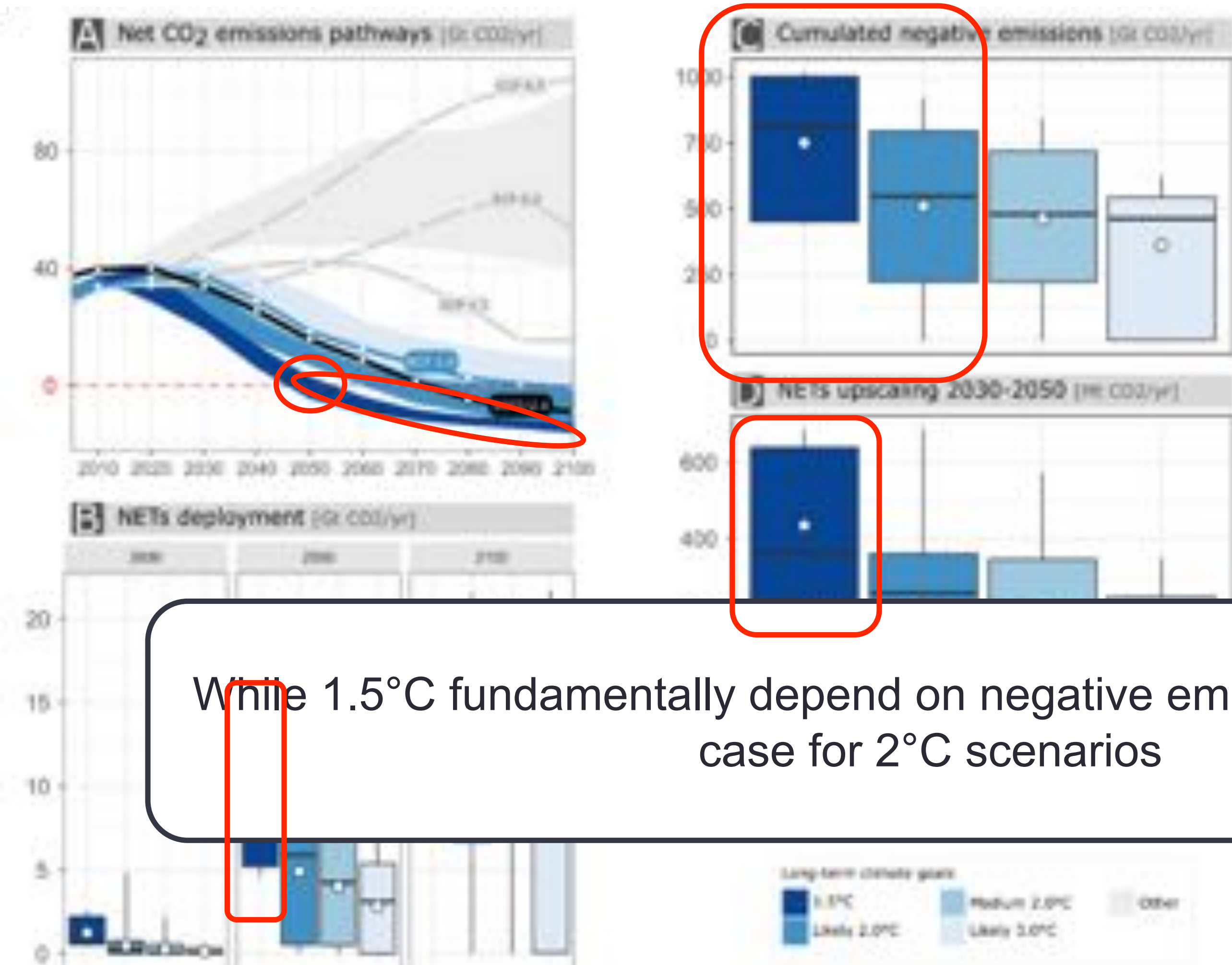


Figure: Max Callaghan
Data: Luderer et al. (2013)

