



**IEA Bioenergy**

Technology Collaboration Programme



## *Bioenergy in a well below 2 degree world: expectations and success factors for long-term evolution*

Session: Bioenergy's contribution to low-carbon energy systems

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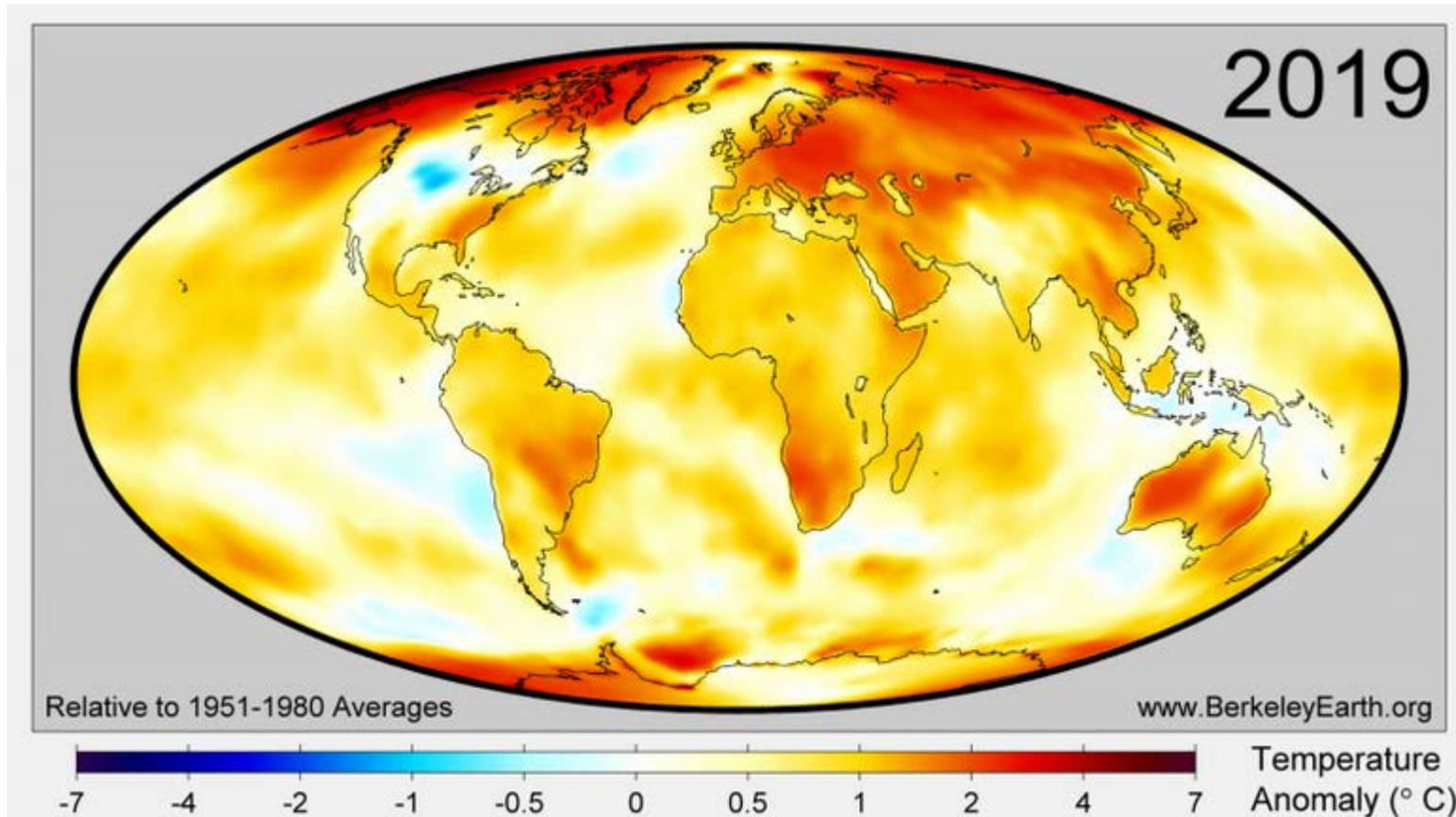
7/12/2021

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**Technology Collaboration Programme**

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# To maintain a BW2 world we have 10 years to act!



