

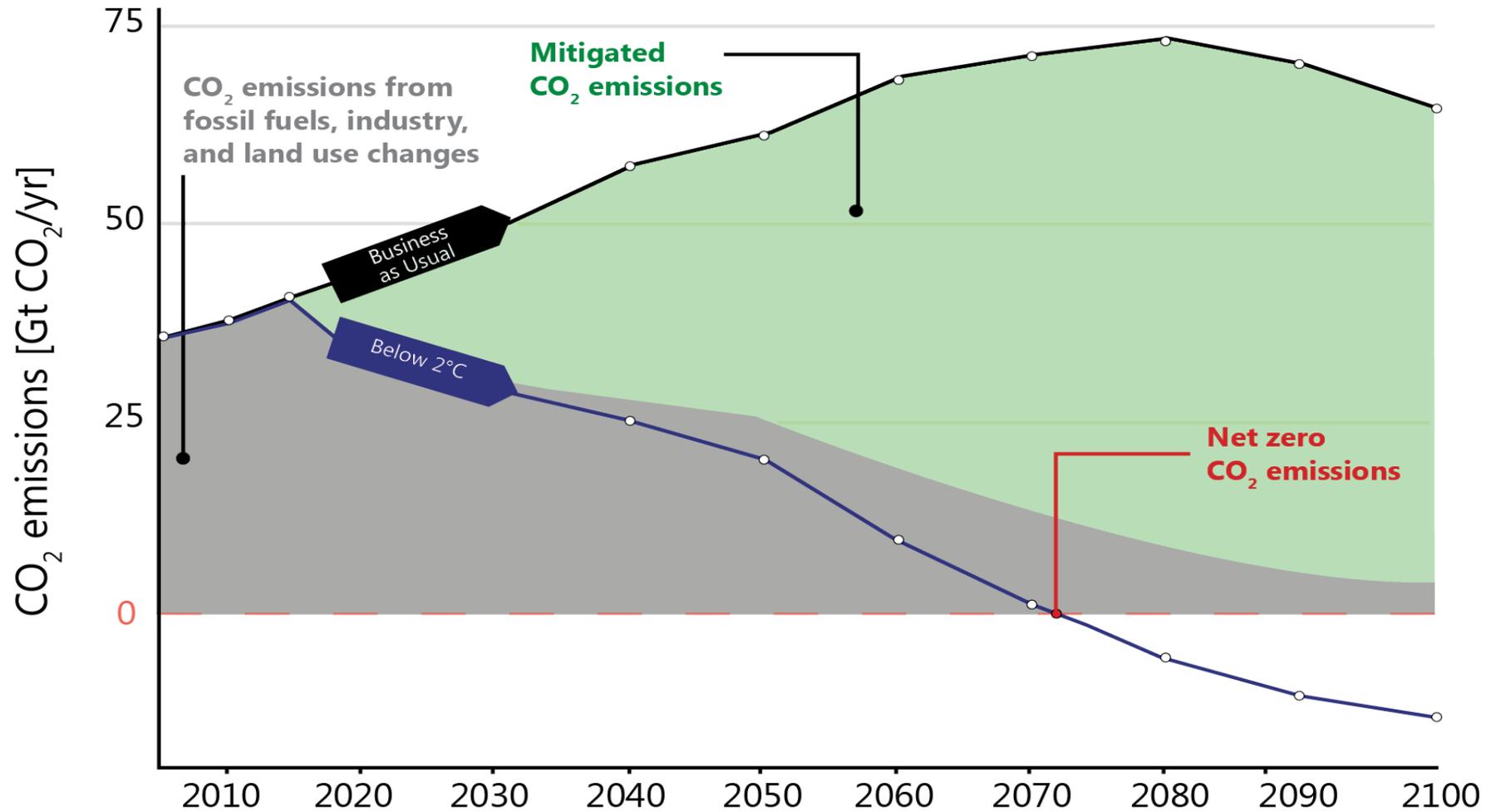
BECCS to the Future

Marc von Keitz, Ph.D.
Program Director

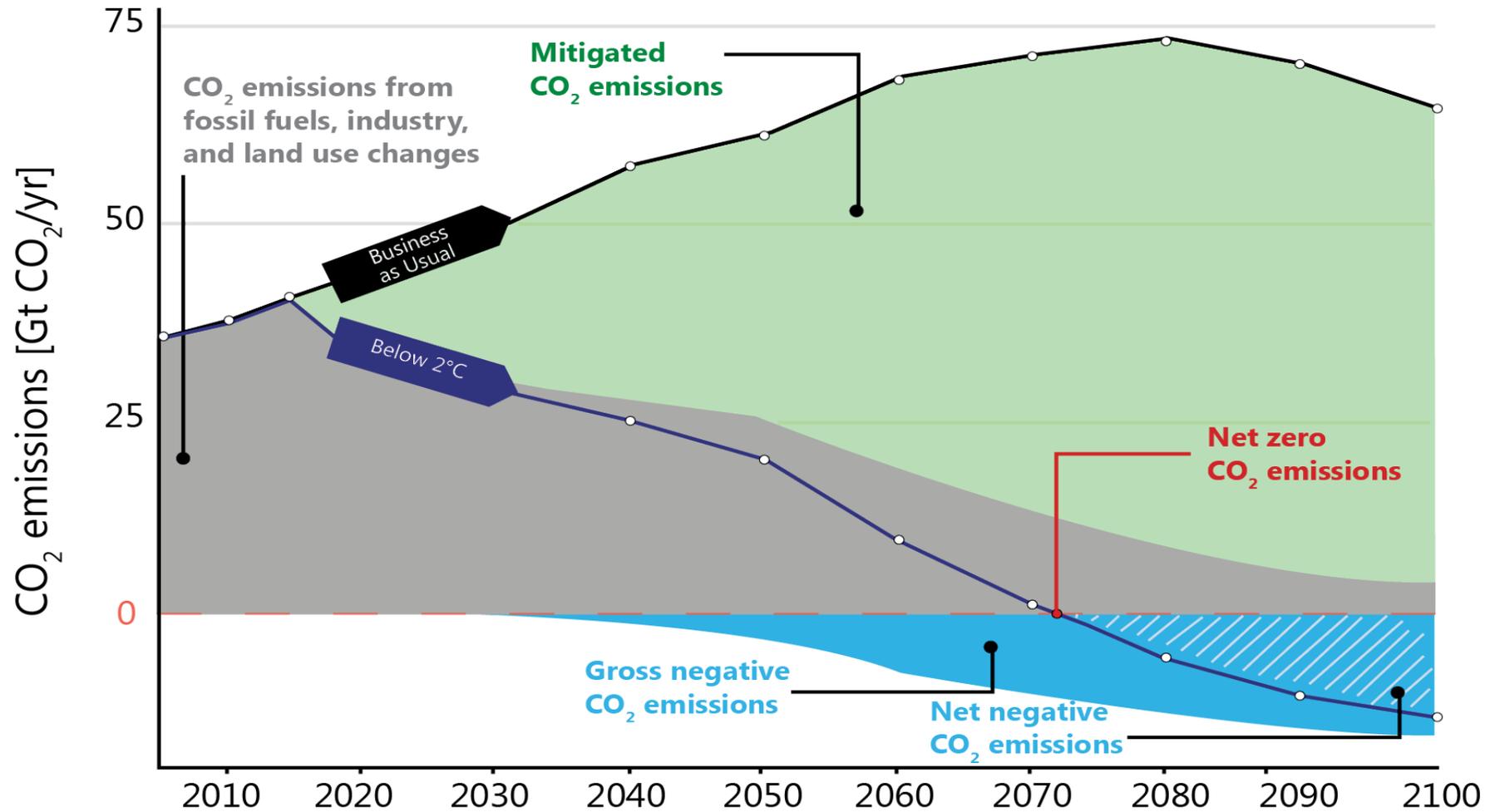
July 9, 2019



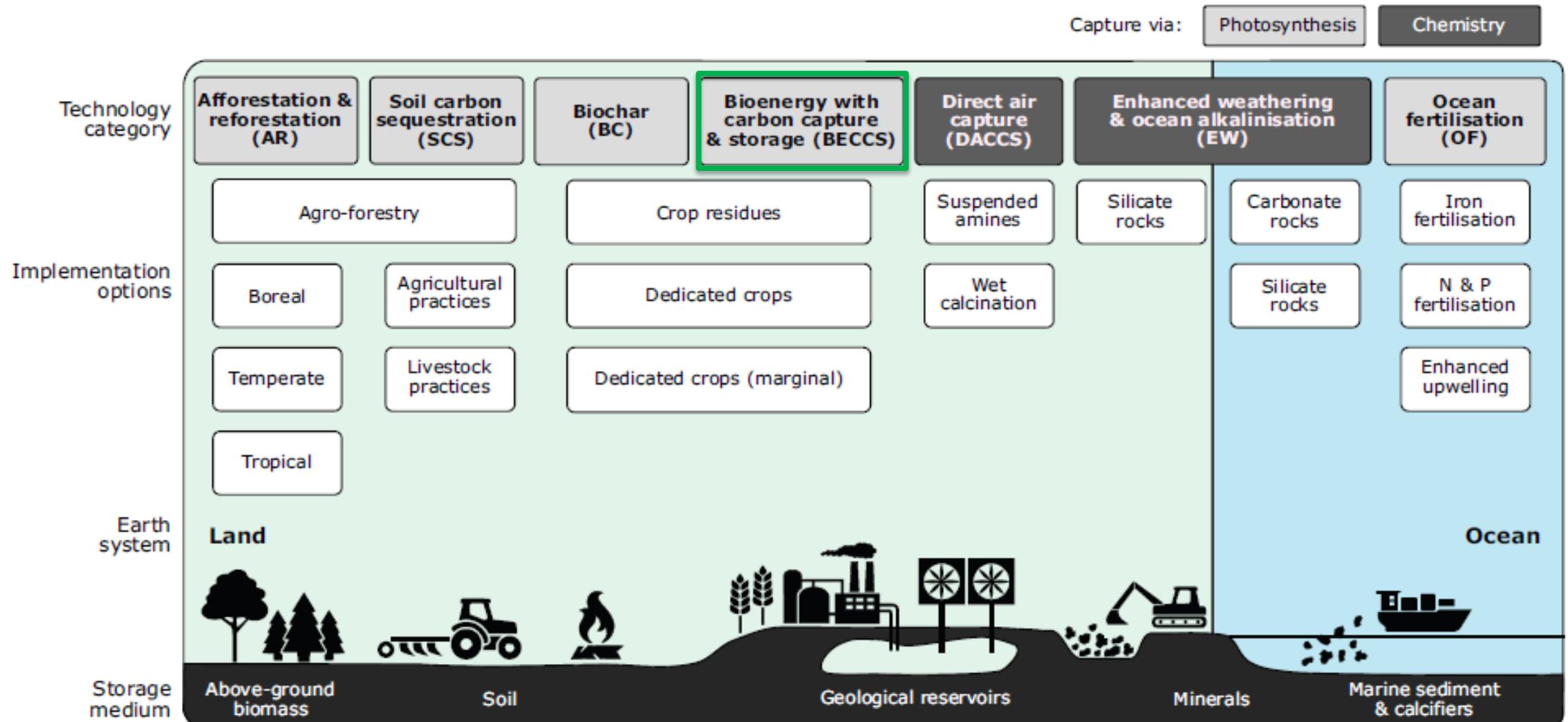