1.5°C scenarios are distinct from 2°C scenarios



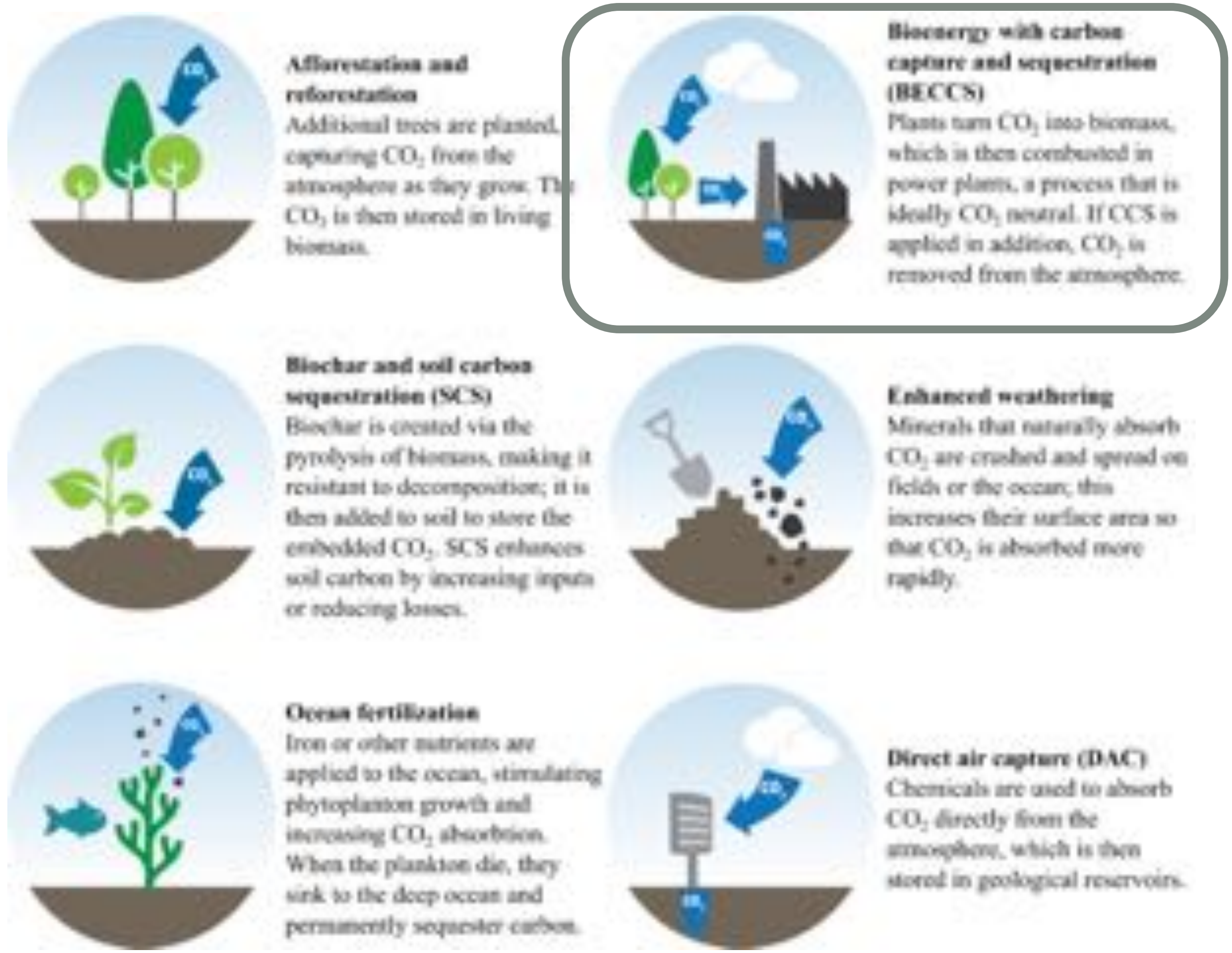
Charateristics of 1.5°C scenarios

- Fully decarbonized world economy by 2050 (sharp emissions reductions)
- Sustained period of deep net negative emissions thereafter
- …ally higher

While 1.5°C fundamentally depend on negative emissions, this is not the case for 2°C scenarios

Source: Fuss et al. (re-submitted)

