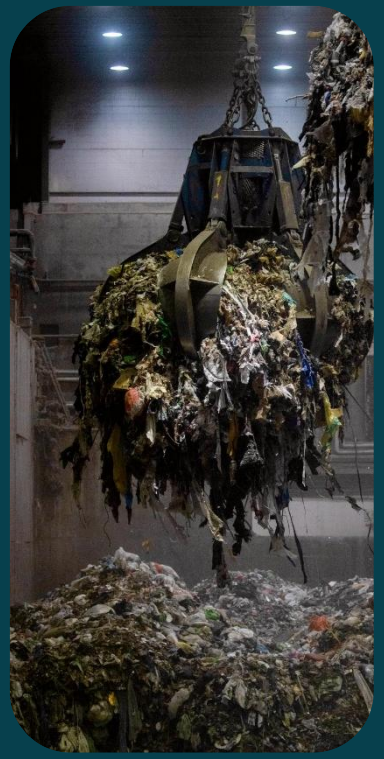
Oslo CCS

Jannicke Gerner Bjerkås, Director CCS and Carbon Markets
Hafslund Celsio

Dette er Hafslund Celsio

Avfallsforbrenning



Norges største tilbyder av avfallsforbrenning

(350 000 t/å)

Fjernvarme

Norges største leverandør av fjernvarme

(2,0 TWh i 2023)

Kjøling

Snart Norges største leverandør av områdekjøling

(150 GWh innen 2035)

Strøm

Største produsent av strøm i Oslo

(150 GWh i 2023)

CCS

Ambisjon om å bli først i verden med fullskala CCS på avfallsforbrenning

Veien blir til mens du går…

Med mål om å redusere klimagassutslippene med 95 prosent innen 2030

Bellona-leder Frederic Hauge, byråd for miljø- og samferdsel Guri Melby (V) og byrådsleder Stian Berger Røsland (H) håper at Klemetsrud-anlegget kan bli et unikt prosjekt for CO2-fangst. – Det vil i så fall bli verdens første karbonnegative anlegg, sier Frederic Hauge.

Publiseringsdato: 3. juni, 2015

2015

… Oslo kan bli verdensledende innen miljøvennlig energigjenvinning…. Oslo kan ta en internasjonal lederrolle i utviklingen av CCS på avfallsforbrenning.

-Stian Berger Røsland

Ingen EU-støtte til CO2-fangst på avfall i Oslo

Syv selskaper får støtte – Fortum Oslo Varme i det norske Langskip-prosjek er ikke blant dem.

2021

Mottok delvis statlig støtte som del av Langskip

Søkte EUs innovasjonsfond.

Nådde ikke opp i konkurransen blant Europas største utslippspunkter

2022

Nytt eierskap

Investeringsstøtte fra Oslo kommune

Investeringsbeslutning juni 2022

Oslos største klimasatsing kan ende på dynga

2023

Krig og energikrise i Europa

Økte kostnadsoverslag

Prosjektkompleksitet

Kostnadsreduserende fase

«Betydelig usikkerhet» ved Hafslunds CCS-prosjekt

Systra og Oslo Economics har avdekket svakheter ved karbonfangstprosjektets egen analyse, som tilsier at kostnadene undervurderes.

2024

Ny FEED med SLBC og AKSO

Sikret kommunal medfinansiering

Flertall i Stortinget for ny statsstøtte

Lovlighetskontroll hos Statsforvalteren avvist

Hafslund

Hafslund Oslo Celsio
2,907 followers
9mo • Edited •

Fortum Oslo Varme had yesterday the privilege to present our carbon capture project in Oslo to the Prime Minister of the Republic of Estonia Kaja Kallas.
We are pleased to see the interest for CCS is growing and we are happy to share our insights and knowledge.
Thank you for visiting, and we hope to be able to show you a full- scale plant in 2026.

Fortum Oslo Varme Oslo kommune Estonia #greentransition #eugreendeal #renewables #carboncapture

Kadri Simson @KadriSimson · 16h
Today, I visited Hafslund Oslo Celsio's waste-to-energy plant.

