

# Building a cost-leading carbon capture tech provider

Pareto Securities' 30th annual Energy Conference

21 September 2023



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# Highlights

Climate change calls for large-scale CO<sub>2</sub> emission reductions

Offering safe and highly cost-competitive carbon capture technologies

Accelerating demand, sales pipeline grew 30% in Q2 2023

Strong traction in cement, the world's largest industrial emitter

Targeting significant long-term value creation with a scalable model

# Capsol Technologies at a glance



Safe and highly cost-competitive carbon capture technologies

Reduced capture cost vs amines<sup>1</sup>

**~40%**

Capture efficiency

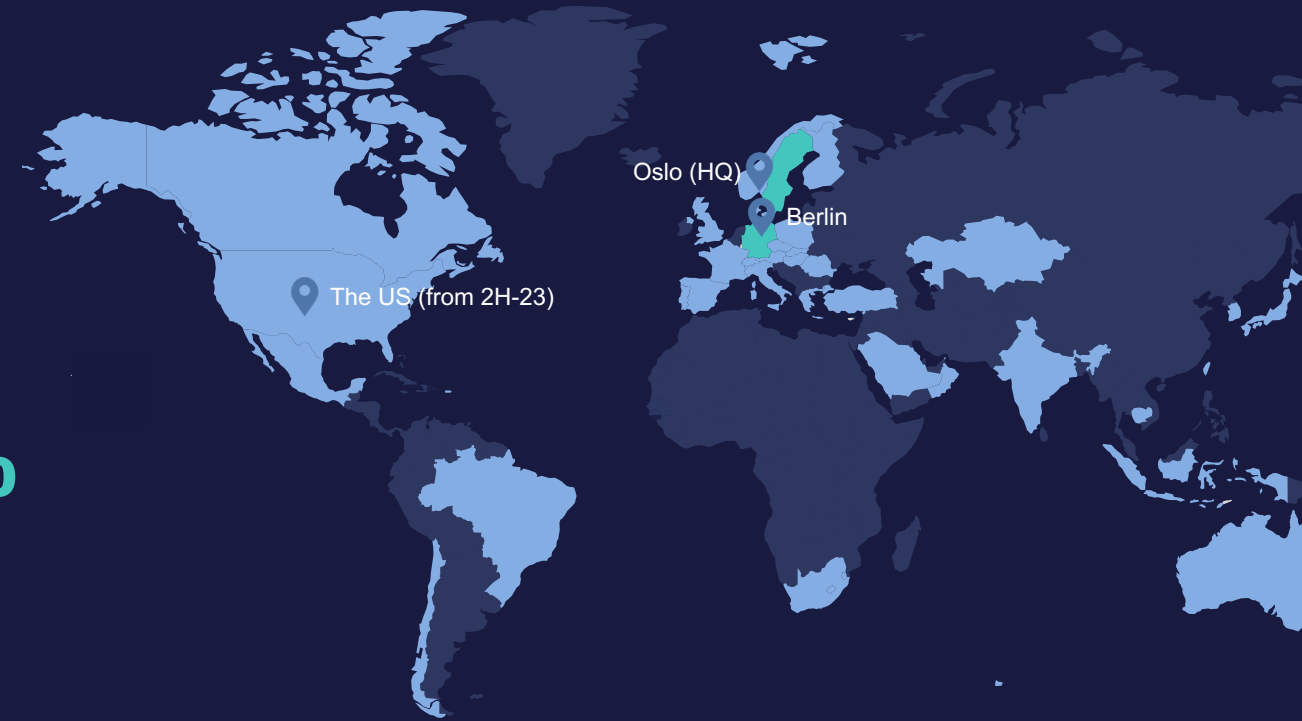
**90-95%**

Hours in operation

**~6 000**

Target industries

**Cement**  
**Biomass**  
**Energy-from-waste**  
**Gas turbines**

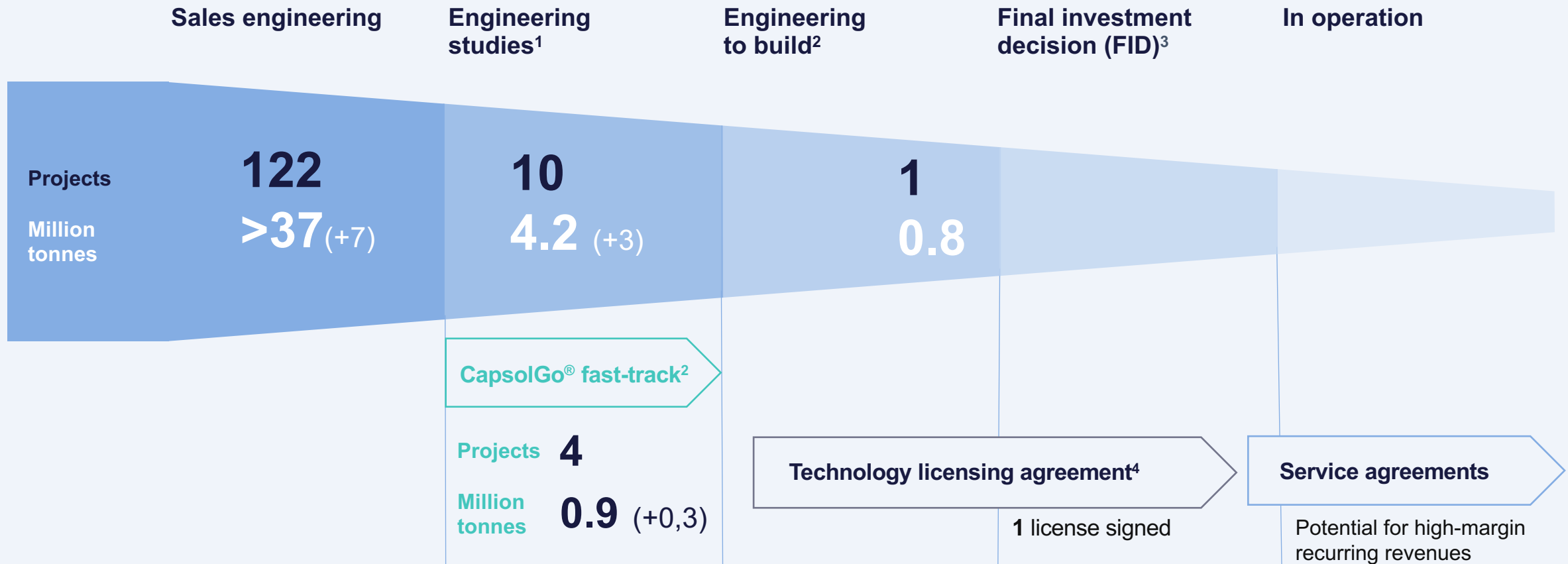


<sup>1</sup> Based on company estimates and studies (Swedish Energy Agency report "Conceptual study for Bio-CCS within Stora Enso's Swedish kraft pulp mills" and Sintef report "Reducing the Cost of 2 Carbon Capture in Process Industry")

# Illustrative revenue potential towards 2040



# 30% growth in pipeline since Q1 – totalling 42 million tonnes of CO<sub>2</sub> to be captured



1) Concept, Feasibility and pre-FEED (front end engineering design) studies with paid engineering work or other project specific work more advanced than "sales engineering". Change in methodology from last quarter – see report for details.

