20 Years of Carbon Capture and Storage

Accelerating Future Deployment

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Bioenergy with CCS: Achieving a 2°C target and beyond

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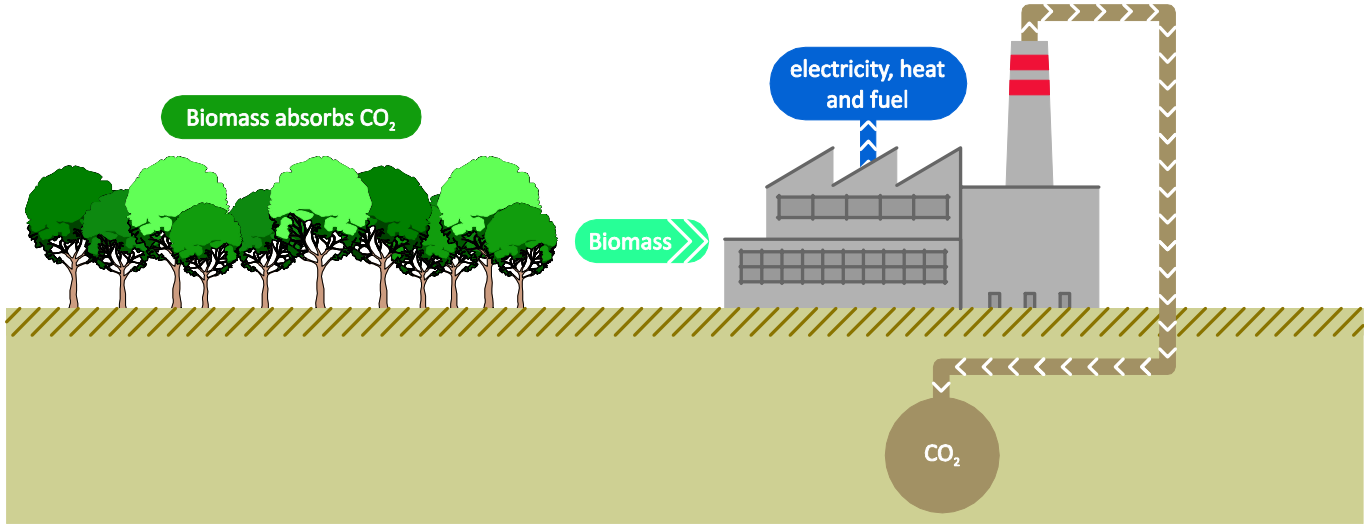
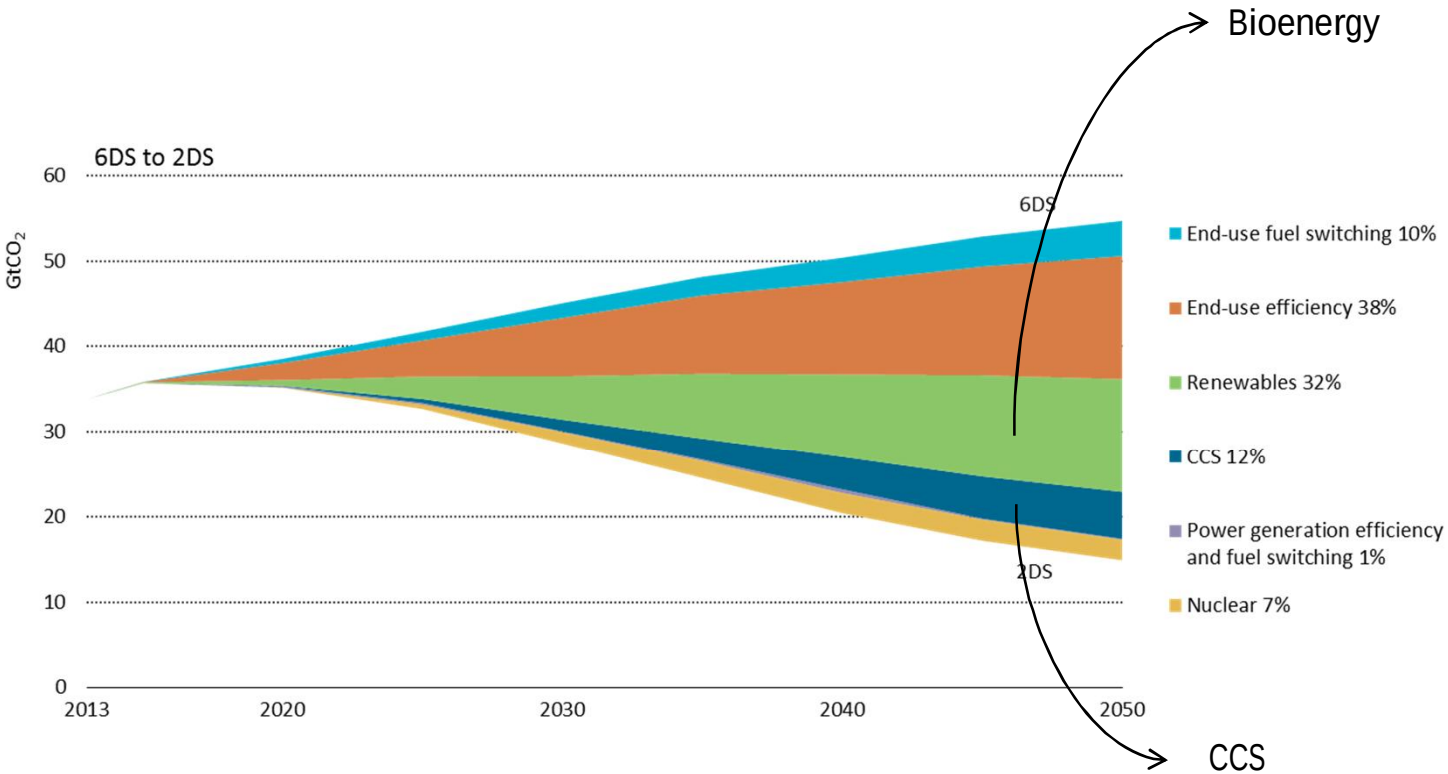
What is BECCS?

