



Er det mulig å lage business for bygg- og anleggsbransjen og for regionen med utgangspunkt i CO₂?

Viggo Iversen

Chief Operating Officer

Ocean GeoLoop AS



Kan vi bruke hullet gjennom Forbordsfjellet til noe mer enn
å kjøre gjennom?

Yes

We Can



Agenda

- Ocean GeoLoop og karbonfangst
- Kan vi gjøre noe smart med den CO₂'en som blir fanget?



PROJECT OCEAN



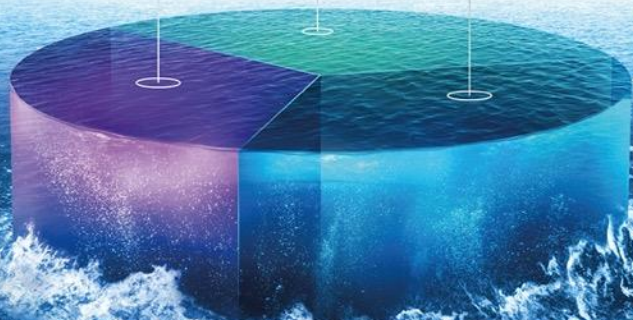
FEEDSTUFF



ENERGY



ADVANCED MATERIALS



DN
Dagens
Næringsliv

Går løs på
direktører,
råd og tilsyn

DN Vale
40 sider
bilag

Slik vil Sp-leder Trygve Slagveit Vedum
bygge ned trykkløst. DN Valg, 6-9

Aps fremtidshåp
Julia Wong, C21, DN Valg, 12-14

Vil grave ned
byråkrabet

Mandag 14. august 2017
ISSN 2242-9612
1. utgave 40
www.dn.no

**Opticom-gründer
Hans Gude Gudesens
comeback**

**Bruker all
tid og penger
på sitt livs
prosjekt**

Side 4, 5 og 6

Halslund-kjøpet:
Småsparene
provosert
av Oslo
kommune
Side 2-8

Kommune-NM

**Norges
«sykste»
kommuner**
Lansene kommuner har
litt å by på når det gjelder
og økonomisk utvikling. De
er på toppen og vil bli
Lansene. Side 14-15

Etterbars

Spillfoppen
Hver dag mister
stadig penger til barn og
barn. Det skal ikke bli
eller pluss. Side 26-27

DN Børs 128,65
DN Indeks 100,00
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Green, disruptive technologies with a global reach



Ocean GeoLoop is solving the greatest challenge of our time: a combined climate, environment and resource crisis.



We develop natural carbon capturing methods to bypass costly and polluting processes, making man-made emissions into resources.



Highly scalable solutions with significant global potential, based on +15 years of R&D together with international partners.



History

Ocean GeoLoop is established to commercialize green, disruptive technologies with a global reach.

- Our solutions are aimed at solving the greatest challenge of our time; a combined climate, environment and resource crisis.
- Man-made emissions, currently causing crises, are future resources.
- We develop natural capturing methods to bypass costly and polluting processes,
- ...and novel methods to harvest energy.
- Based on more than 15 years of research & development together with international partners.
- Highly scalable solutions with significant, global potential.