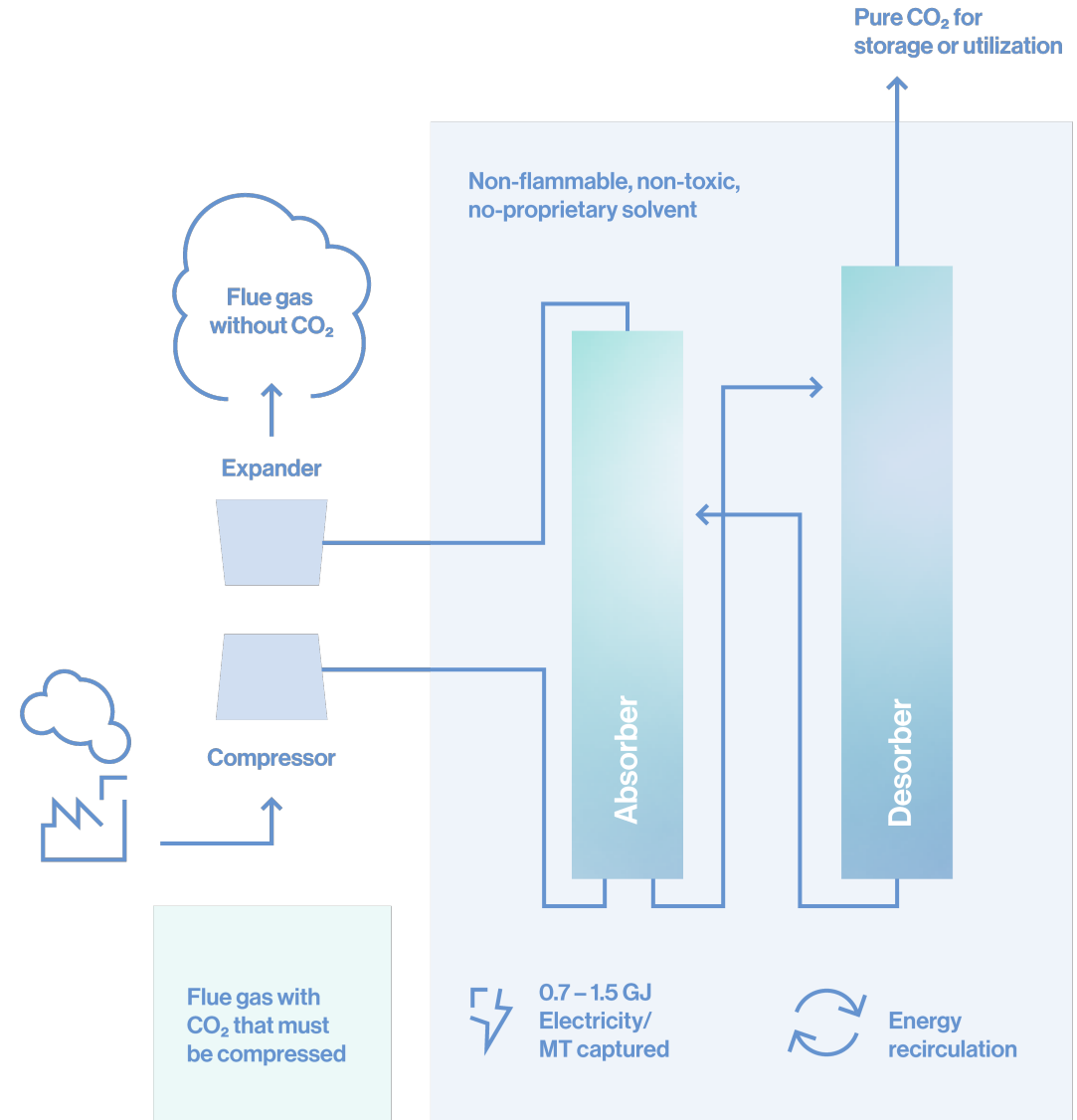
2) CapsolGo® offers an alternative and accelerated path to investment decision.

3) Stockholm Exergi FID expected early 2024 (signed license agreement)

4) Expected 7-12 EUR/installed tones of capacity and/or revenue per tonnes captured

# Efficient capture process based on reusing energy

- The challenge: Separate CO<sub>2</sub> from the exhaust of industrial plants so that it can be stored or utilised
- Capsol Technologies has developed a process to do this safely at low cost
- The process is based on potassium carbonate to bind the CO<sub>2</sub>
- This was traditionally seen as challenging due to the energy intensity of compression to make the chemical process work
- Capsol turned this challenge into a benefit by optimising heat and pressure balance to gain overall energy efficiency



# Capsol Technologies: The mature competitor, highly competitive on cost vs amine based carbon capture

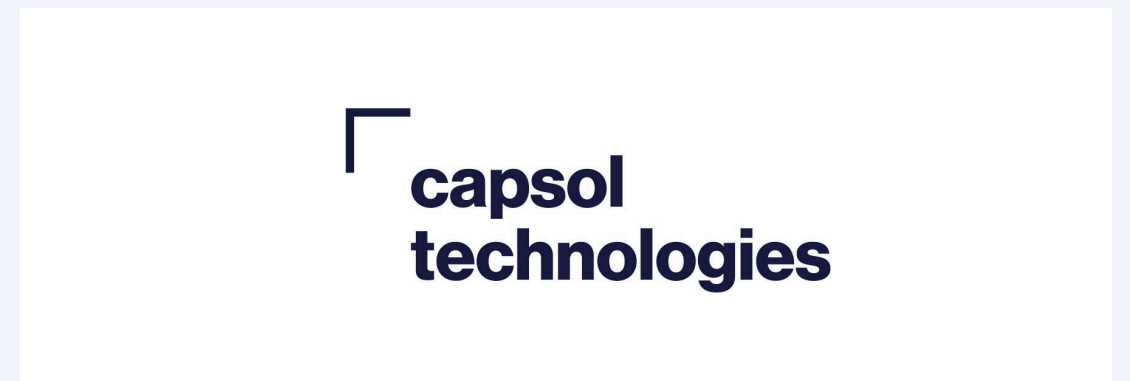
## Amine based carbon capture technology

- The most well know capture technology
- Chemical process used for many decades in other applications
- Many providers. Main intellectual property is chemical blend
- Two large-scale «post-combustion» carbon capture plants built



## Capsol Technologies HPC carbon capture technology

- Hot Potassium Carbonate (HPC) for «post-combustion» carbon capture, in many instances the only viable mature alternative
- Chemical process used for many decades in other applications
- Main intellectual property is centered around process design and energy efficiency