- Carbon capture and storage (CCS) in which the feedstock is biomass
- One of very few technologies able to deliver “negative emissions” - and arguably the most mature
- Possible applications of BECCS include:
  - Dedicated or co-firing of biomass in power plants
  - Combined heat and power (CHP)
  - Pulp and paper mills
  - Lime kilns
  - Ethanol plants
  - Bio-gas refineries
  - Biomass gasification plants

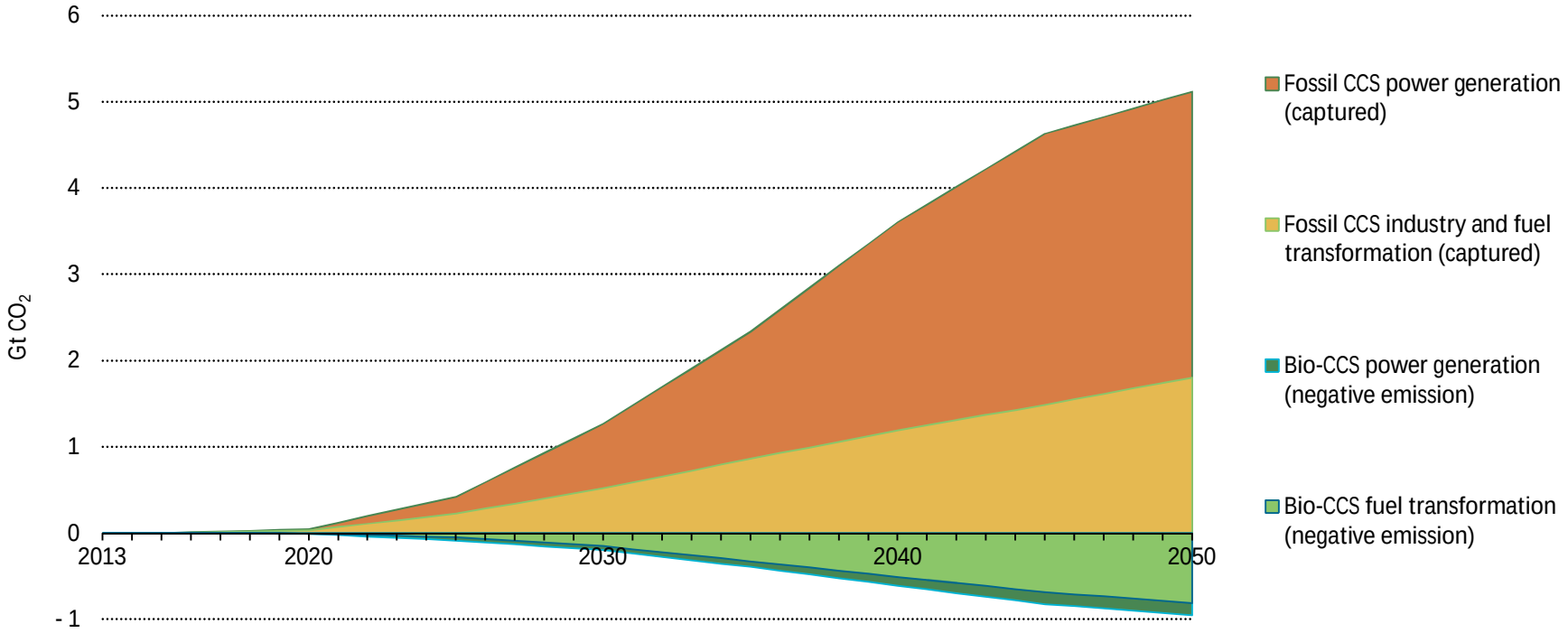


BECCS and the IEA 2DS



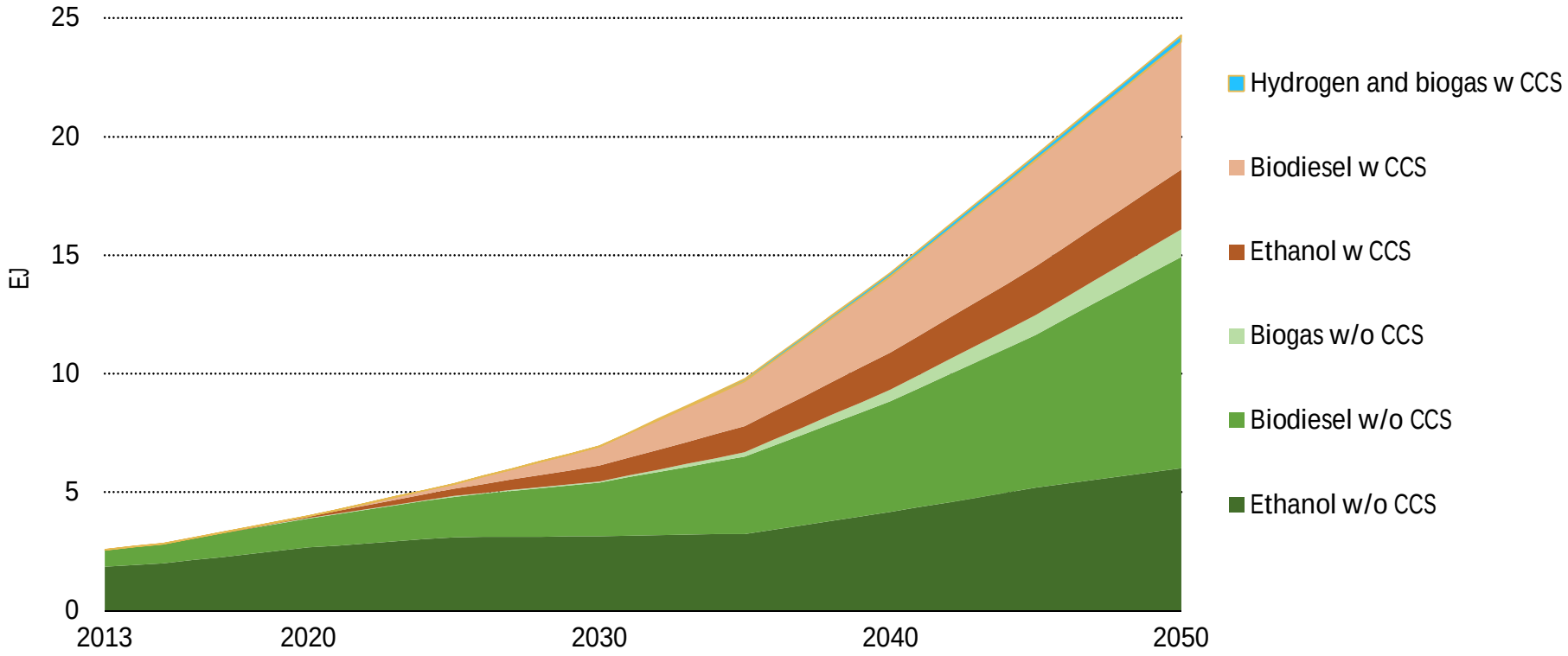
- Bioenergy provides around 10% and CCS 12% of the cumulative reductions
- Bio-CCS accounts for 2% of the cumulative reductions.