Norske Skog Skogn

Our main piloting arena



Strong network of partners

R&D



Suppliers



INRIGO



Collaborators and clients



Government of Iceland

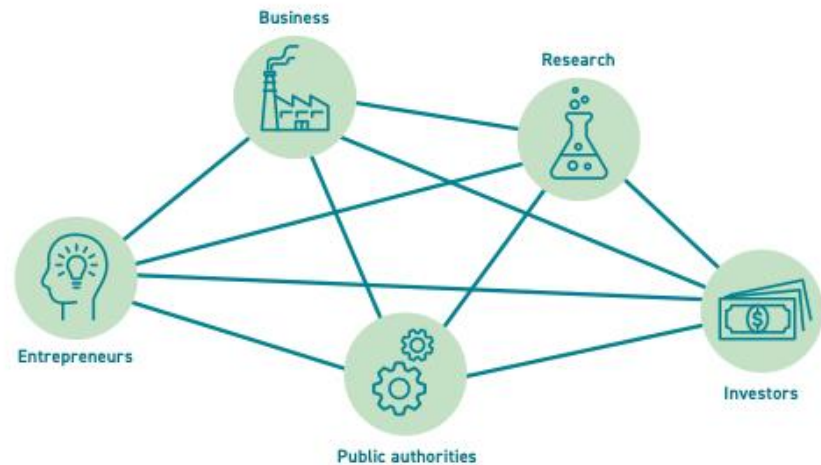


How we work

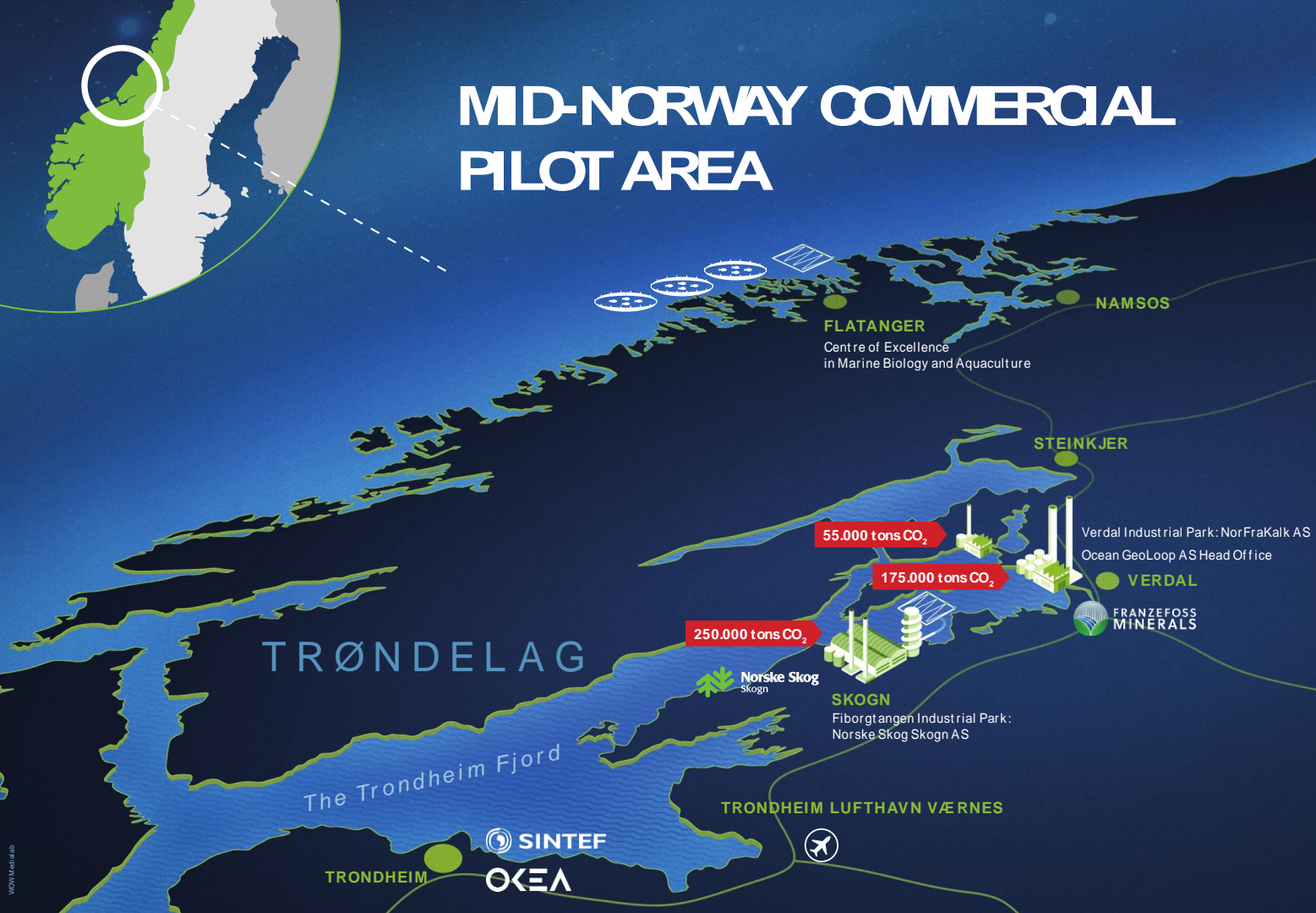
Ocean GeoLoop consciously and actively works in a broad international network - in line with the model illustrated.