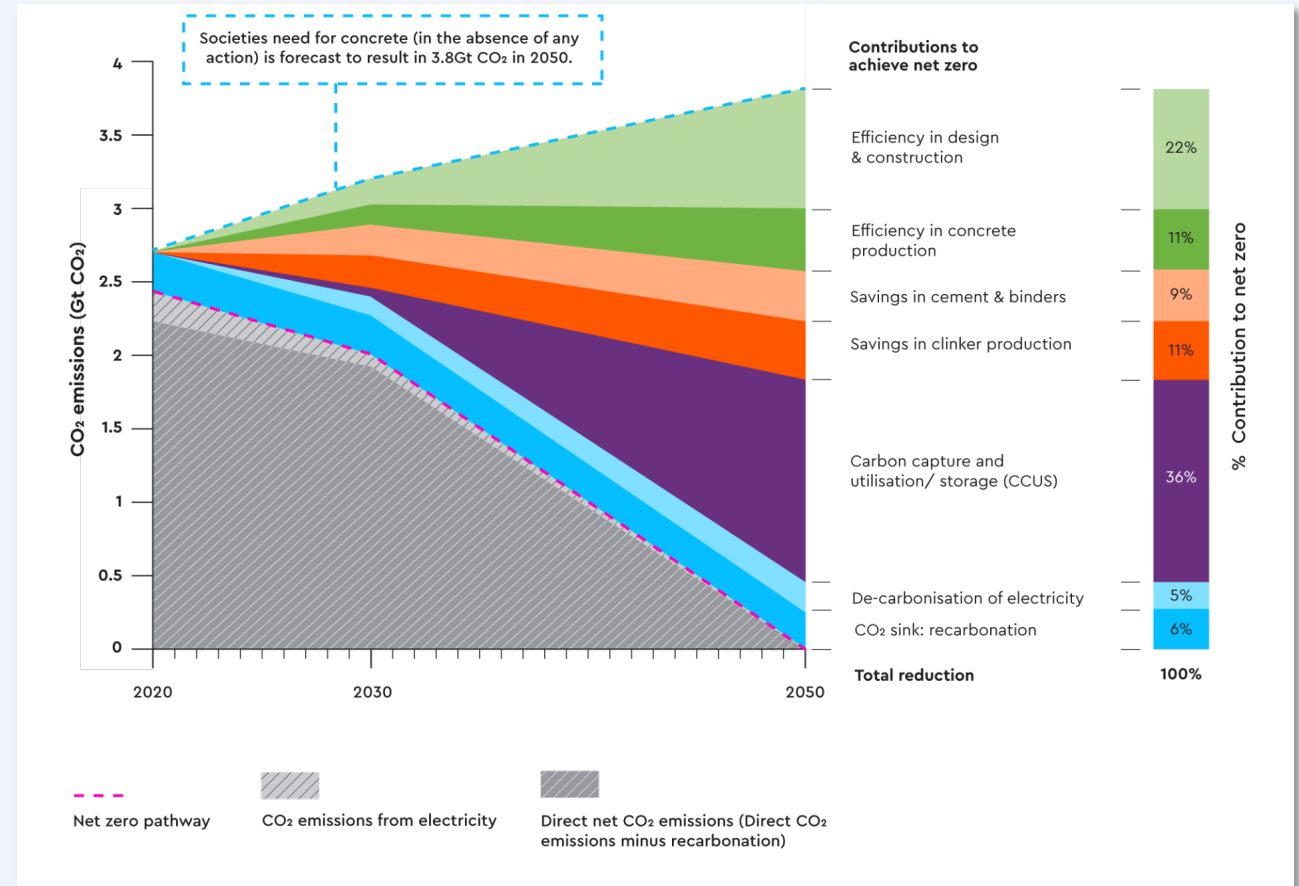




**Providing the best  
carbon capture solution  
for the cement industry**

# Cement is the largest industry opportunity for CCS

- Cement accounts for ~8% of global CO<sub>2</sub> emissions and CCS is the only viable alternative to reach net zero
- EU produced 183 million tonnes cement in 2022, the US 95 million tonnes, India 370 million tonnes and China 2 100 million tonnes<sup>1</sup>
- Expected to account for 30% of total CO<sub>2</sub> capture in 2030<sup>2</sup>
- After 2030, one new full-scale CCS plant is required per week<sup>3</sup>



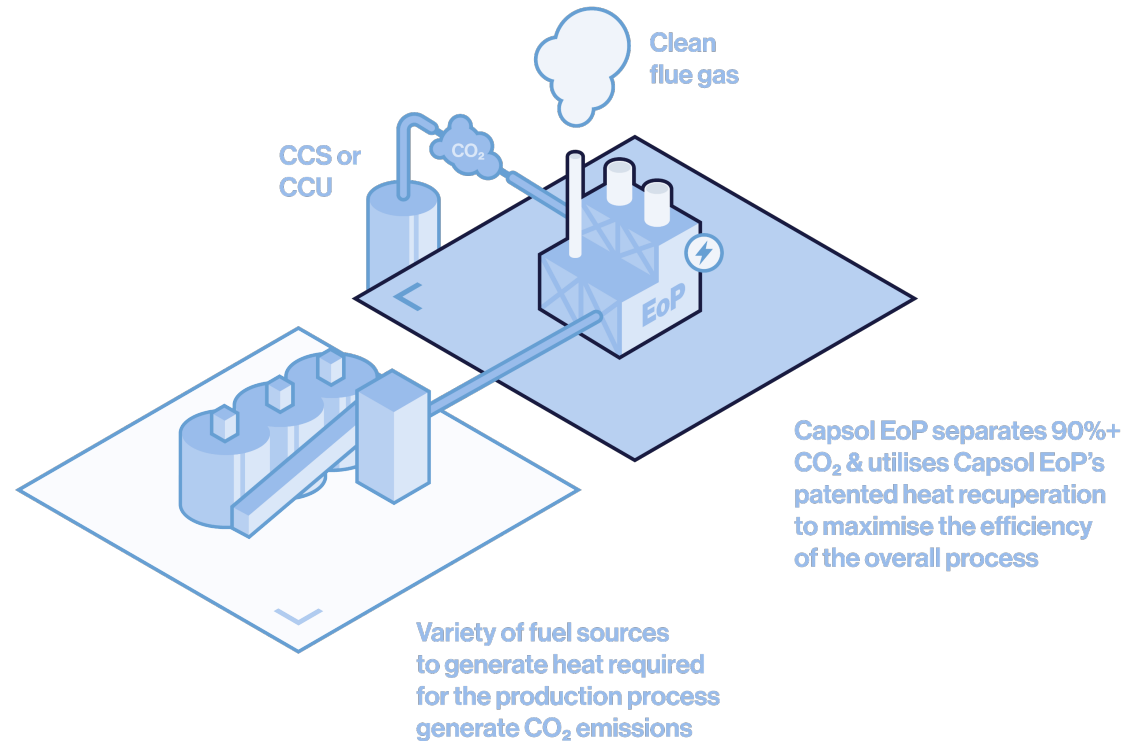
# CBAM!