Role of biomass with CCS in the 2DS: Generating 'negative emissions'



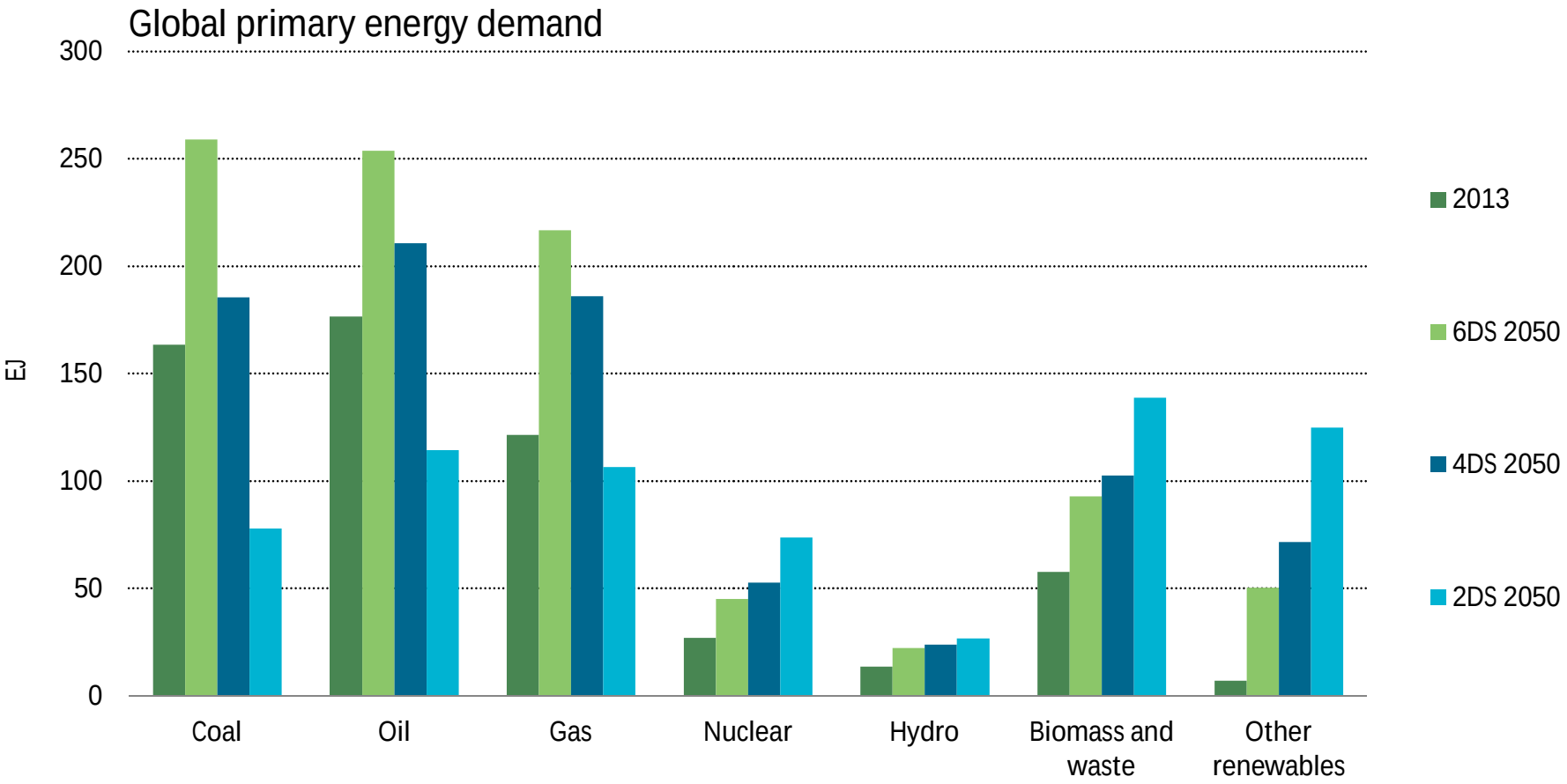
- Almost 1 Gt of CO_2 captured in 2050 is linked to biomass with CCS, corresponding to 16% of total CO_2 captured globally

