



AKER CARBON
CAPTURE

Update from ACC

27 September, 2022

Jon Christopher Knudsen, Chief Commercial Officer



Introduction

DENMARK OFFICE



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Senior Engineer Thermal Energy Systems · Core Technology



Nadya Leviana
Senior Environmental Specialist · Technology



Simon Simpson
CO2 Senior Specialist · Technology & Innovation



Victor Darde
Senior Specialist Engineer · Technology & Innovation

... and several others



NORWAY OFFICE

HQ - Akerkvartalet at
Fornebu outside Oslo

- 100+ employees
- 200+ hired-ins
- 2 live EPC projects
- Several ongoing large FEEDs
- Multiple feasibility and pre-FEED studies ongoing at any time

Oslo office address
Oksenøyveien 8, 1366 Lysaker

Stronghold in North Europe with global reach through the Aker Group





History, technology and key projects

Aker Carbon Capture in brief

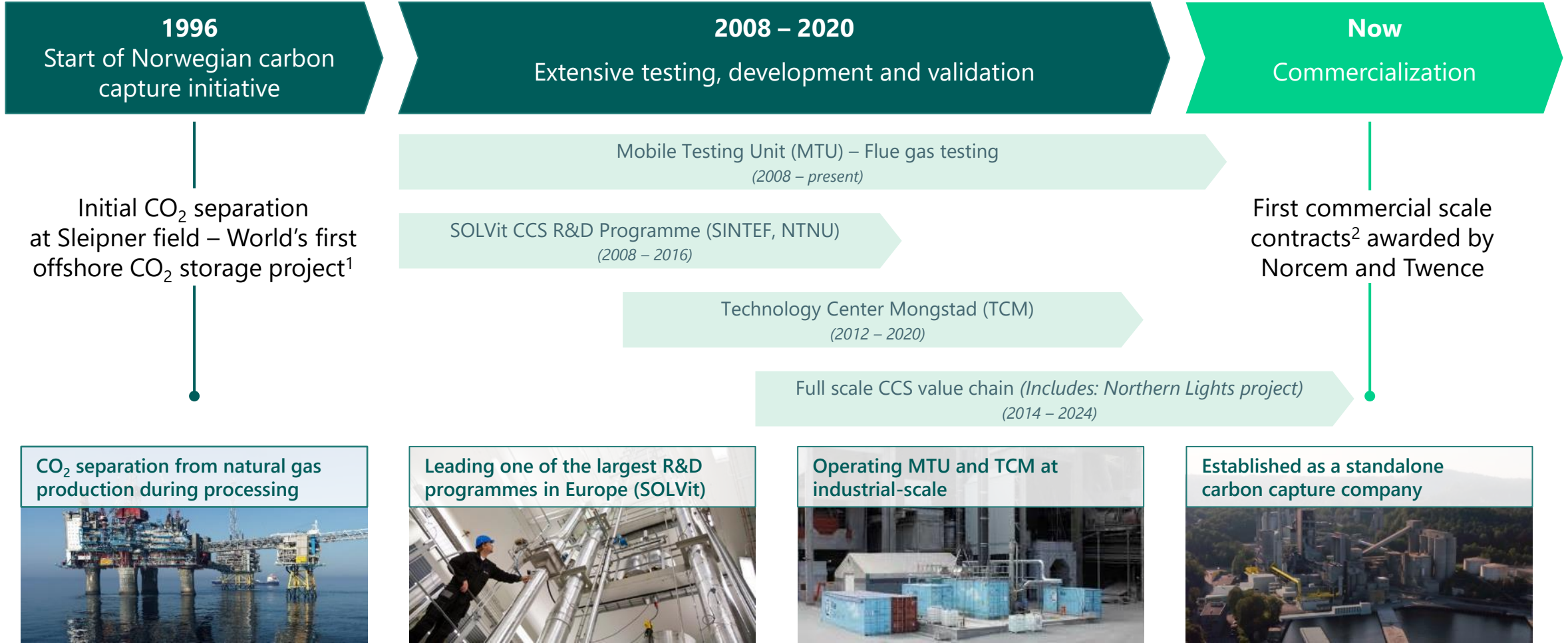
Pure play carbon capture company delivering ready-to-use capture plants