## EU's Carbon Border Adjustment Mechanism



- CBAM will enter into application in its transitional phase on 1 October 2023
- Once fully phased in the CBAM will work as follows:
  - EU importers of cement will have to pay allowances equivalent to the EU ETS expressed in EUR per tonnes
  - At the same time EU domestic producers will lose the “free” emission allowances
- Cement producers in the EU and cement producers exporting to the EU will be fully exposed to EU cost of CO<sub>2</sub> emission
- With a cement price of 100 EUR per ton of cement, emission of 600 kg/ton and ETS price of 100 EUR will add 60% to the price of cement
- **CBAM a powerful driver for carbon capture in the cement industry**

# Highly attractive value proposition for cement

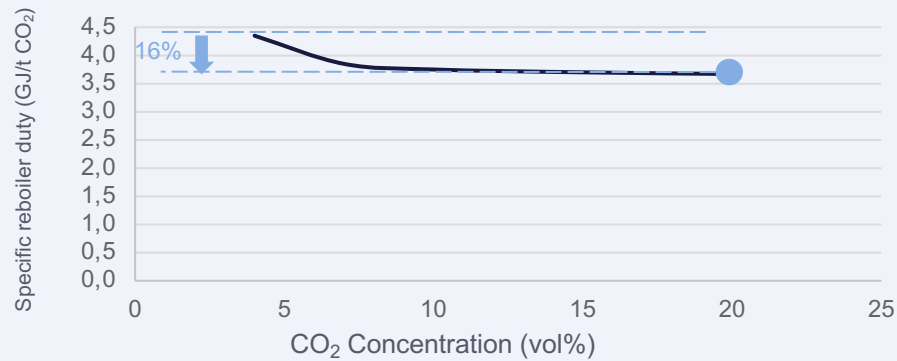


- CapsolEoP® can typically reduce energy use by a minimum of 50% compared to traditional capture technologies such as amines<sup>1</sup>
- CapsolEoP® can reduce levelised capture costs by more than 25%
- Flexible and easy to integrate – minimal production downtime
- Can be run on renewable electricity – no need to burn additional hydrocarbons
- High CO<sub>2</sub> concentration in the flue gas (15-20%) – major advantage for CapsolEoP®

# CapsolEoP<sup>®</sup> for cement – superior energy efficiency

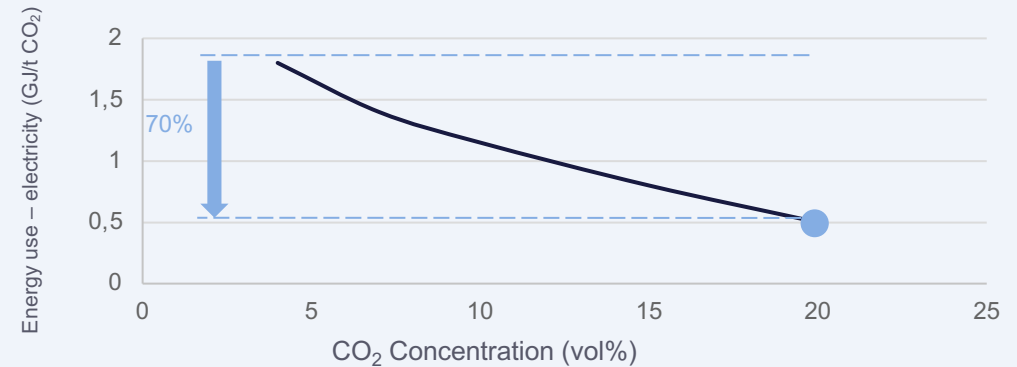
## Traditional CCS technologies (amines)

Heat consumption is a weak function of CO<sub>2</sub> concentration



## CapsolEoP<sup>®</sup>

Electricity consumption is a strong function of CO<sub>2</sub> concentration



# Capsol is currently working with 9 cement projects totalling 10 million tonnes of CO<sub>2</sub>

## United Kingdom



**~700 000**

tonnes of CO<sub>2</sub> per year (full-scale deployment)

Short-listed as technology for feasibility study. Expected start Q3 2023.

## Location undisclosed



**~1 000 000**

tonnes of CO<sub>2</sub> per year (full-scale deployment)

Capsol to provide feasibility engineering. Execution ongoing.

## Northern Europe



**1 000 000+**

tonnes of CO<sub>2</sub> per year (full-scale deployment)

Feasibility study awarded in July 2023. Execution ongoing.

## Southern Europe



**~1 500 000**

tonnes of CO<sub>2</sub> per year (full-scale deployment)

Feasibility study for two plants awarded in September 2023. Execution ongoing.

In addition to above – 4 new projects in sales engineering phase over last months with a total of 5.5 million tonnes of CO<sub>2</sub>



# Summary

# Highlights

## Climate change calls for large-scale CO<sub>2</sub> emission reductions

Significant CCS ramp-up expected towards 2030; CCS licensing market estimated at up to EUR ~50 billion 2023-2040

## Offering safe and highly cost-competitive carbon capture tech

Patented process enables ~40% lower costs. Safe and environmentally friendly solvent. Solution proven with 6 000+ operational hours

## Accelerating demand, sales pipeline grew 30% in Q2

Active sales leads totalling 42 million tonnes of CO<sub>2</sub> by end Q2 2023. Nearly 4x volumes in engineering phase vs the previous quarter

## Strong traction in cement, the world's largest industrial emitter

Awarded engineering work for five cement projects and performing sales engineering for a further four – totalling 10 million tonnes of CO<sub>2</sub> per year

## Targeting significant long-term value creation

2030 ambition of 5-10% technology licensing market share, EUR 7-12 in licensing revenue per tonnes installed capacity, and 40-60% pre-tax profit margin

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0277 Oslo  
Norway

[capsoltechnologies.com](https://capsoltechnologies.com)