- New, industrial partnerships are constantly being established, nationally and internationally. Through a set of pilots, the company has linked up an exciting and growing supplier network
- The company has engaged key personnel from internationally recognized R&D institutions to assist with technology development in various phases
- Through a total of 4 private placements the company has raised approximately NOK 360 million* from national and international investor segments
- The company works actively with and involves authorities, policy makers, clusters and business organizations

* Includes private placement of NOK 101.6 million with Chevron in August 2022



MID-NORWAY COMMERCIAL PILOT AREA





2021-2022

**Developing the
CONCEPT
into
TECHNOLOGY**



2023-2024

**Developing the
TECHNOLOGY
Into
PRODUCTS**



2025-2027

**SCALING
in
PRIORITY VERTICALS**

Green, disruptive technologies with a global reach

1

Point source carbon capture unit

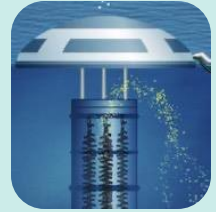
- Captures CO₂ from a point source emitter and can turn it into a pure, liquid state.
- Can be delivered as a service, allowing the customers to pay per ton of captured CO₂



2

GeoLoop Column unit

- A multi-functional, ocean-based dome-system enabling biomass production, ocean purification and oxygenation







Ocean GeoLoop

Ocean GeoLoop



Technology

Our carbon capture process

1 Pre-wash of the flue gas

A water-based method is used to pre-treat the flue gas to eliminate acidic components and other pollutants that may affect the capture process.

2 Absorption

The pre-treated gas proceeds to an absorption step drawing the CO₂ out from the remaining flue gas.

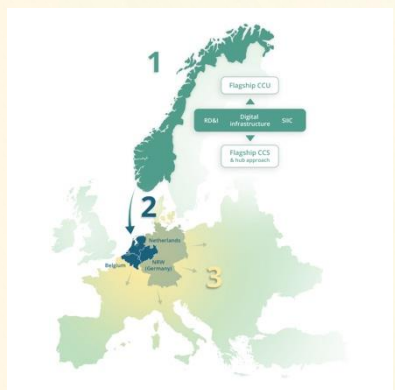
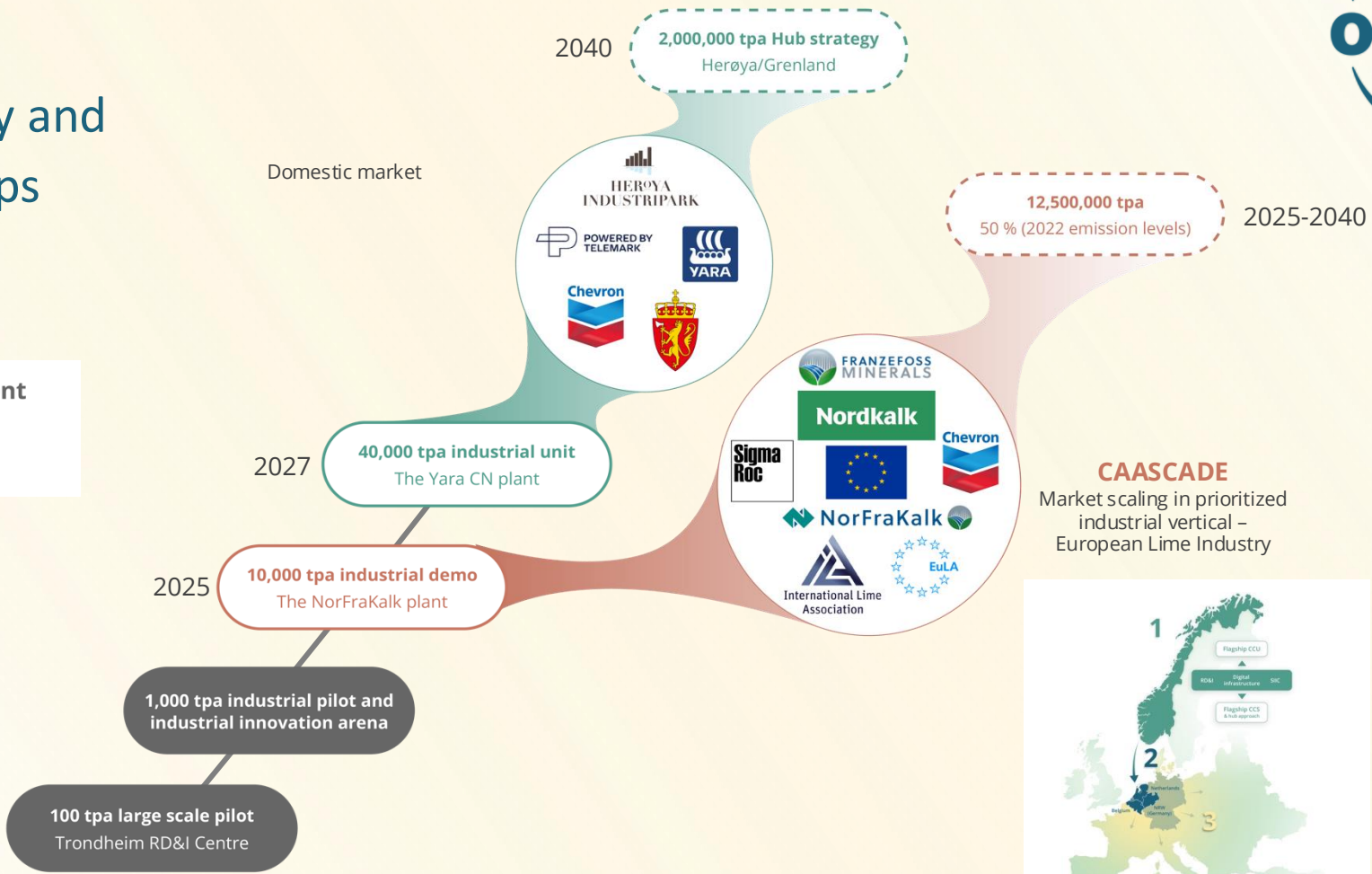
3 Desorption