Global biofuel production



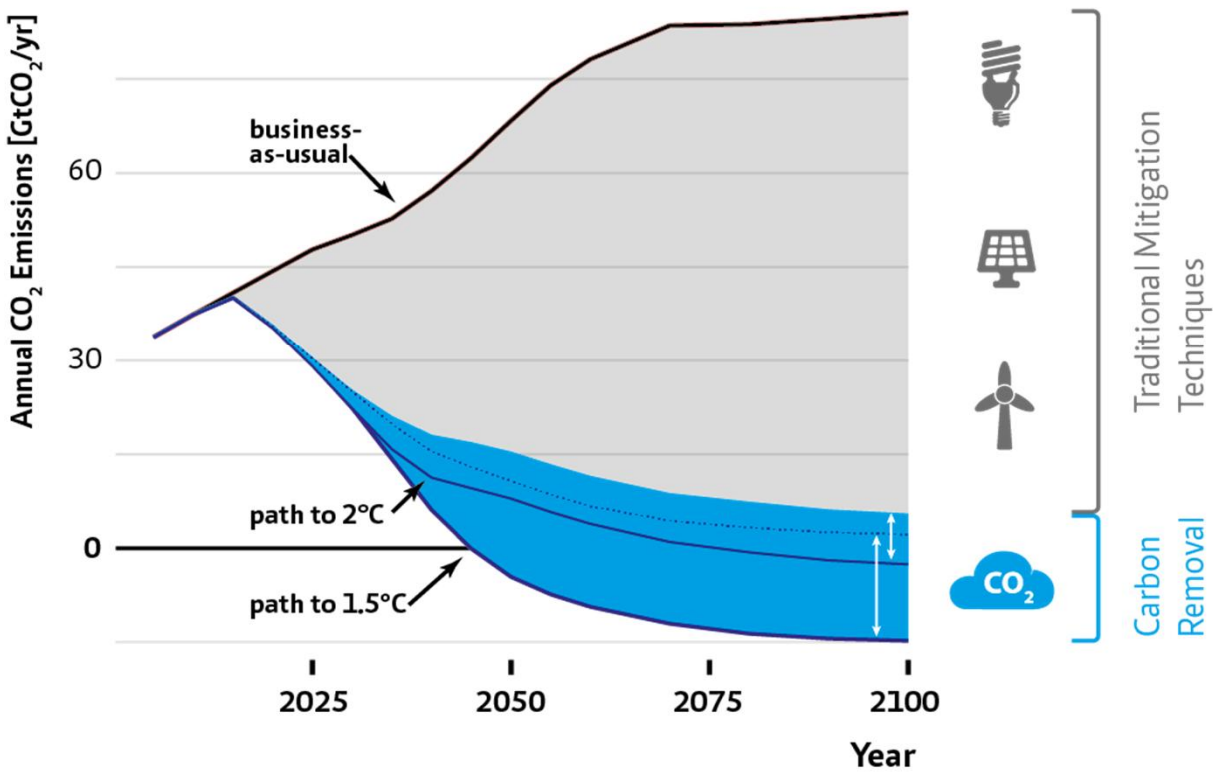
Biomass with CCS accounts for almost 30% of liquid and gaseous biofuel production in 2050 in the 2DS.