Our vision is to accelerate the worlds  
transition to a carbon negative future

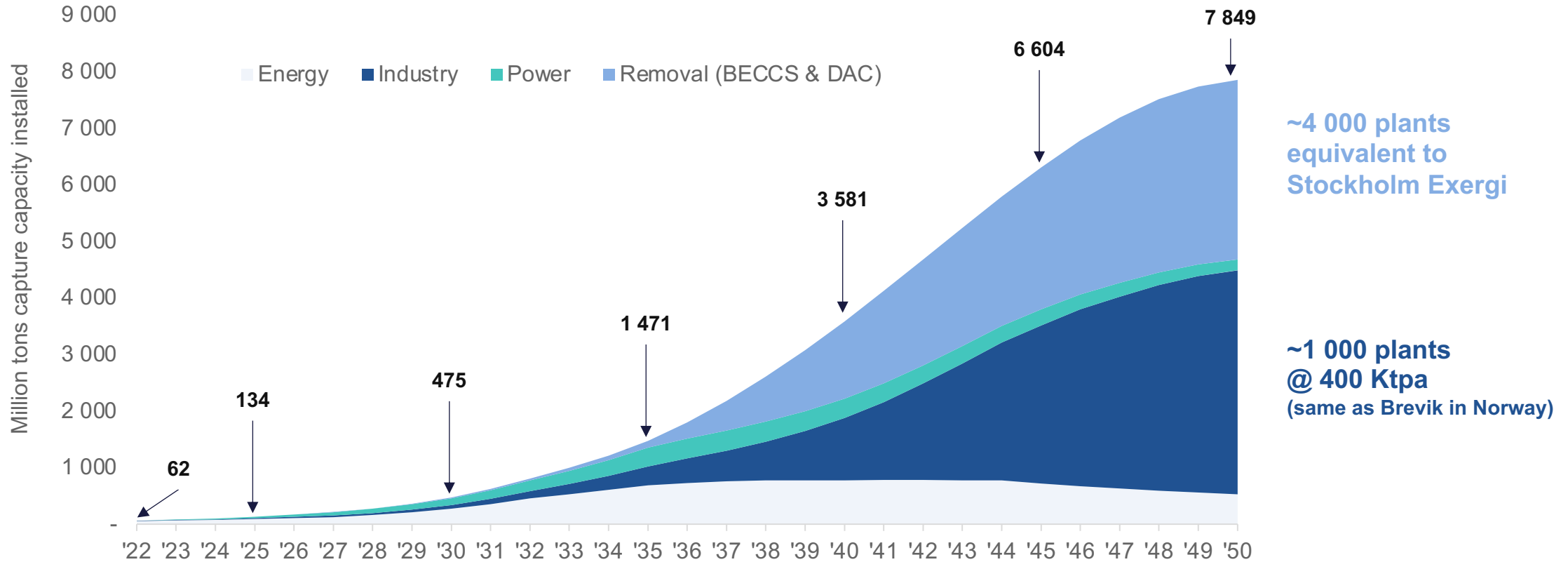
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# Appendix

# Path to net zero requires a step change in carbon capture

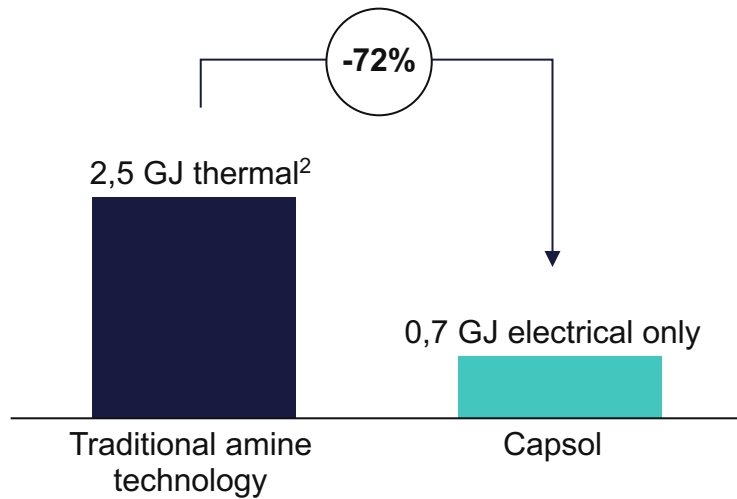
CO2 captured per year – Rystad Energy 1.6dg Scenario



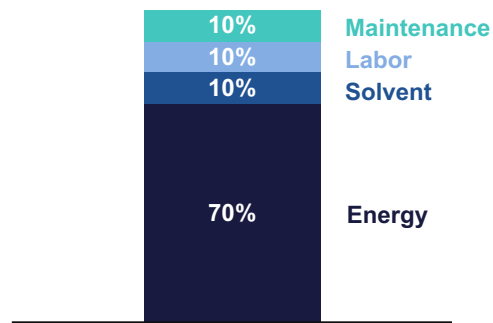
- CCS is still in the early stages, and will need to grow significantly for the world to stay within the 1.6-degree scenario
- Significant ramp-up of capacity towards 2030
- Growth to accelerate in the following decade

# Energy efficiency enables lower operating costs

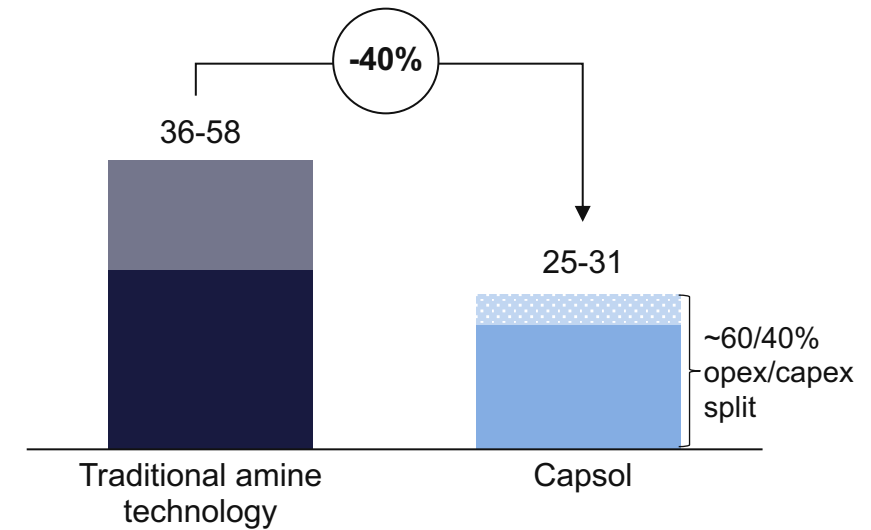
Energy consumption<sup>1</sup> (GJ/t)



Opex distribution (actual project)



Levelized carbon capture<sup>2</sup> cost (EUR/t)



Patented heat recuperation process reducing the main cost driver for carbon capture: **Energy consumption**



# First licensing revenue from pioneering project in 2024

Selected as the preferred solution for Europe's first large-scale negative emissions plant

## First technology licensing agreement with Stockholm Exergi

-  Awarded in July 2022
-  Proven technology
-  Competition with all mature technologies
-  HPC Safety of HPC compared to amimes
-  Highly competitive economics
-  Recover process heat for dist. heat.

## EU award for the project

-  Project awarded EUR 180 million by EU
-  HPC Capsol's HPC technology contributing positively to EU's decision



“

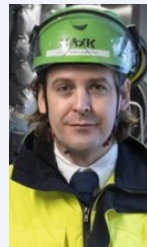
We will do everything we can to get the product to market as quickly as possible

*Erik Rylander | Head of Carbon Dioxide Removal at Stockholm Exergi*

“

If we can build such a facility, basically in the middle of Östermalm in Stockholm, there are no places in the world where you can not build a carbon capture plant”

*Fabian Levihn | Head of R&D at Stockholm Exergi*



Stockholm Exergi is the provider of power, district heating and cooling to the city of Stockholm

Plant	Värtaverket
Installation type	Combined heat and power plant
Type	BECCS
Final investment decision	Expected in 2024
Full-scale deployment	800 000 tonnes CO <sub>2</sub> / year from 2026

# Four strategic pillars supporting growth and long-term value creation

## Strategic focus

### Technology

Continue to develop and protect cost advantage to ensure long-term competitiveness

### Product

Commercialise new products and services to increase revenue per project

### Sales & marketing

Increase brand awareness and expand geographical footprint to ensure access to viable projects