The CO₂ is separated, and the liquid is recycled to the absorption module. The process is not dependent on thermal energy input, resulting in uncomplicated integration with the host.

Technology and scaling steps

Strategic concurrent development

Lowering external electricity consumption in capture.





Hanne Markussen Eek



We want to contribute to developing the most energy-efficient and environmentally friendly technology possible, which is also suitable for capturing CO₂ at our lime kilns. This is the background for our partnership with Ocean GeoLoop. We have a common goal to execute testing of Ocean GeoLoop's technology at NorFraKalk in 2024.

Hanne Markussen Eek

CEO of Franzefoss Minerals AS¹ and Chair of the Board of NorFraKalk AS.



Illustrasjon av et Ocean GeoLoop fangstanlegg på ca. 10.000 tonn kapasitet p.a. hos NorFraKalk AS i Verdal Industripark

NORTHERN LIGHTS

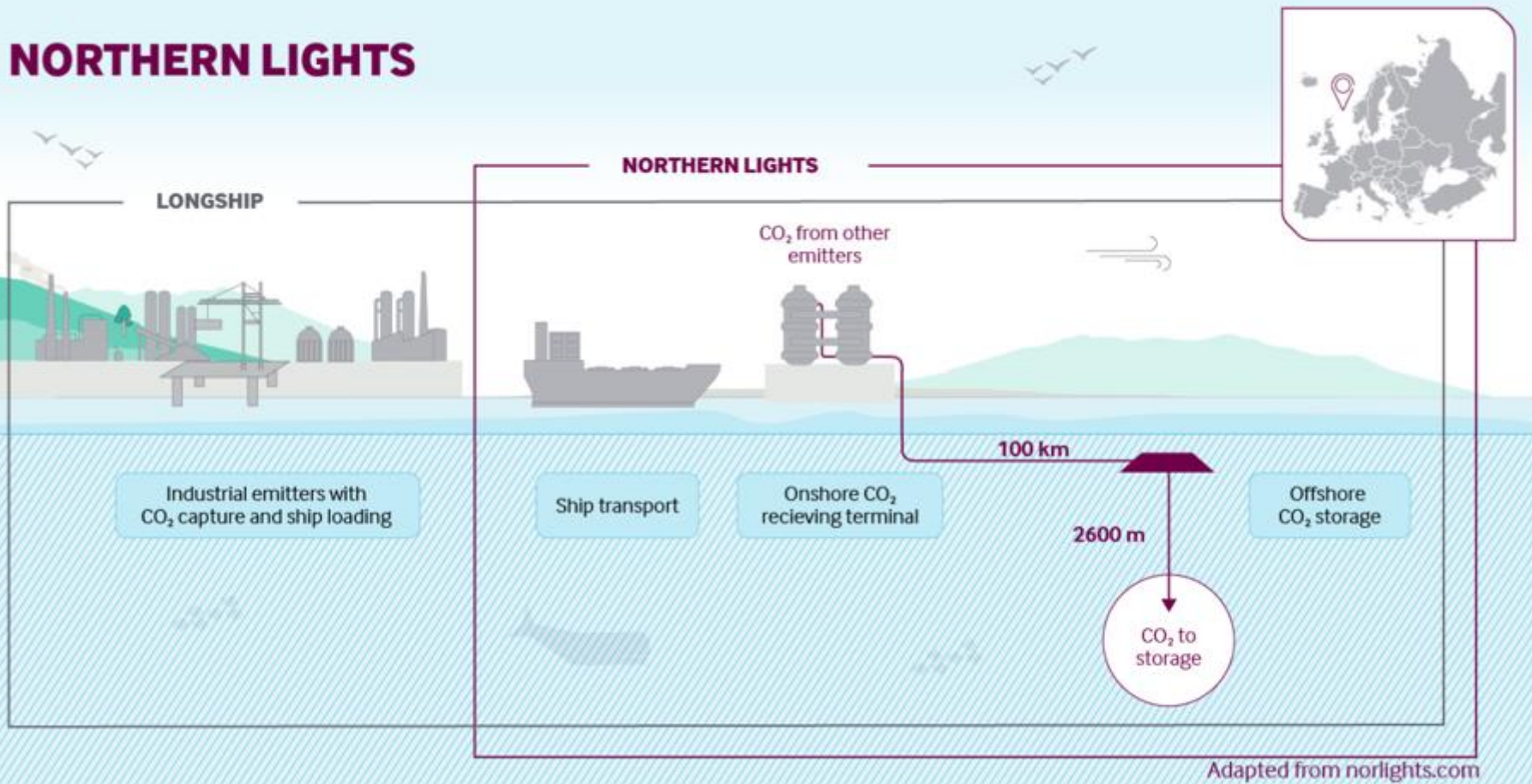


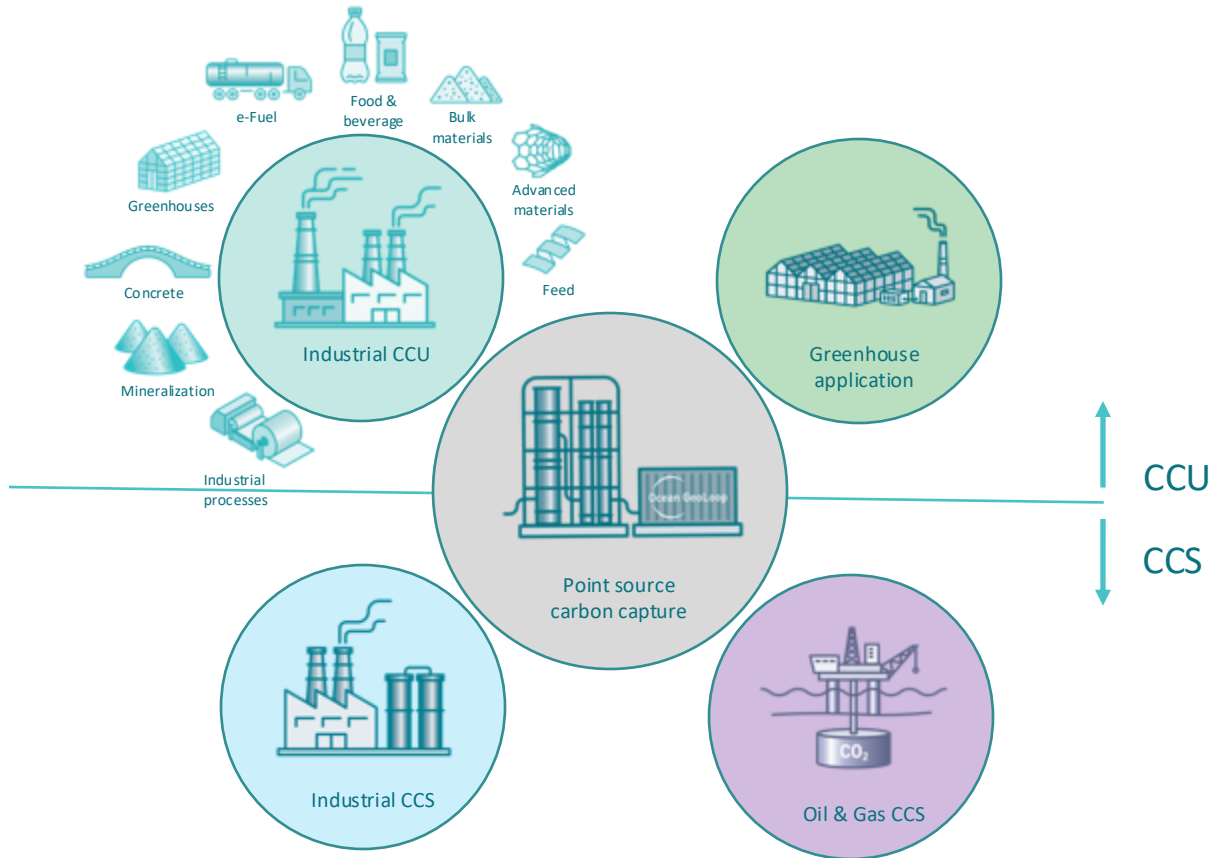


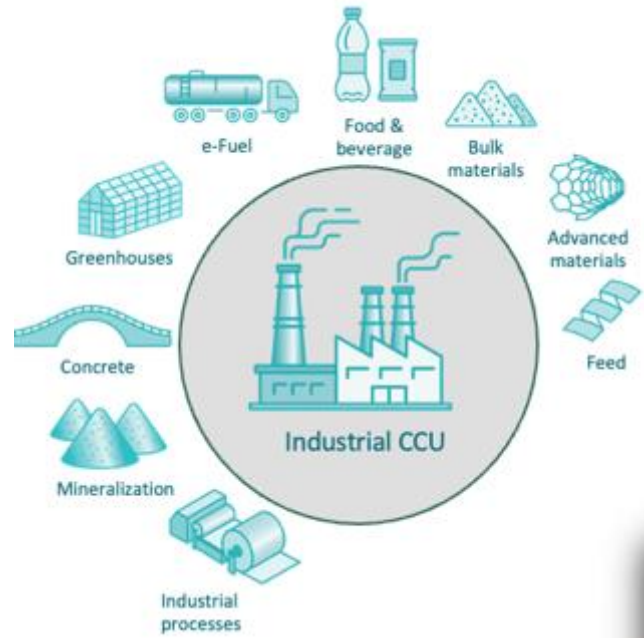
Foto: Innherred



Foto: Remidt.no

Roadmap to market







Kan vi bruke hullet gjennom Forbordsfjellet til noe mer enn
å kjøre gjennom?

140.000 m³



KARB-HEA

Carbon capture and storage to ash from Haraldrud waste-to-energy facility and utilization as a product to replace cement

Partners: Oslo Municipal Corporation, Goodtech (Project owner), NOAH, Aaltvedt Concrete and Uicon