As part of the Longship project, it can become one of the first full-scale #CCS projects on waste-to-energy in the world

2/2

– Dette er fornybar energi

Lansering av håndboken: CCS for avfalls-forbrenning — KAN - KI Avfallsforbrenning
kanco2.no • 1 min read

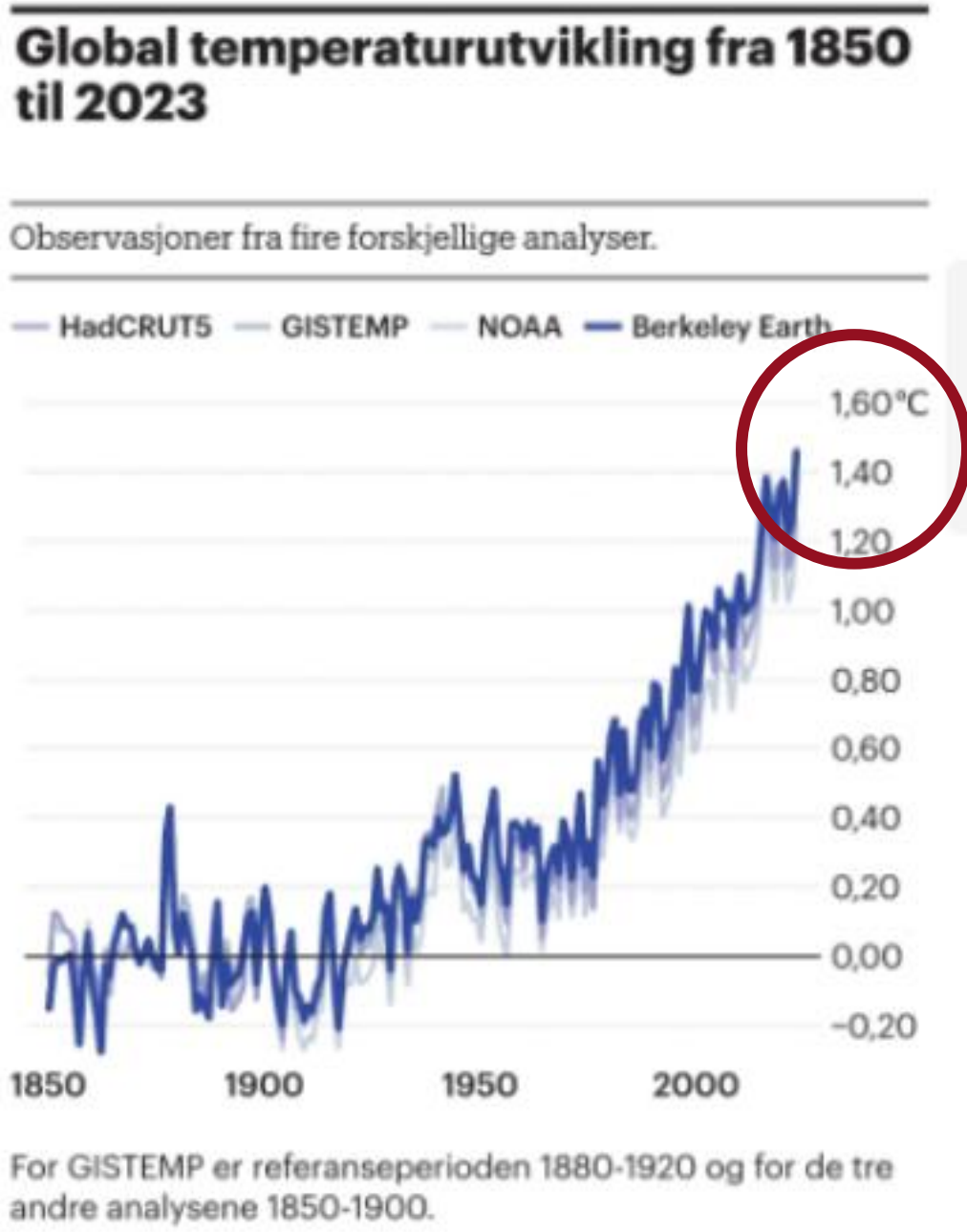
Knut Inderhaug • 1st
4mo •

Dette er en gledens dag! I dag markerte vi byggestart for #CCS-anlegget på Klemetsrud. For etter mange år med hardt arbeid: Endelig bygger vi verdens første avfallsforbrenningsanlegg med fullskala karbonfangst- og lag ...see more