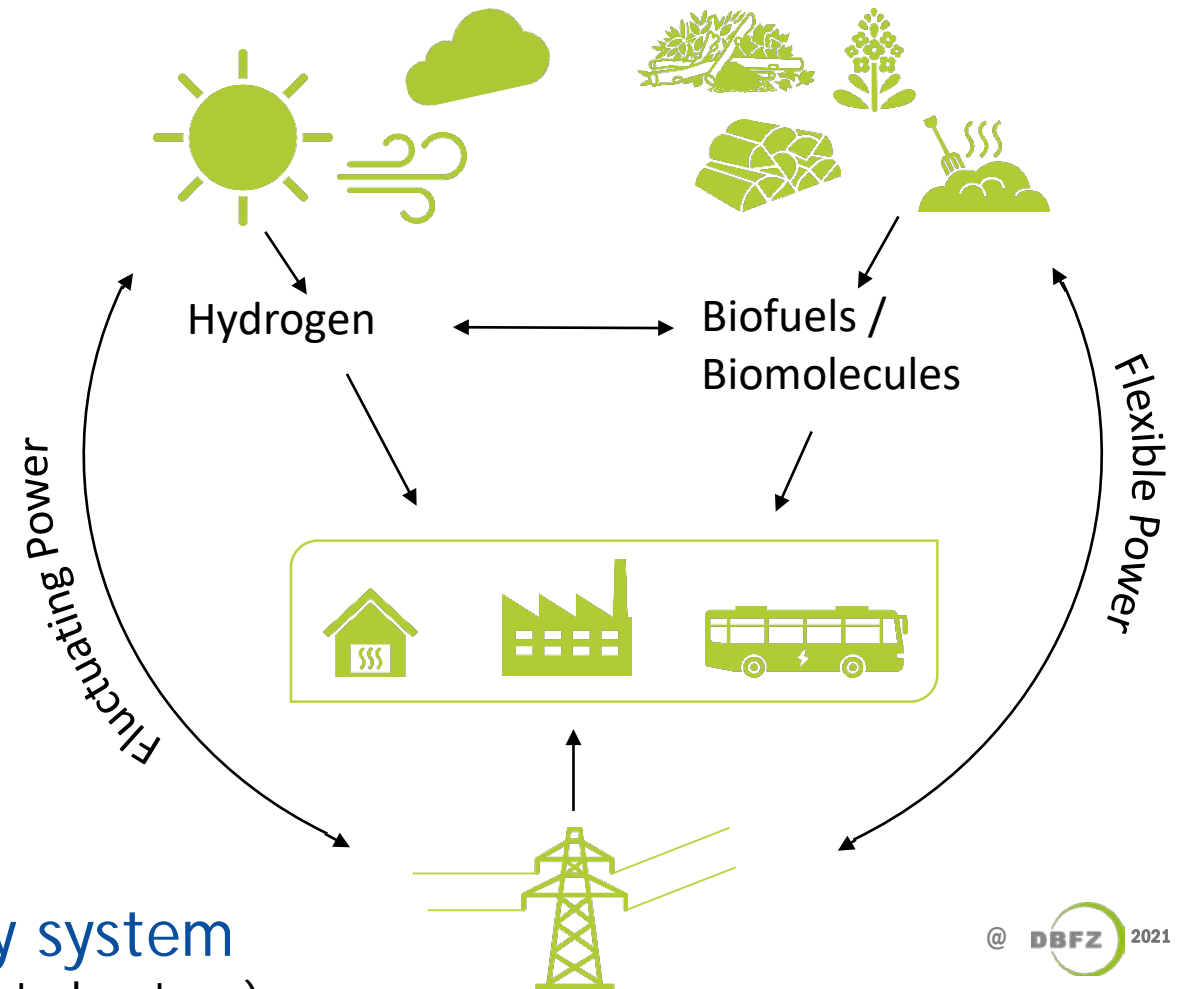
Source: <https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions>; last attended November 2021

# Expectation on the role of bioenergy

## Energy system

- Sustainable resources and modern bioenergy
- Flexible RE in systems with increasing variable RE
- Storable fuels for application difficult to electrify
- Support implementation of hydrogen

→ "Smart" embedding in the energy system  
(e.g. networked information exchange and smart control systems)