Project duration: 2022-2026

Supported by Research Council of Norway

Project Leader: SINTEF





**Bunnaske kan omgjøres til et byggeråstoff
når CO₂ bindes til avfallet. I dag deponeres
all bunnaske i Norge.**

Bunnaskebunker på forbrenningsanlegget

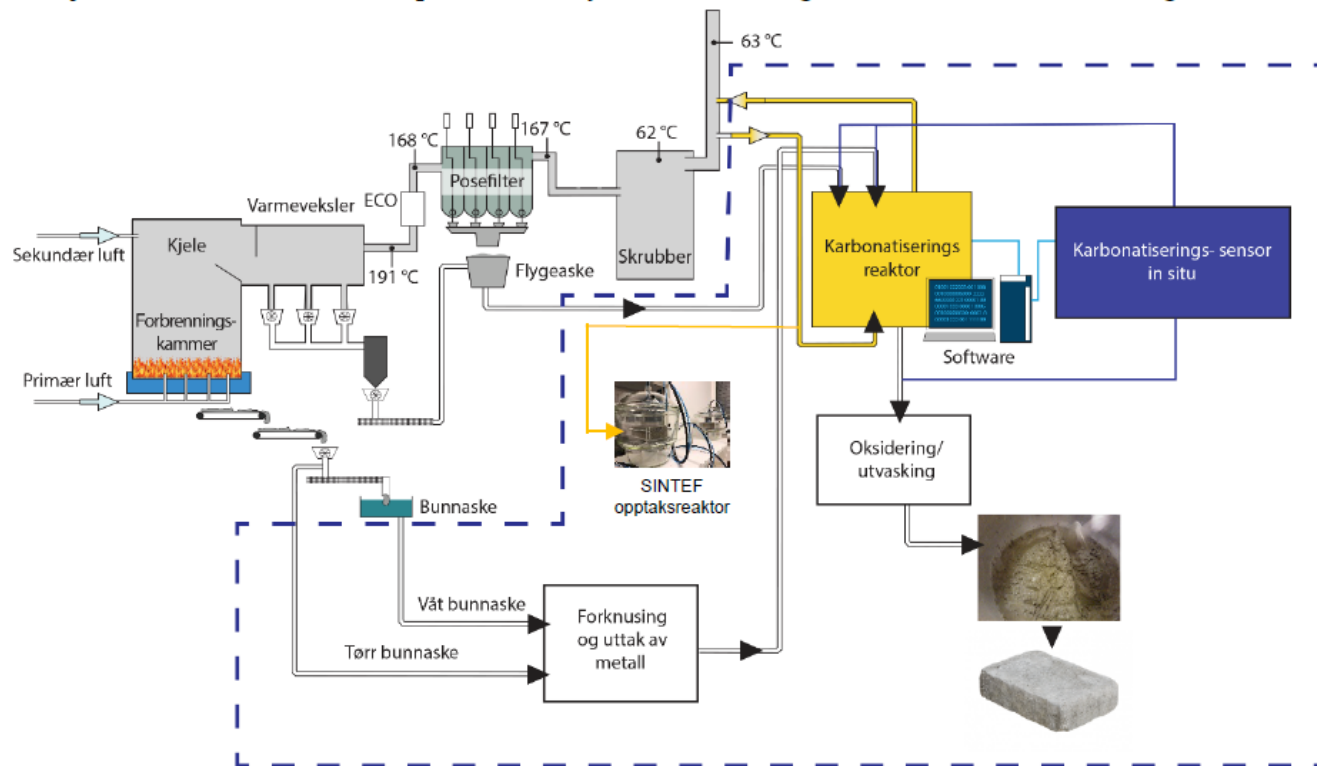


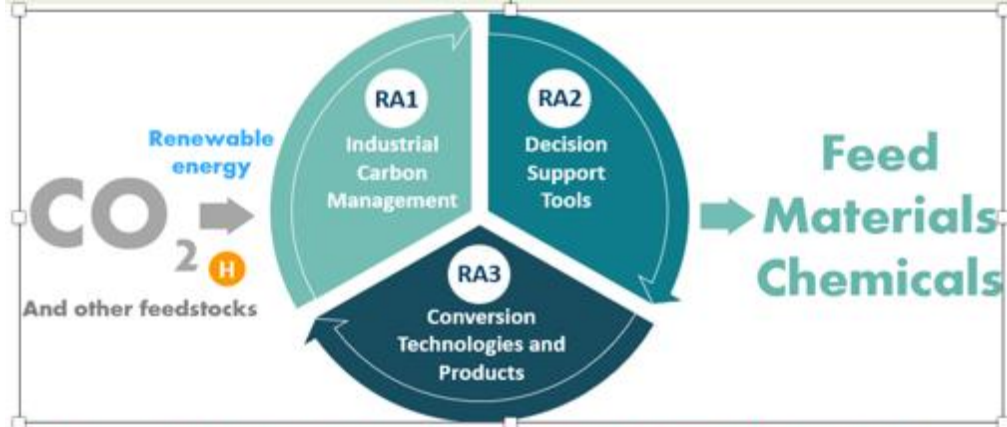
Fig. 1 Prinsipp for nåværende prosess på HEA og innovasjonsideen (stiplet linje). Karboniseringsreaktor er reaktor til NOAH. Karboniserings-sensor er sensor som utvikles i H2. SINTEF opptaksreaktor er på benkestørrelse med egen styringsenhet som plasseres i nærheten av reaktor slik at den har røykgasstilførsel. Den måler forbrukt mengde CO_2 i kammeret og dermed total CO_2 opptatt som funksjon av tid. Sensoren vil derimot måle karbonisering direkte på asken og er derfor egnet til industriskalaprosess og kontinuerlig målinger.