### Engineering & implementation

Increase engineering capacity and streamline delivery model to convert more opportunities to sales

## 2025 goals

**>90%**

of contract awards considering Capsol's solution

**>50%**

increase in efficiency across paid and sales engineering

**Top 5**

Leading position in four key target segments<sup>1</sup>

## 2030 goals

**5-10%**

Technology licensing market share

**EUR 7-12**

Licensing revenue per tonne installed capacity

**40-60%**

Pre-tax profit margin

# Mature technology delivering commercial traction



## Technology developed over 20 years<sup>1</sup>

Combining two established processes (chemical and energy re-cycling) to a solution suitable for CCS



## 3 successful pilots completed

In the EU and the US, demonstrating >90% capture efficiency



## Demonstration unit commercialised

Designed to accelerate customers' investment decisions – first revenue generated in 2022



## 2 demonstration units in operation

One in Germany, the country in Europe with the largest potential for CCS, and one in Sweden



## Patent license agreement with Stockholm Exergi

Europe's first large-scale negative emissions plant – received EUR 180m in funding from the EU's Innovation Fund



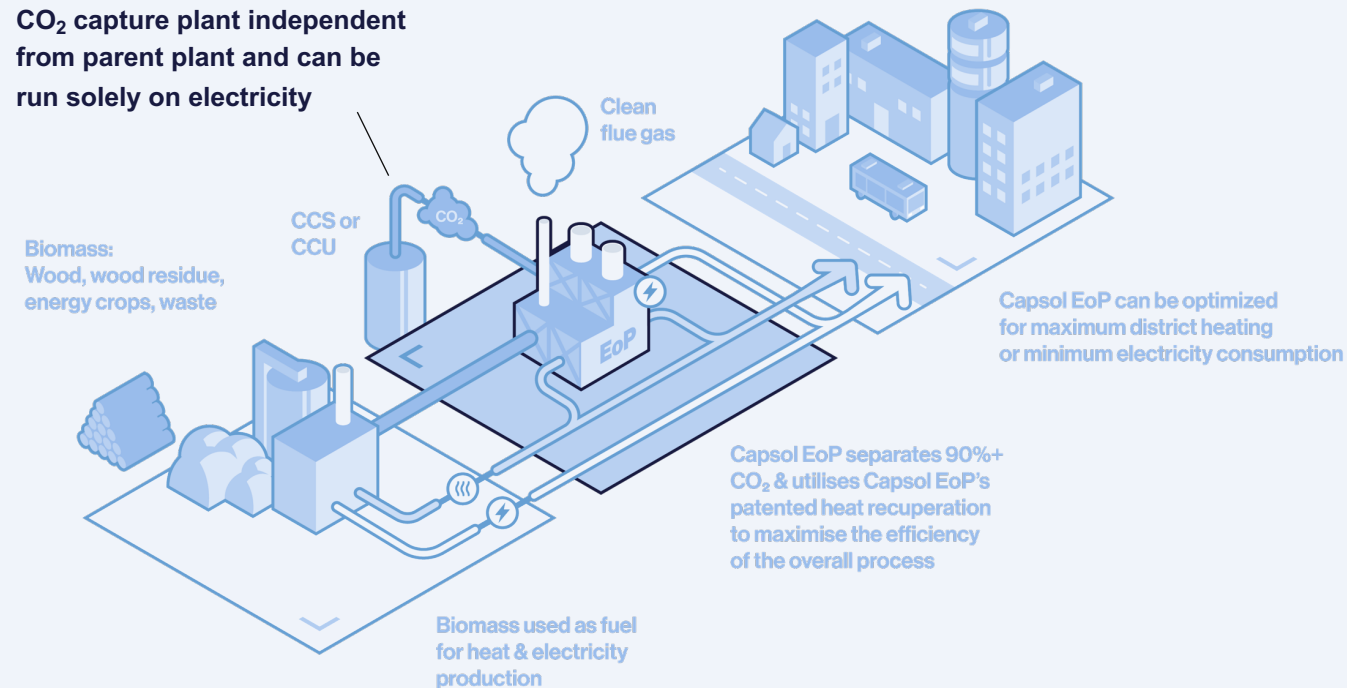
## Collaboration agreements

Signed with large international players

# Value proposition for biomass / BECCS

Offering the lowest opex through additional heat delivery, safe for residential areas

CO<sub>2</sub> capture plant independent from parent plant and can be run solely on electricity



## Biomass plants can become CO<sub>2</sub> negative

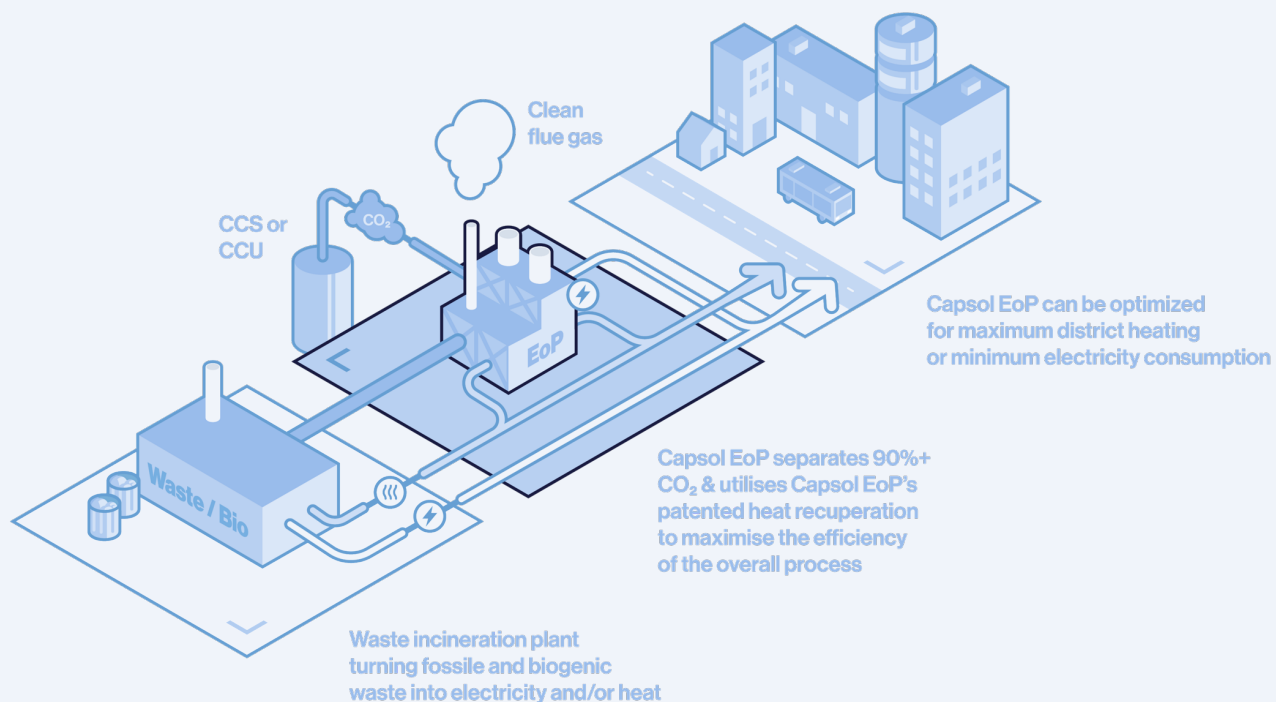
- Incineration of biomass considered carbon neutral
- Potential to remove carbon from atmosphere using BECCS – few alternative processes