# Synergies with other renewables

## A variety of options

<https://task44.ieabioenergy.com/best-practices/>



Germany, E-gas plant in Werlte (@ e-gas GmbH, 2021)



Australia, @ The Ehtec Lignocellulosic Bioethanol Pilot Plant in Muswellbrook



Sweden, Liquid Wind's production facility (@ Övik Energi)

# Synergies with other renewables

## The way forward

Five cornerstones are necessary

- (1) Clear definition
- (2) Multiplication of Best cases
- (3) Technology development
- (4) Policy and market conditions
- (5) Appropriate consideration in long energy system planning



<https://task44.ieabioenergy.com/publications/five-cornerstones-to-unlock-the-potential-of-flexible-bioenergy-2021/>

# Expectation on bioenergy

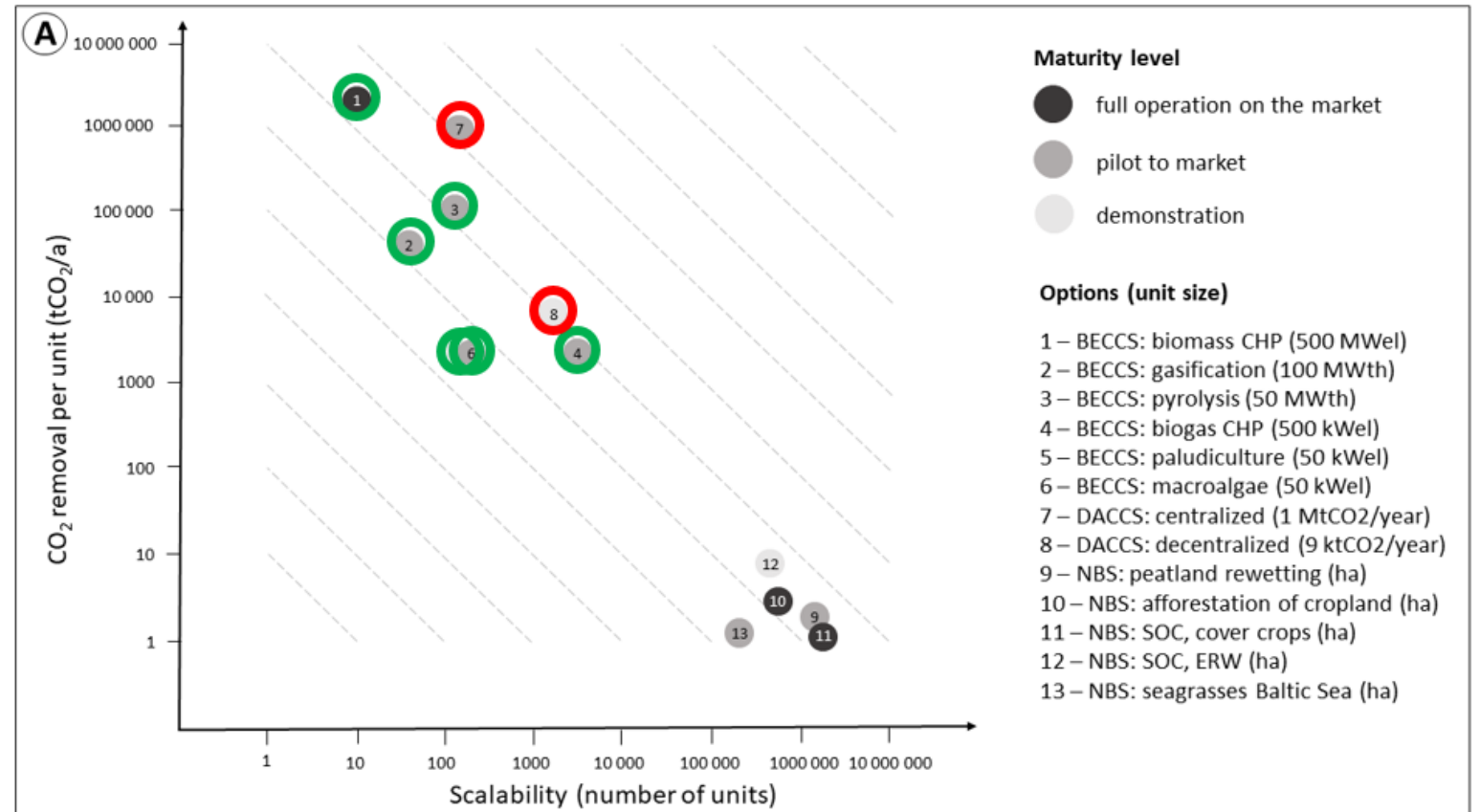
## Climate system

### Carbon Dioxid Removal depends on bioenergy

- Capture potential
- Technology rediness
- Net energy povision



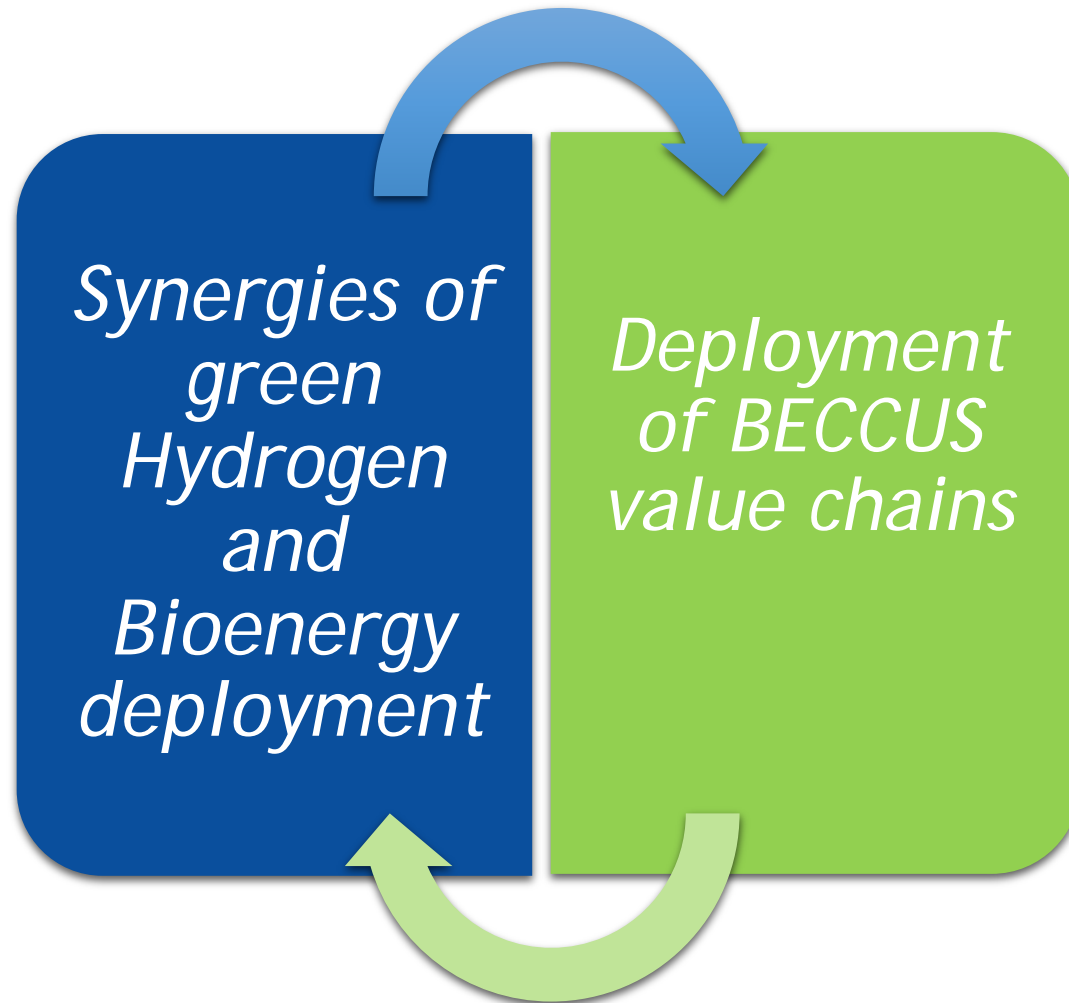
Source: Jan Otto/iStockPhoto.com



Source: Potential for CDR in Germany. Adopted from Borchers et al. (2021): Contribution to Net-Zero-2050 Germany - the portfolio of carbon dioxide removal options. Under review. (green circles: net energy provision; red circles: net energy demand)

# Conclusion

## Flexibility, Green Hydrogen and BECCU/S



# Thank you

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