Negative emissions can be generated by a diverse set of technologies

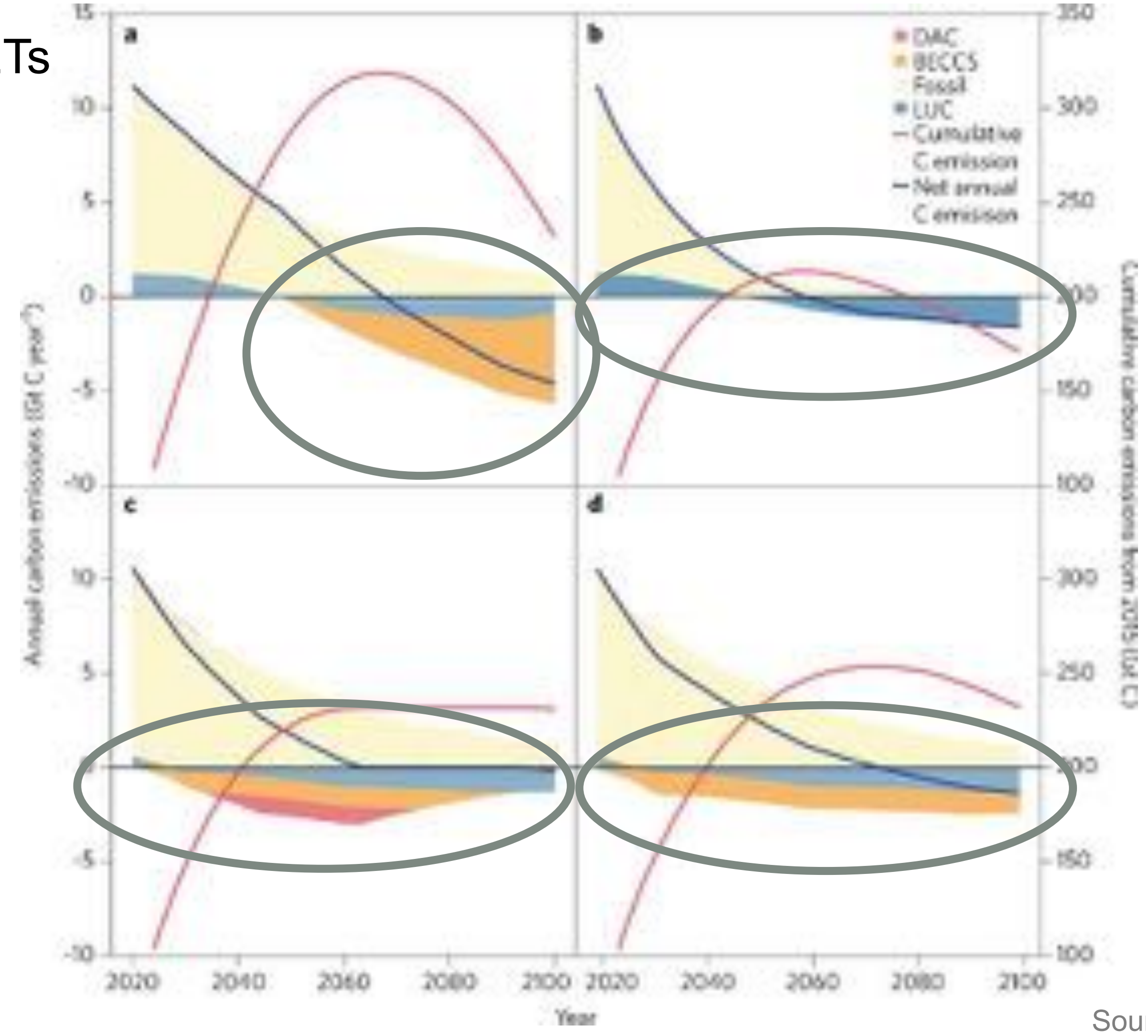


Source: Minx et al. (2017)

There are multiple „negative emission worlds“ that need to be explored

Late century NETs

Rapid decarbonization



No overshoot

Minimize NETs

Source: Obersteiner et al. (2018)

Conclusion

- Achieving the international climate goals of the Paris Agreement requires a full decabronization of the world economy.
- Bioenergy plays an important role for meeting the climate goals of the Paris Agreement.
- The absence of substantial amounts of bioenergy makes such mitigation more difficult and costly
- Substantial disagreement on what a sustainable bioenergy potential may be
- Bioenergy is versatile and important regardless of scale of carbon dioxide removal („negative emissions“)
- Enhancing mitigation ambition to 1.5°C makes „negative emissions“ obligatory
- Need a broader discussion of possible „negative emissions worlds“ – and the role of bioenergy therein

Thanks!

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the Potsdam Institute for Climate Impact Research