See translation

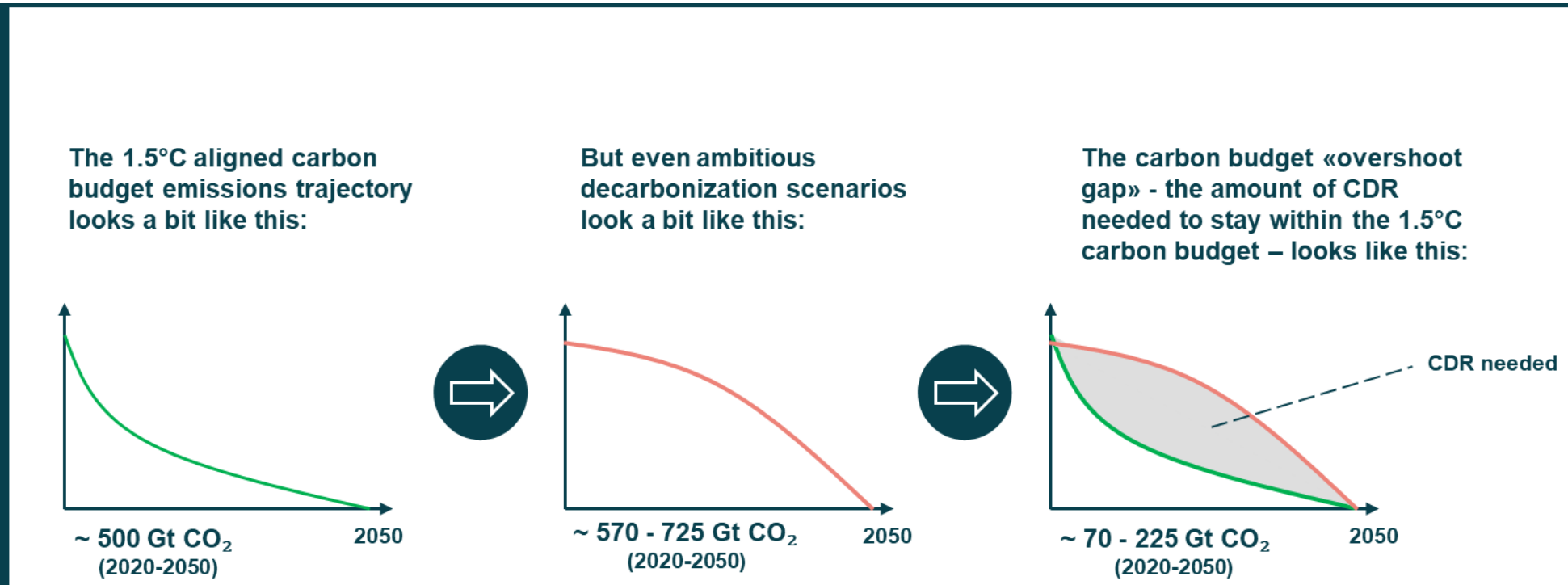
1,5 degree global warming already passed

- 2024 was the hottest year ever registered, and the first year hotter than the 1,5 degree target
- Heat stored in oceans will accelerate the development
- The increase in renewable energy has mostly come **in addition to**, not instead of, fossil energy
- Time is running out also for the 2 degree target
- We are looking at **a massive overshoot**