Bioenergy becomes the single largest source of energy

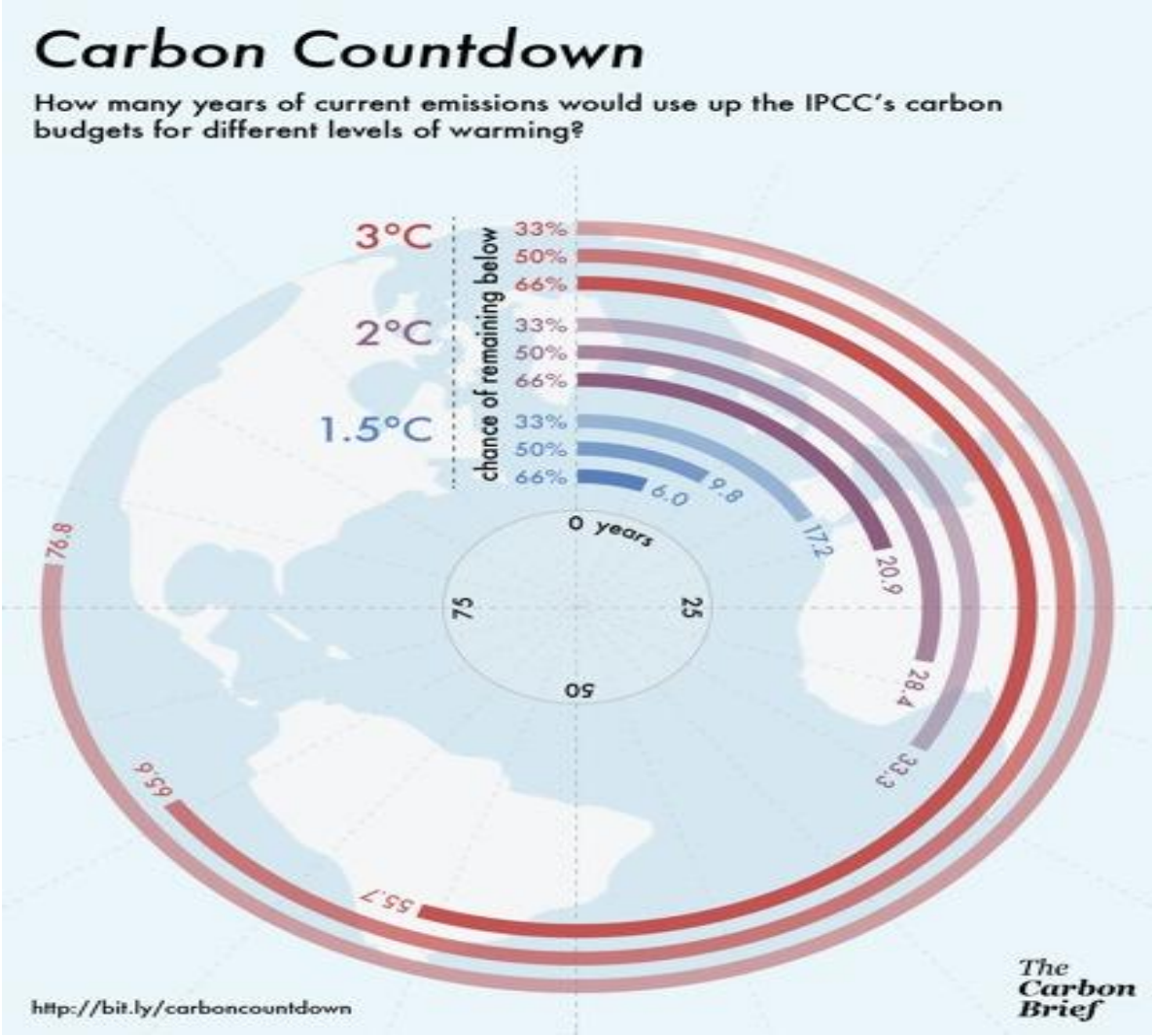


Share of fossil fuels in primary energy is in the 2DS with 45% almost halved by 2050 compared to today (81%), biomass becomes the largest energy source in 2050 in the 2DS.

Can we get to 'well below 2' without BECCS?