## Capsol End-of-Pipe (EoP™) for BECCS

- Can be optimized for maximum heat delivery to district heating system – 8x additional heat output over 60°C for every additional 1 MWe electricity

# Value proposition for Energy-from-Waste

Fully electric and safe solution fit for residential areas with large integration potential



## Waste incineration is part of the circular economy and a source for negative emissions

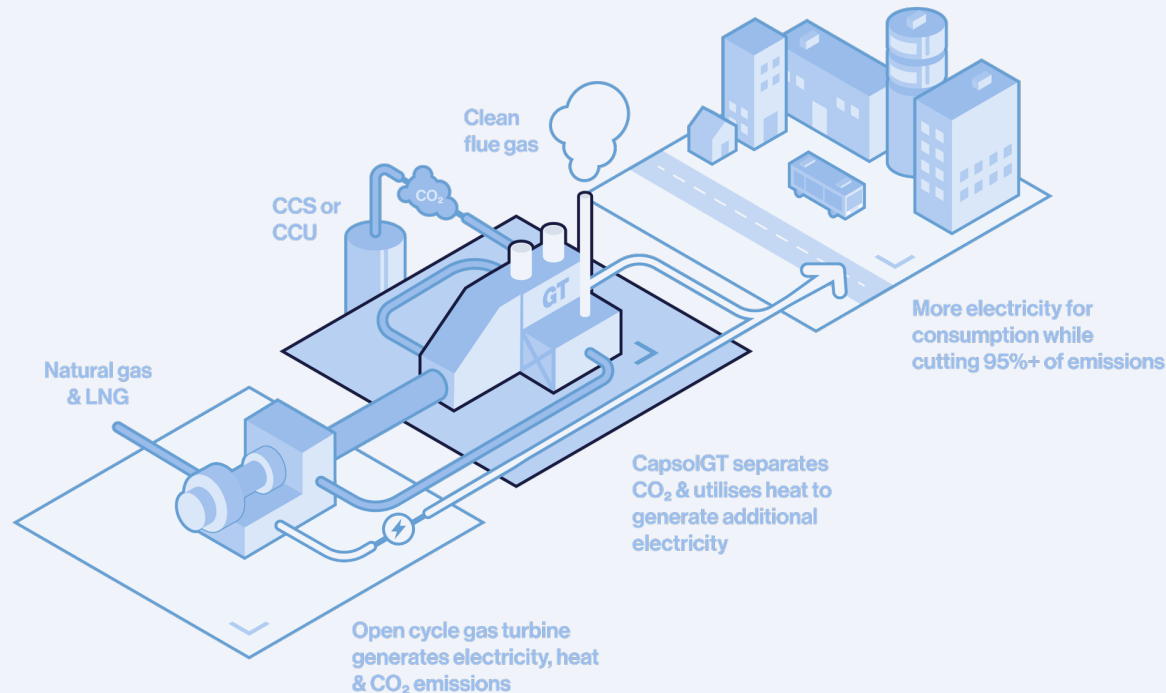
- Waste handling represents a major source of greenhouse gas emissions
- Moving away from landfill to recycling and incineration of waste that cannot and should not be recycled is expected to and will have to increase to meet necessary emission reductions
- Biogenic waste also represents an important opportunity for carbon removal from the atmosphere – typically represents 50–60% of burned waste

## Capsol End-of-Pipe (EoP™) for Energy-from-Waste

- Can be optimised for maximum heat delivery to district heating system – 8x additional heat output over 60°C for every additional 1 MWe electricity

# Value proposition for open-cycle gas turbines

Ability to handle low CO<sub>2</sub> concentration – potential for additional power generation



## Capturing CO<sub>2</sub> while generating additional electricity

- CapsolGT<sup>®</sup> carbon capture solution for open-cycle gas turbines – capturing >95% of carbon dioxide while enabling additional electricity generation

## Gas as a mainstay for power and heat and feedstock for industry

- Natural gas accounts for ~25% of global electricity generation<sup>1</sup>
- 2 200 gas power plants in the US and 800 plants across Europe

## Developing partnerships to commercialise CapsolGT<sup>®</sup>

# Proven traction with BECCS in Europe and the US

Awarded licensing agreement in Europe's first large-scale negative emissions plant

## Stockholm Exergi, Sweden



**800 000**

tonnes of CO<sub>2</sub> per year  
(full-scale deployment)

Capsol awarded technology licensing agreement for CapsolEoP™

## Biomass plant, Sweden



**~170 000**

tonnes of CO<sub>2</sub> per year  
(full-scale deployment)

Capsol awarded Front End Engineering Design (FEED) study with Norconsult

## United States



**~100 000**

tonnes of CO<sub>2</sub> per year  
(full-scale deployment)

Capsol executed feasibility study in 2022 and awarded pre-FEED study in 2023

## Germany



**~200 000**

tonnes of CO<sub>2</sub> per year  
(full-scale deployment)

Capsol awarded CapsolGo® demonstration campaign

# Waste-to-Energy segment is accelerating

New projects, solid execution and key partners

KVA Linth, Switzerland



**~100 000**

tonnes of CO<sub>2</sub> per year (full-scale deployment)

Awarded feasibility study for the CapsolEoP carbon capture technology

Öresundskraft AB, Sweden



**~200 000**

tonnes of CO<sub>2</sub> per year (full-scale deployment)

CapsolGo® campaign completed carbon capture demonstration campaign at Helsingborg

Central Europe



**~200 000**

tonnes of CO<sub>2</sub> per year (full-scale deployment)