- Prosjekter som Forbordsfjellet kan bli fremtidige «smarte» CO₂ lager
- Hvor betongen som anvendes lages av sementerstatninger der man **BRUKER CO₂ som råvare/ressurs**
- 140.000 m³ betong brukt i slike prosjekter kan potensielt lagre opp til 25 .000 tonn CO₂
- **Tilsvare utslippet til alle dieserbiler som kjører strekningen i ~ 4 år**
 - *utslipp bil per km er 0,13 kg CO₂*
 - *forutsatt 7500 dieserbiler per dag som trafikkerer strekningen*



SFI Carbon Symphony Consortium



RA1 Industrial Carbon Management (North University)

WP 1
Conditions for carbon circularity
North University Business School

WP 2
Conditions for carbon-based industrial symbiosis
SINTEF Industry

RA2 Decision Support Tools (SINTEF)

WP 3
Feedstock Resources
SINTEF Helgeland

WP 4
TEA and LCA
SINTEF Industry

RA3 Conversion Technologies and Products (USN)

WP 5
Gas fermentation
SINTEF Industry

WP 6
Photosynthetic excitation
SINTEF Ocean

WP 7
Photo- and Electrochemical conversion
USN

WP 8
Chemical Conversion
SINTEF Industry

WP 9
Mineralization
SINTEF Community

Figure 1. SFI Carbon Symphony will advance research and innovation to develop next generation carbon management products. The Centre constitutes of three research areas (RAs) with nine work packages (WPs).

**Yes
We Can**



Mål og arbeidspakker

Det haster å komme i gang. Skal vi lykkes, krever det større ambisjoner, høyere tempo, bedre gjennomføringsevne og mer systematisk samarbeid enn i dag.

Grønt Industriløft, Nærings- og fiskeridepartementet

Overordnet mål:

Sammen skal vi utvikle Verdal industripark til å bli en grønn, smart og fremtidsretta industripark.

Arbeidspakker:

Mål, delmål og arbeidspakker i prosjektet er tett koblet til de nasjonale målene for industriparkene (SIVA)

AP1: Parkadministrasjon

En tydelig administrasjon vil sikre at Verdal Industripark drives på en effektiv, bærekraftig og strategisk måte, med klare mål og god koordinering mellom alle involverte parter.

AP2: Energi

Verdal industripark bidra til det grønne skiftet gjennom reduksjon av CO2 utslipp og økt utnyttelse av den totale energien i parken.

AP3: Sirkularitet

Fremme gjenbruk, resirkulering, industriell symbiose og effektivt materialbruk for å styrke bærekraft og konkurransekraft.

AP4: Areal og infrastruktur

Gjennomføre tiltak for optimalisering av arealbruk, fortetting. Grønn infrastruktur, transport og logistikk.

AP5: Forskning, utvikling og kompetanse

Igangsette FoU-prosjekt i Verdal industripark og i samarbeid med andre industriparter.

foto: Øyvind Malum

Prosjektskisse
Grønt industriløft
Verdal Industripark

Et samarbeidsprosjekt mellom Verdal kommune, Proneo, Innherred Næringsforening og Industrinavet Trøndelag.



Røra

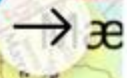
Sparbu

Fleskhus

35000

40000

45000





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