Keeping the Temperature Rise Below 2°C



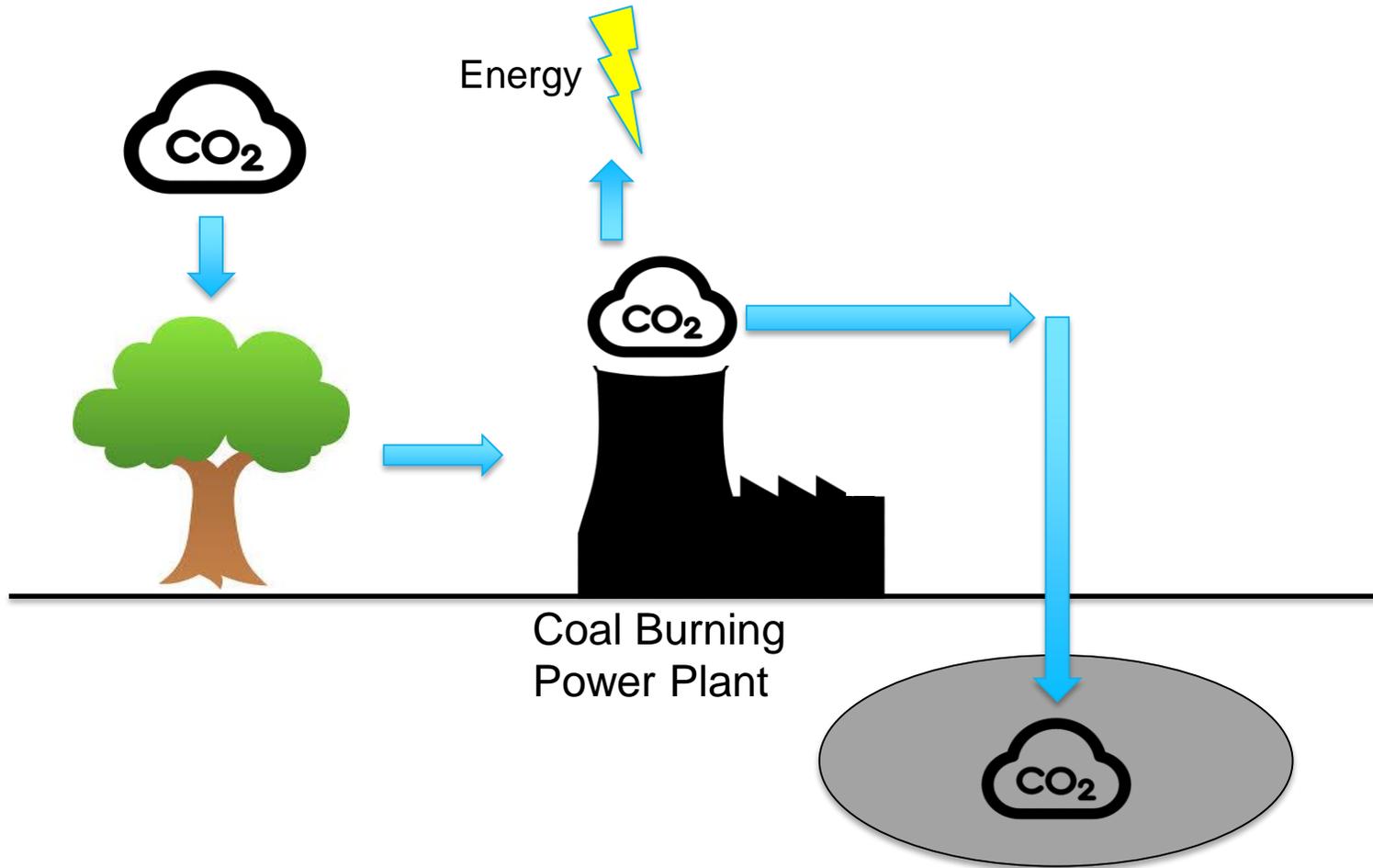
Keeping the Temperature Rise Below 2°C



Negative Emissions Technologies



Traditional BECCS - Bio-Energy with Carbon Capture and Storage



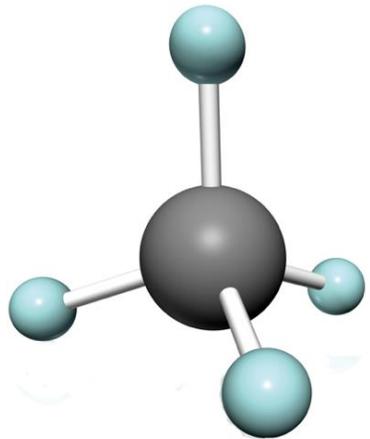
Challenges:

- **Feedstock supply**
(Land & freshwater availability)
- **Logistics of solid biofuels**
- **Reliance on coal-fired power plants**
- **CO₂ storage**

Path to Gigaton Scaling

- **Process:** technically scalable
- **Feedstock supply:** reliable & sustainable (without compromising food & feed)
- **Speed to scale:** multiple Gt in < 30 years
- **Financeable:** minimizing risk of stranded assets