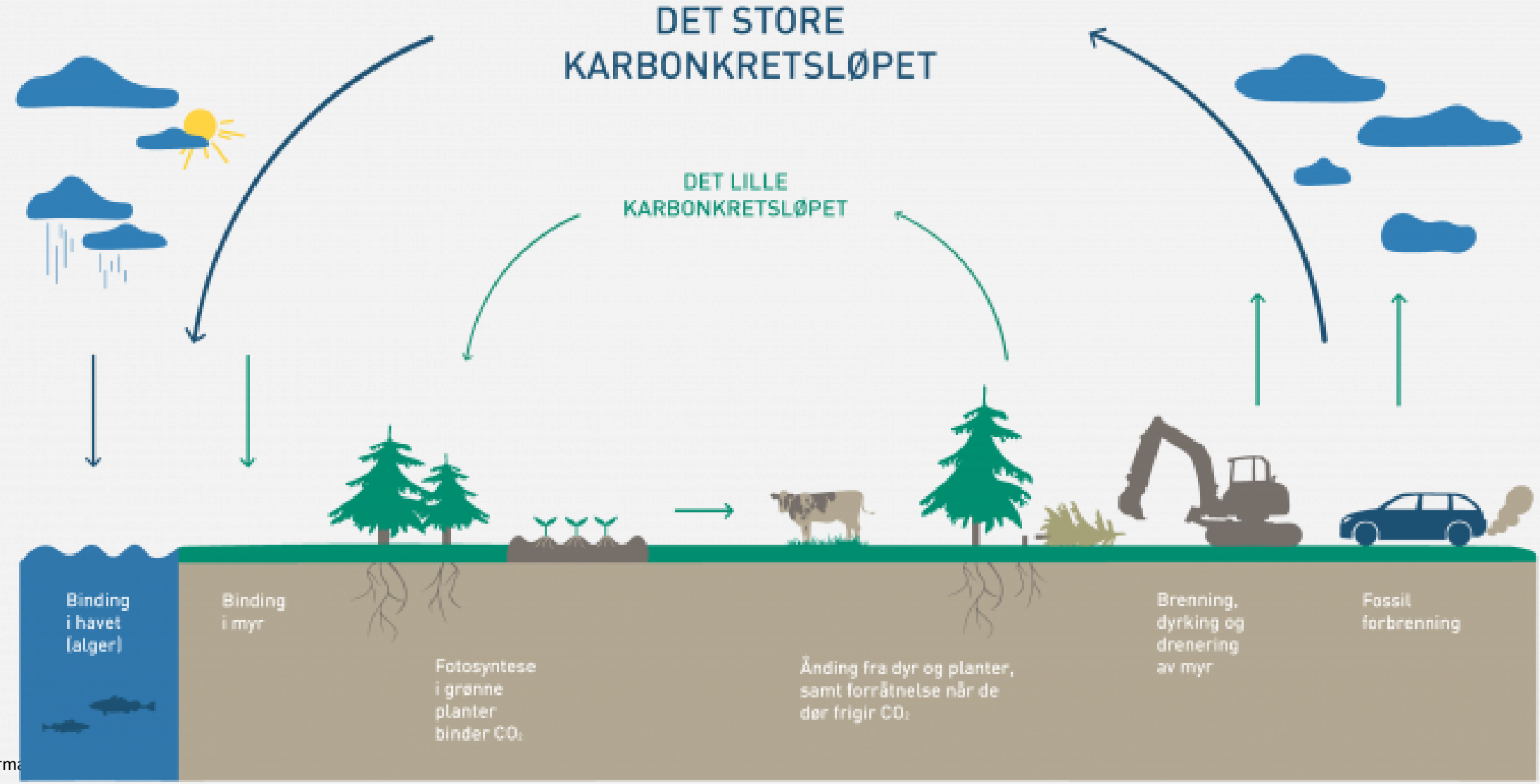
Tiden renner ut for netto null – karbonfjerning er et nødvendig i tillegg

