

# Carbon Dioxide Removal (CDR)

Snapshots of activities in Norway

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# Norway's interests within CDR

1. Norway is opening a storage site in the North Sea for storing of CO<sub>2</sub>
  - **BiCRS:** The Longship demo project:  
Waste-to-Energy CCS (Celsio) and Heidelberg Cement
  - **BiCRS:** Agreement to receiving biogenic CO<sub>2</sub> from BECCS facility in Denmark (Ørsted)
2. Industry using biomass with potential for CDR
  - Processing of biomass with CCS (e.g. Borregaard pulp and paper)
  - Process industry uses carbon as raw material (e.g. ferroalloy industry) – planning for bioCCS
  - Inherit, a CDR project developer
3. DAC – Norwegian Technology
  - GreenCap Solutions and Removr
4. R&D within CDR
  - SINTEF's Global Climate Fund
  - CDR solutions are one of SINTEF's corporate focus areas



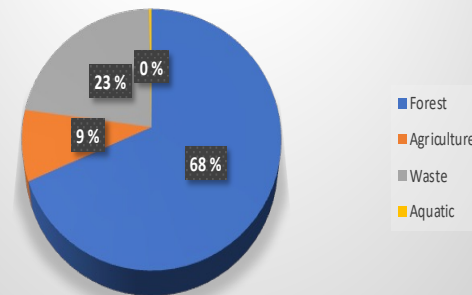
# Activities with potential for Biomass Carbon Removal and Storage (BiCRS)

Potential for additional biomass harvest or utilisation  
(Mapped by Sintef, Nibio, Norsus, biogas associations, Statistics Norway)

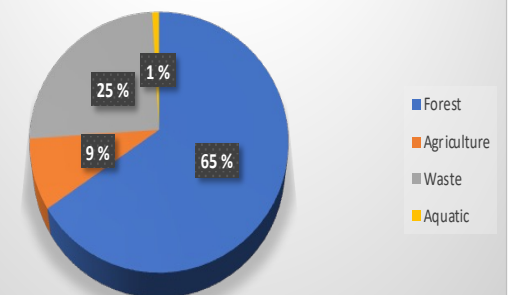
1. Available forest biomass may be subject to
  - a) Additional sustainability restrictions
  - b) Competitions from other applications (expanded market)
2. Biogenic waste and residues may be an important source for BiCRS



Potential for additional biomass harvest, 2020, 10671 t CO<sub>2</sub>



Potential for additional biomass harvest, 2050, 10733 t CO<sub>2</sub>



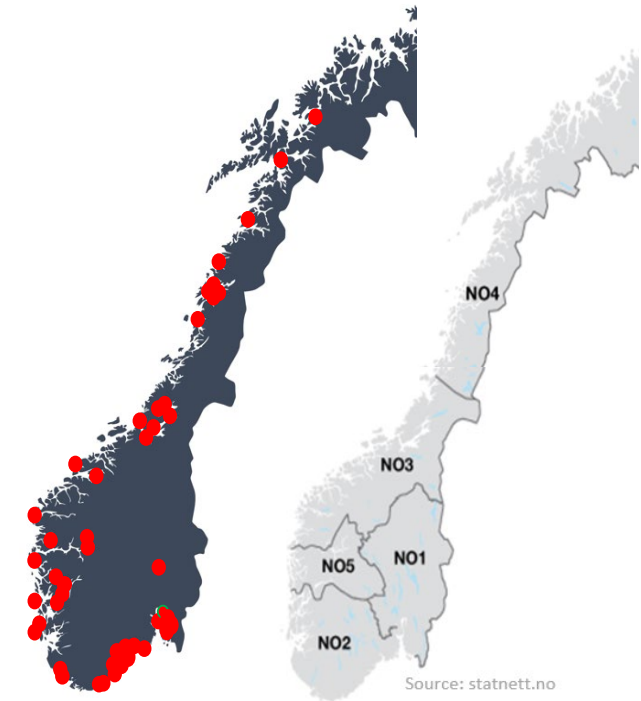
# Direct Air Capture (DAC) with CCS

## Opportunities:

- Energy Intensive Industry along the coast – many with available excess heat
  - 6 CCUS Industry clusters – sharing of local infrastructure and logistics for CO<sub>2</sub>-transport
- Clean renewable energy
- Easy access to cooling water
- Public support system, e.g.
  - CLIMIT
  - The Research Council
  - Enova
  - Innovation Norway

## Challenges:

- Price of electricity may vary dependent on location – a «weather based energy system»
- The grid
- Transport costs dependent to storage facilities (Northern Lights and others under development)



# Norway's participation in MI CDR (1)

- Norway is, through Gassnova, co-lead for the BiCRS (Biomass Carbon Removal and Storage) Technical Track with Japan
- Norway's main activities within MI CDR (besides being co-lead)
  1. Mapping potential for additional biomass harvest and BiCRS demo projects (with Canada in particular)
  2. LCA and TEA - case study on Waste to Energy (WtE)
    - Stakeholders with broad knowledge and experience
      - NTNU – (LCA)
      - NORSUS – (LCA)
      - SINTEF Industry and SINTEF Energy (TEA and LCA)
  3. Participating in ZEP's Network Technology group on CDR
  4. Arranging BiCRS webinars and workshops together with our co-lead Japan to inform stakeholders and encourage international collaboration.
    - upcoming BiCRS' webinar November 2 presenting global BiCRS demo projects from 8 countries



# Norway's participation in MI CDR (2)

- Seeks collaboration with
  - Other Missions and Initiatives (MI Integrated Biorefineries, CEM Biofuture Platform)
  - International CCUS organizations
  - Stake holders:
    - Industry with CDR activities and/or plans of CDR activities
    - Technology suppliers of CDR technology
    - R&D and experts within CDR and LCA/TEA
- Developed, maintains and follows up BiCRS Scope of Work and action plans
- Give input to MI CDR documents like roadmaps and action plans for other tracks
- Arrange and secure participation of experts in workshops/webinars and meetings