BECCS to the Future is fueled by Methane



CH₄



Methane Pyrolysis

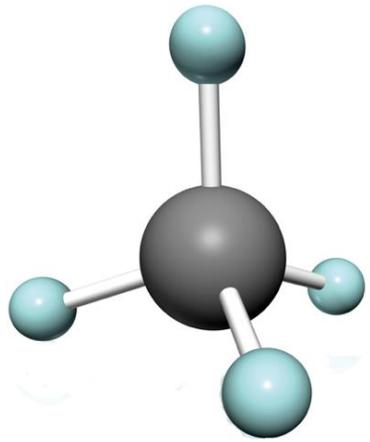


Solid Carbon



Hydrogen

BECCS to the Future is fueled by Methane



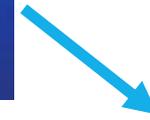
CH₄



Methane Pyrolysis



Solid Carbon

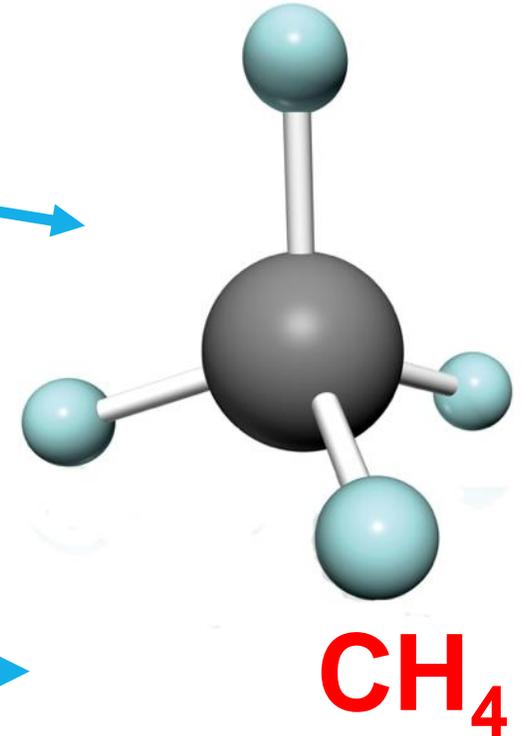


Hydrogen

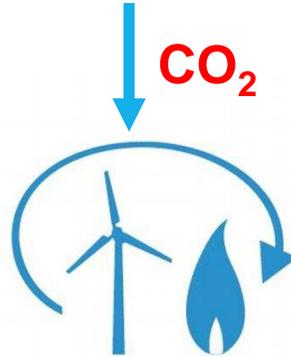
From carbon-neutral to carbon-negative



Anaerobic
Digestion



CO₂



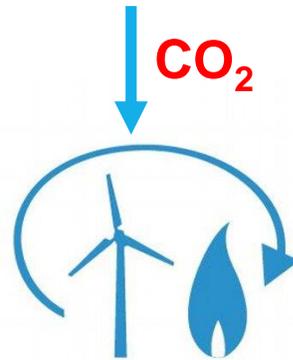
Power-to-Gas



...with ocean-wide growth potential



Anaerobic Digestion



Power-to-Gas

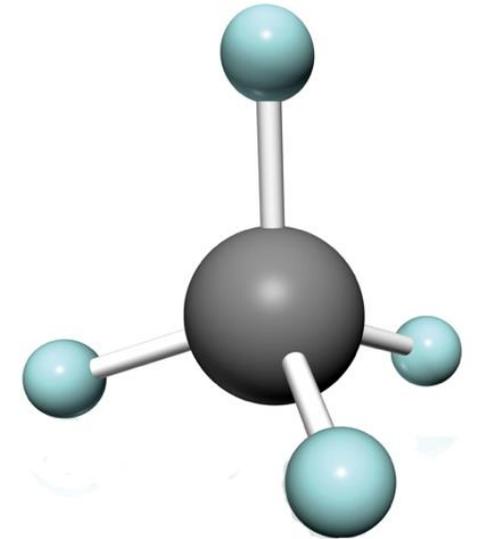
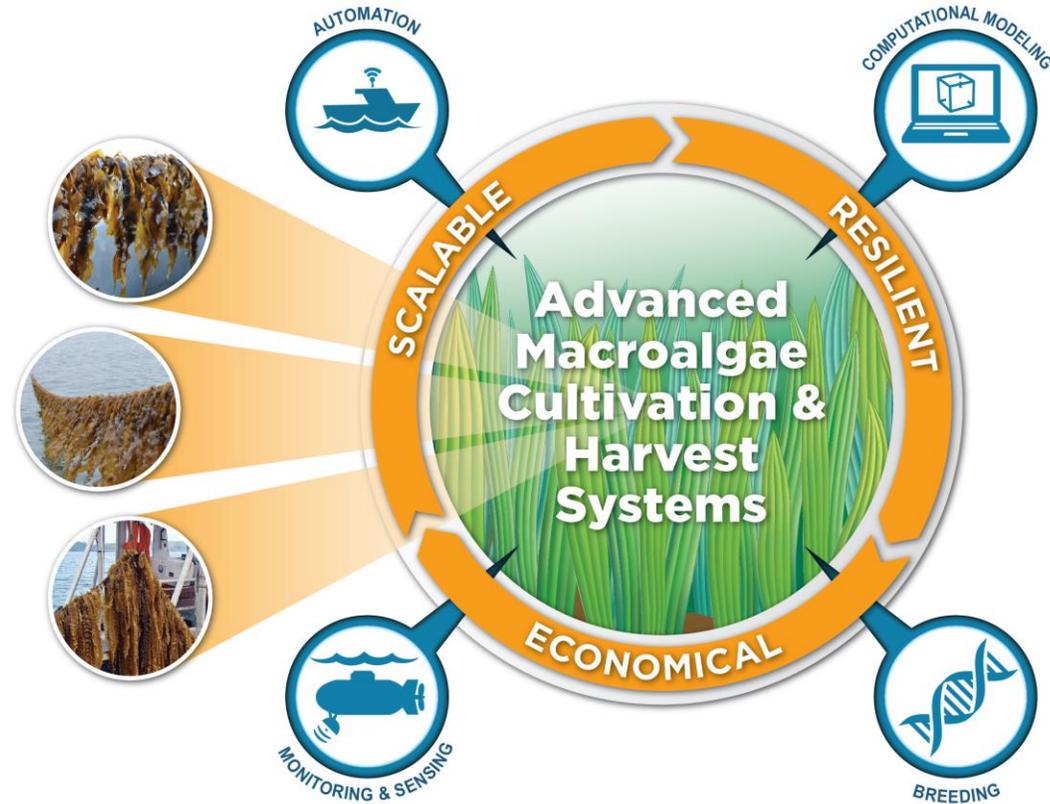