The 1.5°C target is not even **theoretically** possible anymore



Source: Energy Transition Commission

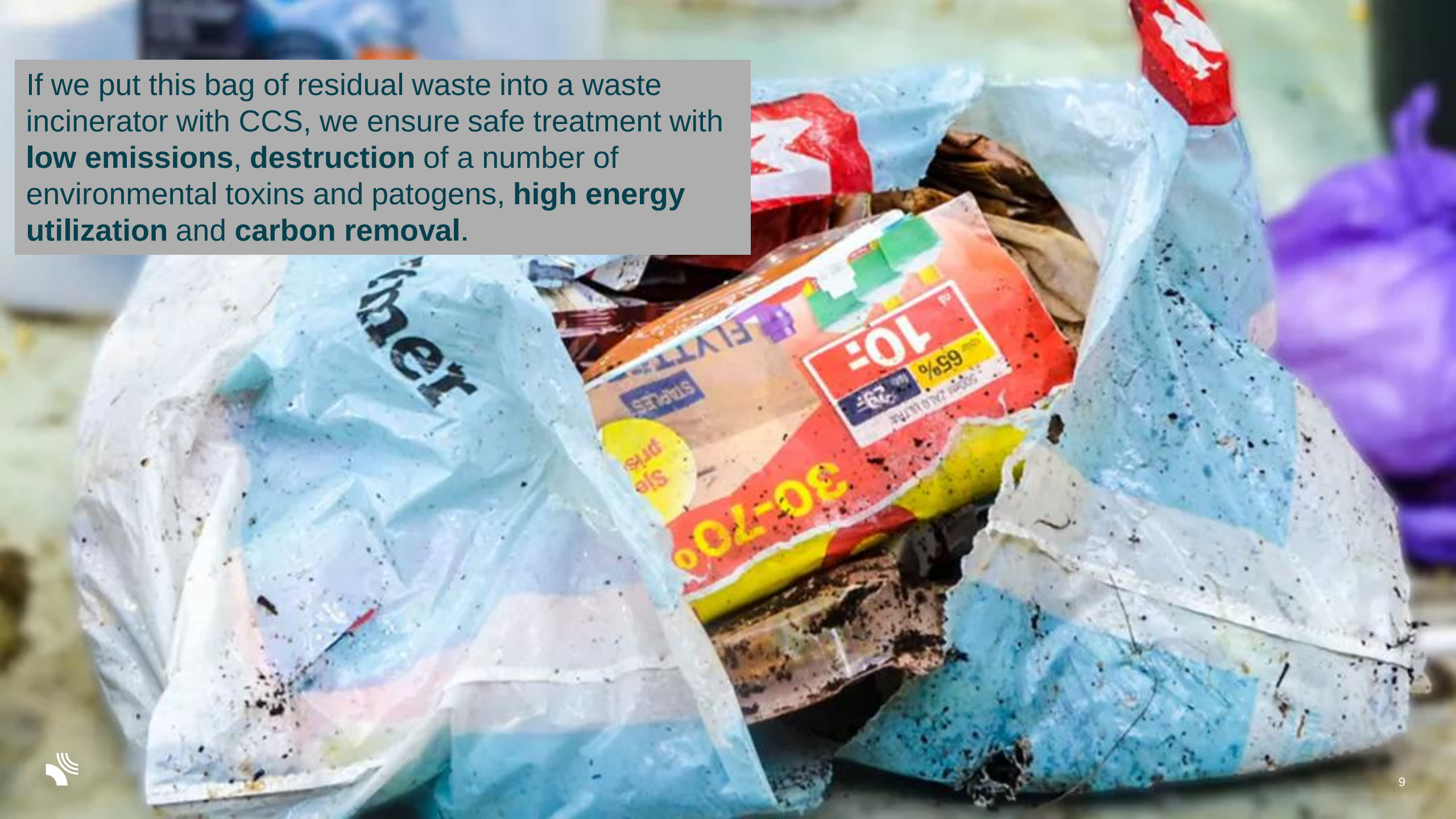
What is Carbon Removal or Negative emissions?



Waste is one of the world's largest climate challenges

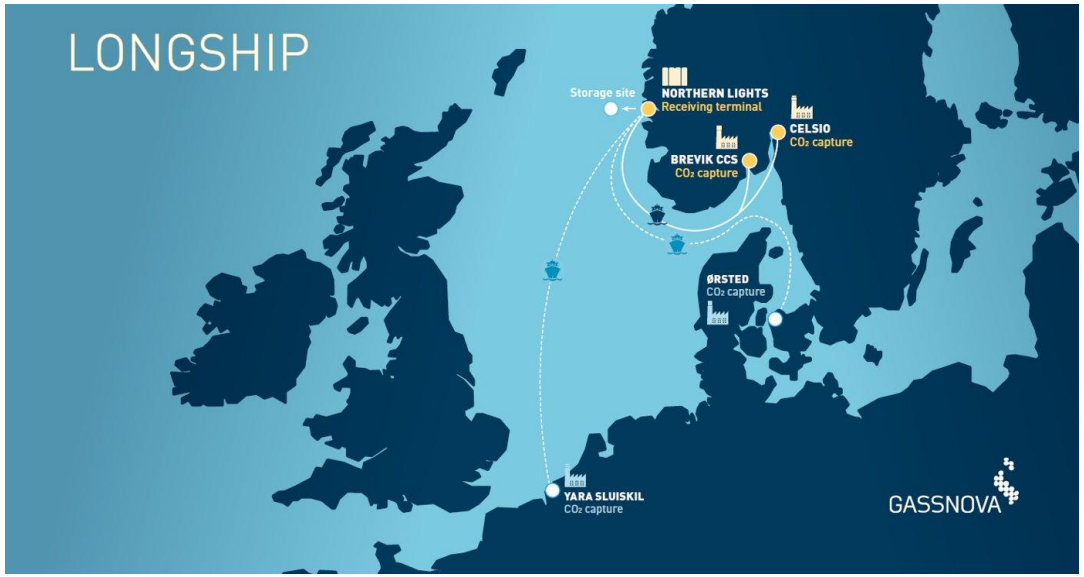
- 2,3 billion tonnes of waste is produced every year, expected to grow to **3.8** billion tons by 2035
- Household waste alone accounts for >5% of global CO2 emissions
- Landfills cause large methane emissions; >20 % of global warming - and pollution to soil and water
- In the EU alone, approximately 100 million tonnes of waste is landfilled every year
- We cannot recycle everything!