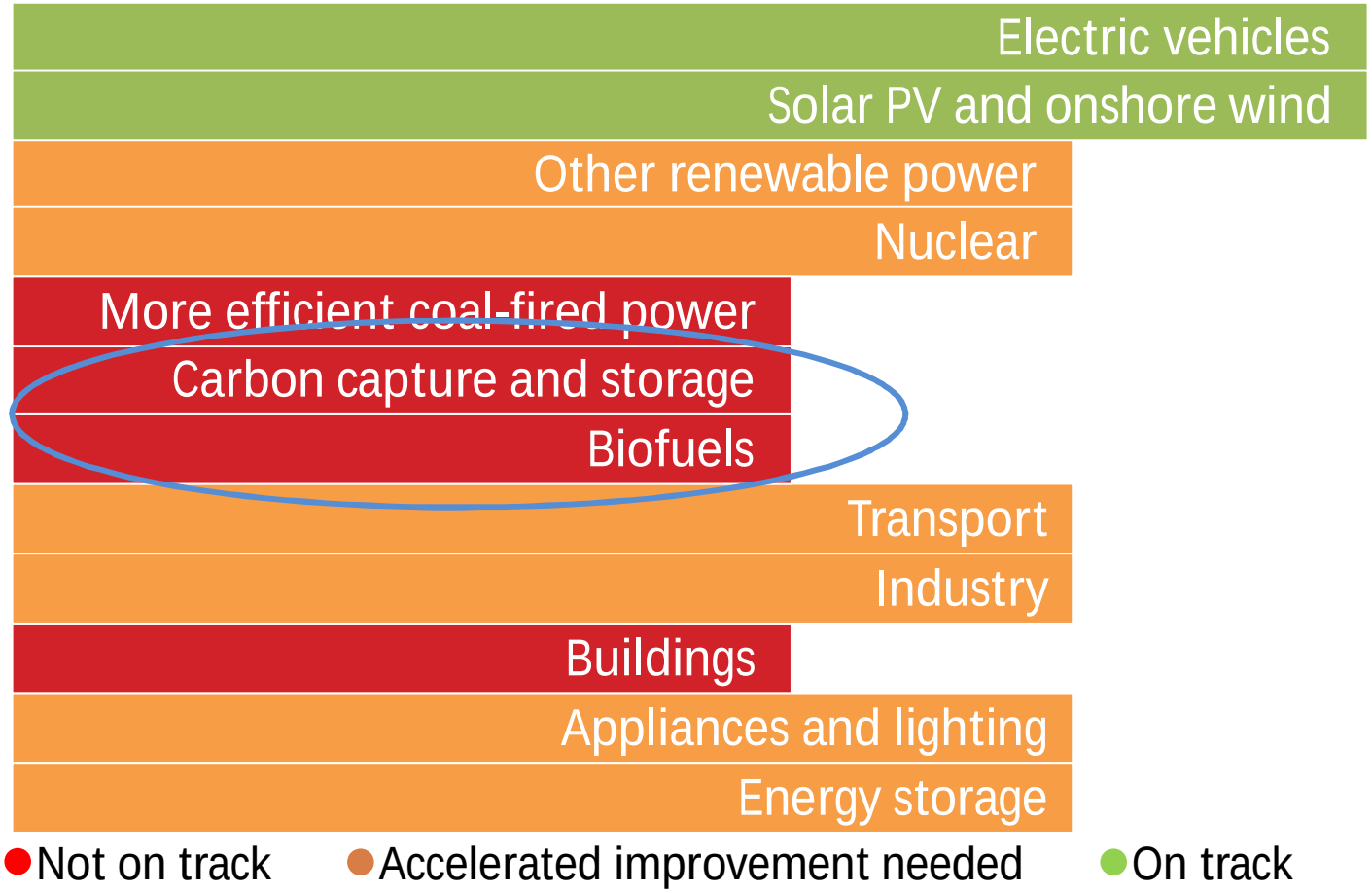


Risk of “overshoot” is high

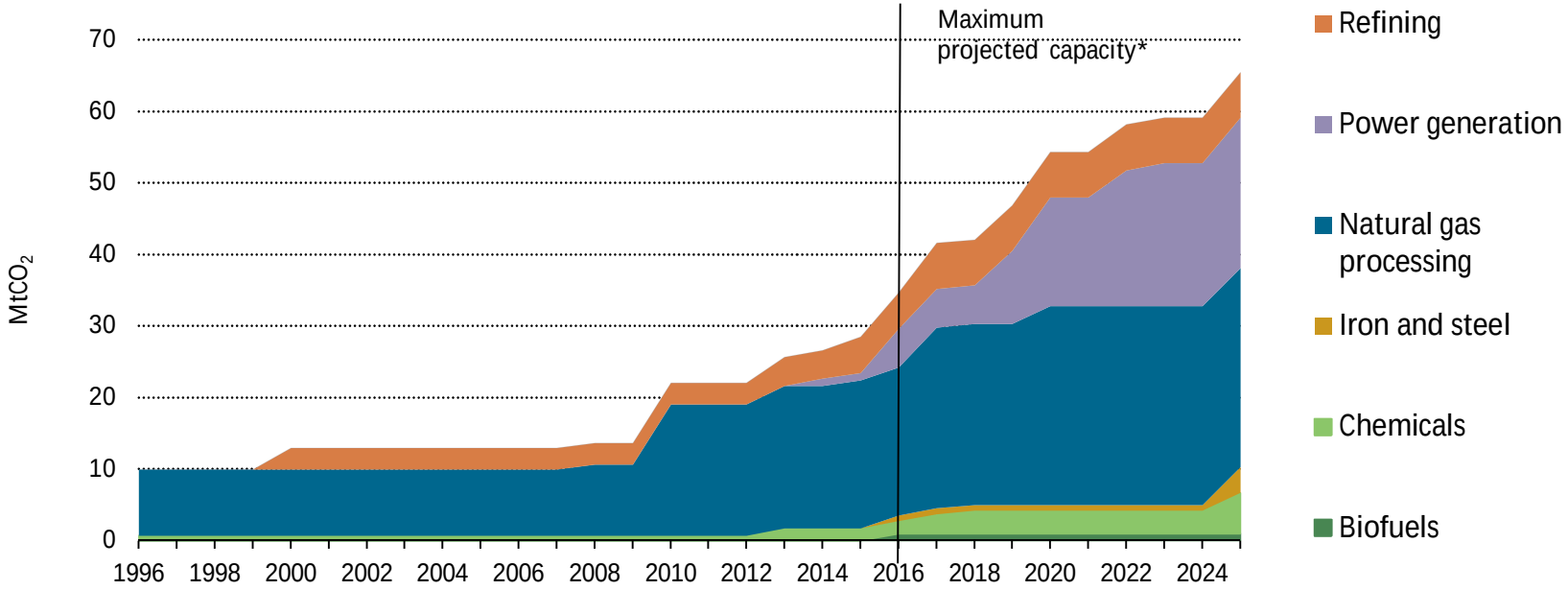


Can BECCS deliver?
CCS and Bioenergy "off-track"