Photo credits: water-technology.net

...with ocean-wide growth potential



Macroalgae Biomass:

No Land

No Freshwater

No Fertilizer

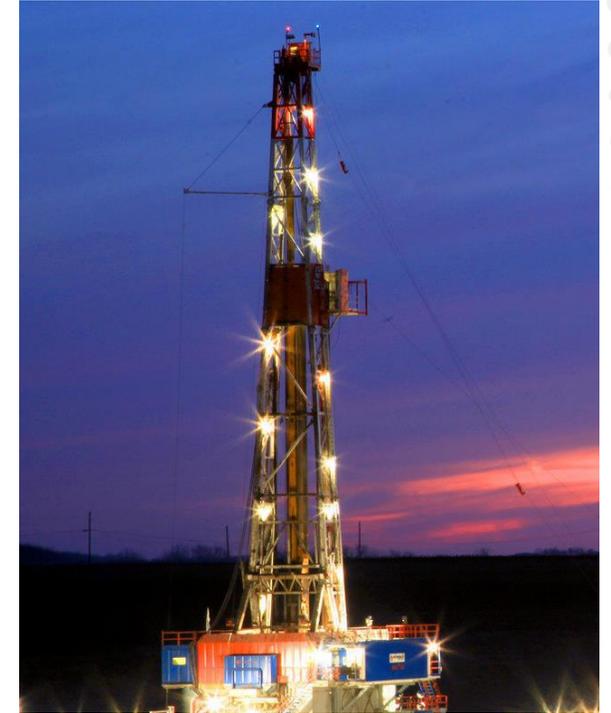
MARINER creates new biomass production opportunities for the vast ocean resources of the United States.

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Daria Barbour/National Geographic; The Island Institute; Bren Smith/Huffington Post

MARINER

Avoiding the Chicken-and-Egg problem

- Leverage US gas wealth to rapidly develop methane pyrolysis infrastructure



Avoiding the Chicken-and-Egg problem

- Leverage US gas wealth to rapidly develop methane pyrolysis infrastructure
- In parallel, expand biogas as a widely available low-carbon fuel



Avoiding the Chicken-and-Egg problem

- Leverage US gas wealth to rapidly develop methane pyrolysis infrastructure
- In parallel, expand biogas as a widely available low-carbon fuel
- Long-term utilization of methane pyrolysis assets for carbon negative hydrogen & carbon production



Thank you!

Questions & Suggestions: Marc.vonKeitz@hq.doe.gov

Office hours: Wed, July 10, 8-9am, Adams Foyer