Source: UN Environment Program


If we put this bag of residual waste into a waste incinerator with CCS, we ensure safe treatment with **low emissions**, **destruction** of a number of environmental toxins and patogens, **high energy utilization** and **carbon removal**.

Full-scale CCS on waste-to-energy

- Part of the Norwegian Longship project = partial funding and storage secured
- Studies/pilot completed 2015-2021 (+ new FEED 2024)
- 350 000 t CO2 capture with 90% capture rate
- Biogenic CO2 capture;
  - **50 % Carbon removals ≈ 150 000 tonnes**
- Thoroughly tested technology (SLB Capturi)
- Establishes a CO2 hub for South East Norway



Cost increases causes pause (April 2023)

- **Inflation, power prices, market situation, currency**
- Final location at Port of Oslo changed
- Area demand and infrastructure
- Local power demand
- Organization

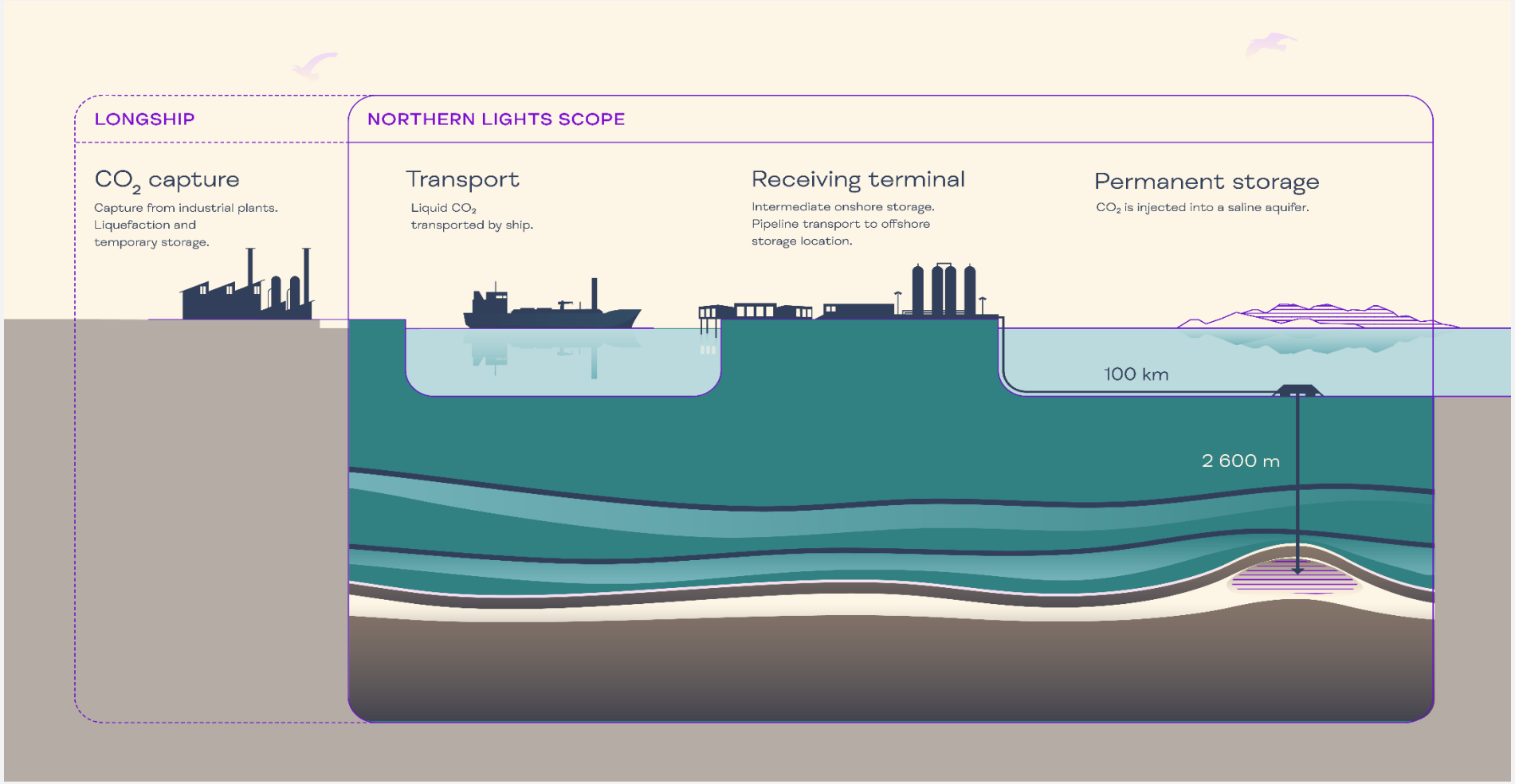
New FID Q1 2025:

- Maturing and cost cuts
- New FEEDs
- Revised state support agreement and Oslo investment
- Realizing revenues from capture of biogenic CO2

Northern Lights provides **a safe and permanent** storage solution

Northern Lights

- High pressure and temperature
- CO2 injected in a porous sandstone layer
- Layer(s) of shale above the sandstone
- The CO2 will slowly dissolve in the salt water
- Over time the CO2 will form into minerals



Source: Northern Lights

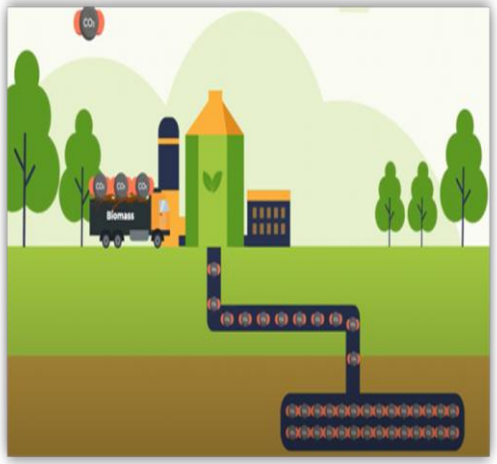
A Public Private Partnership dependent on CDR revenues

OPEX Oslo CCS
315 mill NOK

CAPEX Oslo CCS

8,4 mrd. kr (P50)
9,5 mrd. kr (P85)

Revenues from Voluntary Carbon Removals Market



- Emerging market
- Legislation lacking
- No deals on waste incineration

State support

Parliament of Norway
Acc: Stortinget.no

City of Oslo investor in the project

Oslo City Hall

Celsio accelerating market evolution

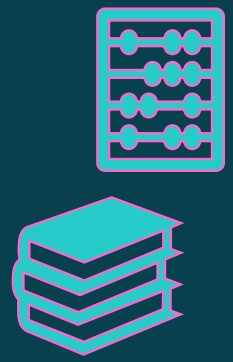
Suppliers of negative emissions/carbon removals

- Bioenergy
- WtE/WECCS
- DAC/DACCS
- Nature-based solutions

Legal agreements

Validation/certification

Framework/standards for carbon removal



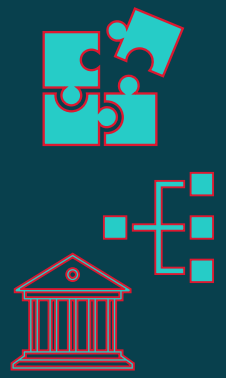
- EU legislation for CDR
- Voluntary market framework
- Stockholm E and Oslo CCS
- Others

Certification

Control organ/ registry

- Verra
- Puro.Earth
- Gold Standard
- Others

Brokers, sales services



- Banks
- Independents
- Platforms

Market/Customers – companies with high margins and clear goals for net zero

- Microsoft
- Frontier
- JPMorgan
- Shopify etc.

Andre mulige inntektsstrømmer

CO_2 terminal og logistikk

Fjerning av ikke-gjenvinnbar plast

Tro på økt betalingsvillighet for karbonnøytrale avfallstjenester.

Waste-to-energy with CCS: A three-in-one solution

1. Provides safe and sustainable end-treatment for unrecyclable waste
2. Produces local heat and electricity
3. Reduces CO_2 emissions from the incineration and removes CO_2 from the atmosphere (BECCS/CDR)


Hafslund