Feasibility study for the CapsolEoP carbon capture technology

Westenergy, Finland

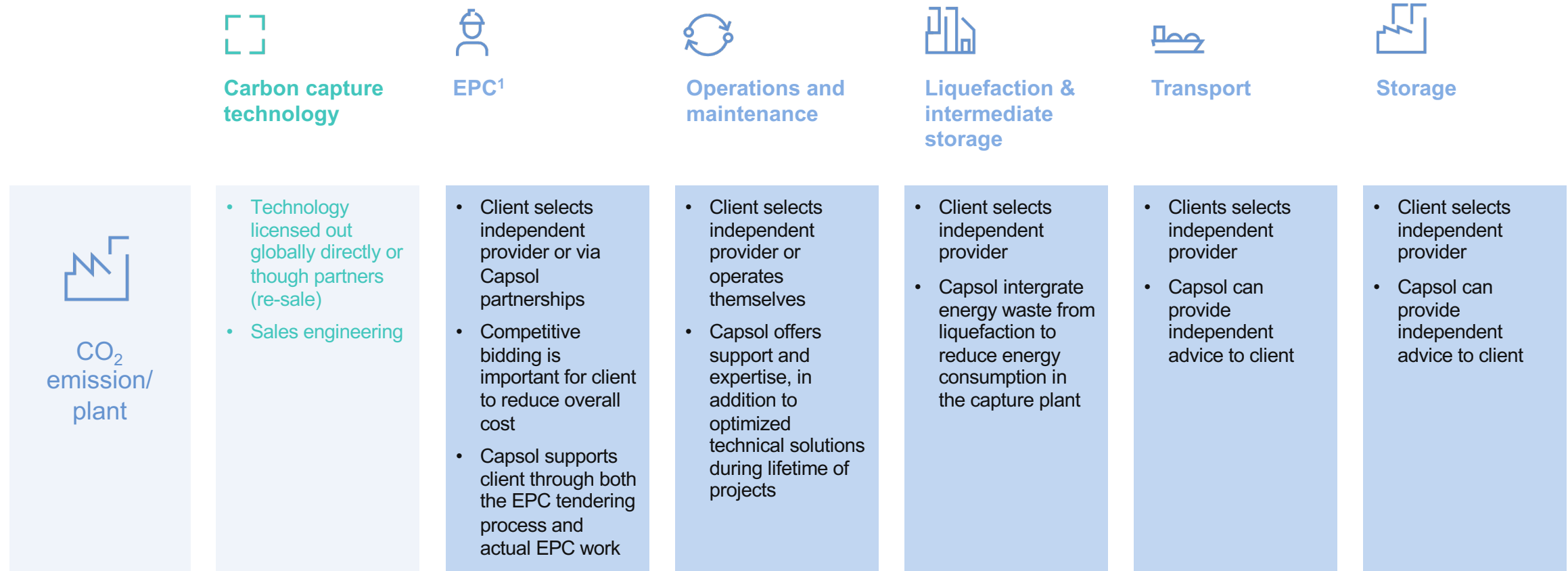


**~200 000**

tonnes of CO<sub>2</sub> per year (full-scale deployment)

Technology selected.  
Cooperation with Sumitomo

# Value chain overview



Supporting client through the value chain, but client remains free to choose providers

# Capital light, low risk and high margin licensing model



Capsol is offering a highly scalable licensing model



Currently three income streams

- Paid engineering/process design
- Revenues from demonstration units
- Licensing fees



No project construction risk



Mean and lean organisation – marketing power to be secured through global cooperation and partnerships



First part of licensing fee normally paid when final investment decision (FID) is made

- Assuming at least 1/3 of total license fee to be paid at FID
- Normally a time period of 12-24 months from feasibility study initiated to FID (Final Investment Decision)
- Alternative model is to introduce license fee as a recurring payment per ton of CO<sub>2</sub> captured



Targeting a pre-tax margin of 40–60% – higher end achievable when critical mass on license projects reached



Additional recurring revenue potential by leveraging core technology to deliver high-value operational support/services

# Patent portfolio overview

**Patent family 1:**  
Low emission  
thermal powerplant

**Patent family 2:**  
Combined storage  
solution for natural  
gas and CO<sub>2</sub>

**Patent family 3:**  
Method and plant for  
transport of rich gas

**Patent family 4:**  
Thermal power plant  
with CO<sub>2</sub>  
sequestration

**Patent family 5:**  
Purification of flue  
gas from marine  
diesel engines

**Patent family 6:** Oil  
sand production  
without CO<sub>2</sub> emission

**Patent family 7:**  
Heat integration in  
CO<sub>2</sub> capture

**Patent family 8:**  
Method and plant for  
CO<sub>2</sub> capture

**Patent family 9:**  
Heat recovery for  
CO<sub>2</sub> capture  
(pending)

**Patent family 10:**  
Method and plant for  
CO<sub>2</sub> capture from a  
district heating plant  
(pending)

**Patent family 11:**  
Energy integration of  
CO<sub>2</sub>-capture with a  
powerplant (pending)

# Management



## **Jan Kielland, Chief Executive Officer**

>40 years experience with management and board positions in the energy sector internationally. MSc in Petroleum Engineering from NTNU.

Shares held: 5,172,677      Options: 850,000



## **Ingar Bergh, Chief Financial Officer**

>15 years experience as advisor and executive in the energy and shipping sectors. Engineering degree, MSc in Supply Chain Management, MBA Finance, Authorized Financial Analyst (CEFA).

Options: 750,000



## **Johan Jungholm, Chief Commercial Officer**

10 years in Business Development, Complex Sales and Marketing and 15 years in energy sector. BA in Geology and Environmental Science, University of Pennsylvania.

Options: 230,000



## **Cato Christiansen, Chief Technology Officer**

Former Shell, SPT Group and the Norwegian Ministry of Petroleum and Energy (Carbon Capture and Storage). PhD in Mechanical Engineering from NTNU.

Options: 500,000



## **Tone Bekkestad, Chief Marketing Officer**

>20 years experience in communications & media. Moderator and lecturer on the topic of solutions to climate change. MSc in Meteorology.

Shares held: 717,118      Options: 590,000



## **Philipp Staggat, Chief Product Officer**

>10 years at Siemens, including lead commissioning engineer and project manager, before joining CO2 Capsol. BSc Engineering Berlin University of Applied Sciences and MBA London Business School

Options: 190,000

# Board of directors



**Endre Ording Sund**

Chair

- >40 yrs experience with mgmt. and board positions in the energy, banking and shipping sector
- Royal Navy Academy, Norwegian School of Management, Harvard Business School



**Einar Chr. Lange**

Board member

- Largest investor in CO2 Capsol
- Mgmt. experience from shipping and private companies
- Economics degree from University of Cambridge



**Wayne G. Thomson**

Board member

- Extensive international career as a top executive within oil and gas
- Chairman of Svante Inc
- B.Sc. in Mechanical Engineering from University of Manitoba



**John Arne Ulvan**

Board member

- Former Shell, SPT Group and the Norwegian Ministry of Petroleum and Energy (Carbon Capture and Storage)
- MSc in Chemical Engineering from NTNU



**Monika Inde Zsak**

Board member

- Extensive career within energy, renewables and sustainability
- MSc in industrial engineering and finance from NTNU and University of New South Wales, Australia (UNSW).



**Claes Nygren**

Board member

- >50 yrs of experience in engineering and leading management positions
- MSc in Mechanical Engineering

# Risks and mitigating actions

## Key risk factors

Small player

Competitors  
developing better  
technologies

## Mitigating actions

- Licensing model highly scalable with limited resources
- Partnering with big global players to greatly extend reach, capacity and capabilities
- A clear strategic roadmap for organic growth and opportunistic approach to inorganic growth
- Highly capable and incentivised team
  
- Prove cost competitiveness and continue to implement learnings from executed projects
- Sound strategy and routines for patent protection implemented, continue to invest in R&D
- Consider establishing projects with long cash flows
- Opportunistic approach to acquiring promising new technologies

**Annual review to identify risk factors and implement mitigating actions overseen by the board of directors**

Our purpose



**Accelerating the  
world's transition to a  
carbon-negative future**