

Bioenergy with Carbon Capture and Storage (BECCS) or Utilization (BECCU) – Where to go?

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Context

- Builds on Regitze Skou Fertin's MSc thesis at the Climate Change programme at University of Copenhagen
- Collaboration with the utility Ørsted that develops/operates two larger BECCS facilities.
- BECCU is not deployed at scale yet.
- CCU (e-methanol) based on biogas is operational and supplies CO₂ to methanol (shipping fuel, MAERSK) and in the future plastics production (LEGO).

Policy context

Climate neutrality by 2050 (current Climate Act) or 2045 (expected revised Climate Act).

CCS

- Between 2020 - 2030, 5.1 billion EUR allocated to support CCS.
- Three tenders carried through.
- 1st: Two larger biomass fired CHP awarded
- 2nd: Smaller biogas upgrading facilities awarded
- 3rd: 9 out of 10 prequalified withdrew from bidding before Christmas.

CCU

- No similarly targeted funds are available for CCU although there are support instruments available.

CDR

- 2030 climate target: ~1-1.5 Mt CO₂ as CDR.
- 2050 climate target; 7.8 Mt CO₂ as CDR.

Removals or reductions?

Are we comparing apples and pears?

CCS addresses an end-of-life-problem, while CCU addresses a beginning-of-pipe problem, as CCU can provide a sustainable carbon source. (Bui et al. 2018).

When no CDR-technology is found to ***not*** have any significant impact on land, albedo, energy, water, nutrients, or cost, should focus be on emission reductions and not removals? (Smith et al. 2015).

Take home messages

- BECCS provides permanent CDR relative to more conventional CDR methods, e.g., afforestation.
- BECCU may provide temporary carbon storage when products have a meaningful life-time.
- BECCU provides emission reductions as long as there are fossil or higher emitting counterfactuals.
- CDR to CCS ratio < 1 because a) the carbon was not in the atmosphere when captured, and b) need for additional 10-15 % biomass to supply process energy.
- Time is of essence when assessing the efficiency of BECCS and BECCU.
- The cost of green hydrogen and delayed expansion of renewable electricity capacity may be a bottleneck for rapid deployment of BECCU.
- Both BECCS and BECCU are needed to meet climate targets.