Technology Status today against 2DS targets



CCS is progressing, but too slowly



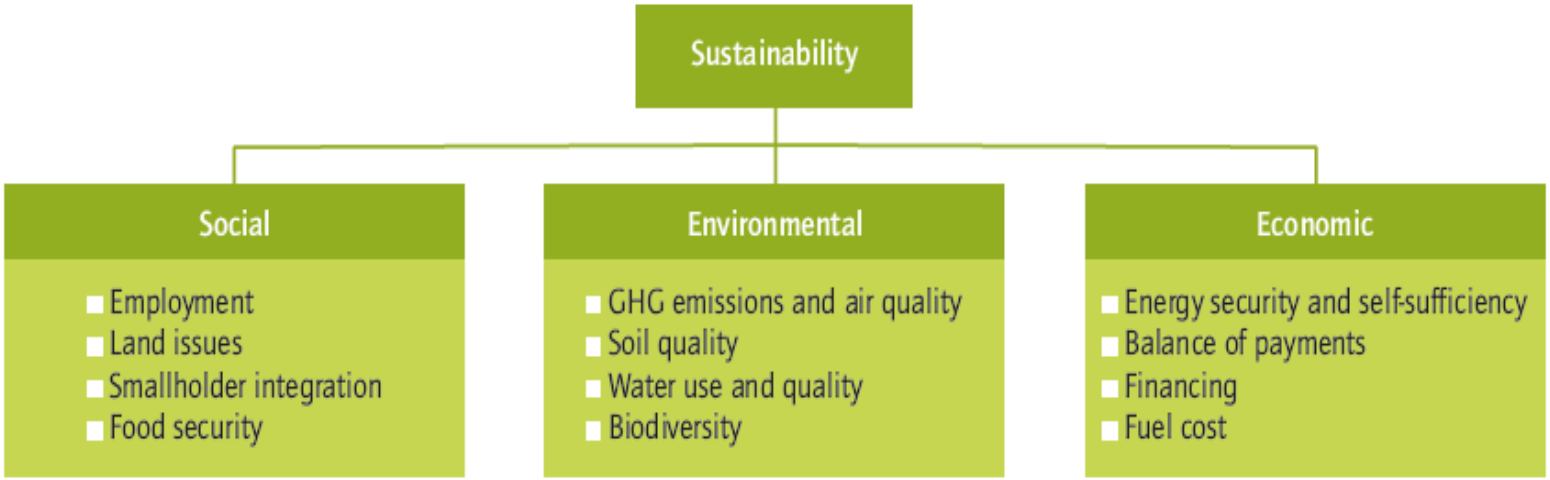
15 large-scale CCS projects are in operation and 6 under construction. Only one is linked to bioenergy (ADM Illinois).

Challenges for deployment

Bioenergy-related factors	CCS-related factors
▪ Sustainability of biomass ▪ Land use changes ▪ Land availability ▪ Water requirements ▪ Fertiliser requirements ▪ Health and social impacts ▪ Impact of climate change on crop yields ▪ Food security/competition ▪ Competition for biomass ▪ Lifecycle emissions – measurement and uncertainty ▪ Biomass transport costs ▪ Public perception	▪ Capture cost ▪ Economies of scale ▪ Energy requirements ▪ Transport infrastructure availability ▪ Geological storage availability ▪ Technical and integration risks ▪ Public perception

ADM's Illinois Industrial CCS Project: the first large-scale BECCS project

Sustainability of Biofuels



- Sound policies are needed to ensure biofuels are produced sustainably
- Assessments and policies should be based on international sustainability criteria (as developed *e.g.* by the Global Bioenergy Partnership, GBEP) covering all three sustainability pillars – social environmental and economic
- Many sustainability issues are relevant to the whole agricultural/ forestry sector and not just to biofuels
- Particularly sensitive issues include:
  - the magnitude and timing of ghg savings compared to fossil fuel use
  - The impact on food production

Priorities for BECCS

- Resolving accounting issues to ensure appropriate recognition of "negative emissions"
- Ensuring bioenergy production is (genuinely) sustainable
- Understanding and quantifying future potential
- Investment in multi-user CO_2 transport and storage infrastructure
- Cultivate near-term opportunities for BECCS deployment

Action on BECCS is needed today to deliver negative emissions in the future!

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THANK YOU!