Best-in-class HSE friendly solvents and other patented plant technologies for better all-round plant performance

Validated and certified market-leading proprietary technology with more than 50,000 operating hours



A long-term Norwegian technology initiative



We designed and delivered Technology Center Mongstad (TCM)



We designed and are currently delivering Brevik CCS

Heidelberg Cement NORCEM's large scale CO₂ capture

- Project will be the world's first CCS plant at a cement facility
- Scope: EPC delivery of a complete CO₂ capture plant in Brevik, Norway for HeidelbergCement Norcem
- Plant capture capacity 400,000 t/pa of CO₂
- Key milestones achieved according to schedule
- Contract value at award of ~NOK 1.7 billion
- In **operation from 2024** as part of the full CCS value chain Longship project in Norway

Market

- Cement industry represents 6-7% of global emissions



Brevik CCS live:
kunde.bygggekamera.no



We are currently delivering our Just Catch™ modular plant

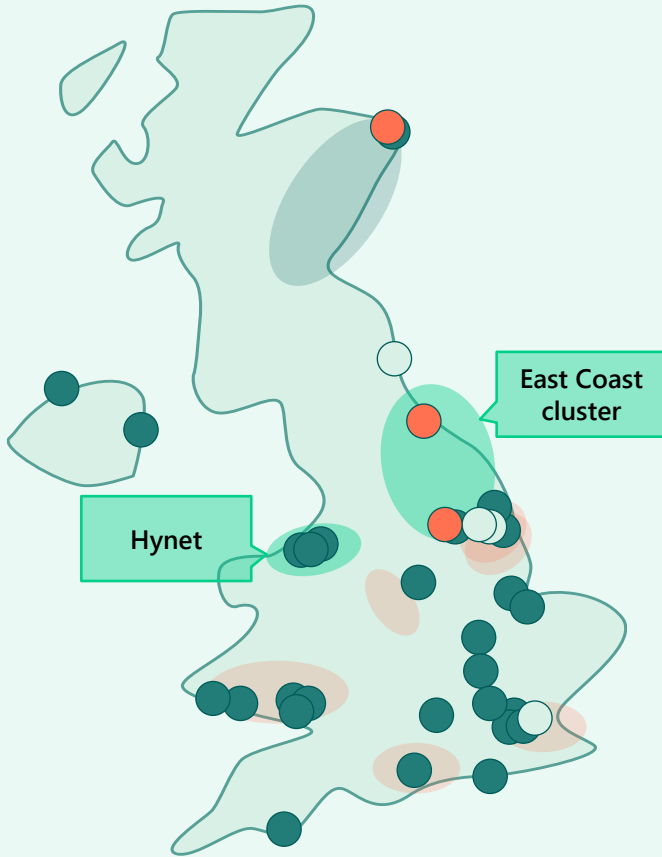
EPC delivery to Twence W2E in Hengelo, Netherlands

- Scope: Delivery of 100,000 TPA Capture unit
- Ongoing project, planned **operation in 2023**
- Mid-scale modular plant based on our Just Catch™ technology
- Pre-fabricated and brought to site – short delivery time
- CO2 distributed by trucks to local greenhouses
- CO2 will boost greenhouse production = CCU



Gas Fired Power Plants in the UK

- Industrial clusters, track 1
- Industrial clusters, track 1 reserved cluster
- Potential industrial clusters, Track 2
- Planned new build CCGT c/w CCS
- Existing CCGT retrofit CCS plans
- Gas fired power plant >300 MW



**Technology partner:
Siemens Energy**

We are currently delivering two large scale gas-to-power FEEDs

Secured FEED for Net Zero Teesside Power (BP)

- The world's first commercial scale gas-fired power station with carbon capture
- Technology partner to a consortium of Aker Solutions, Siemens Energy and Doosan Babcock
- Capacity of about 2 million tonnes CO₂ per year
- CO₂ transportation and storage infrastructure being developed by the Northern Endurance Partnership to serve the East Coast Cluster

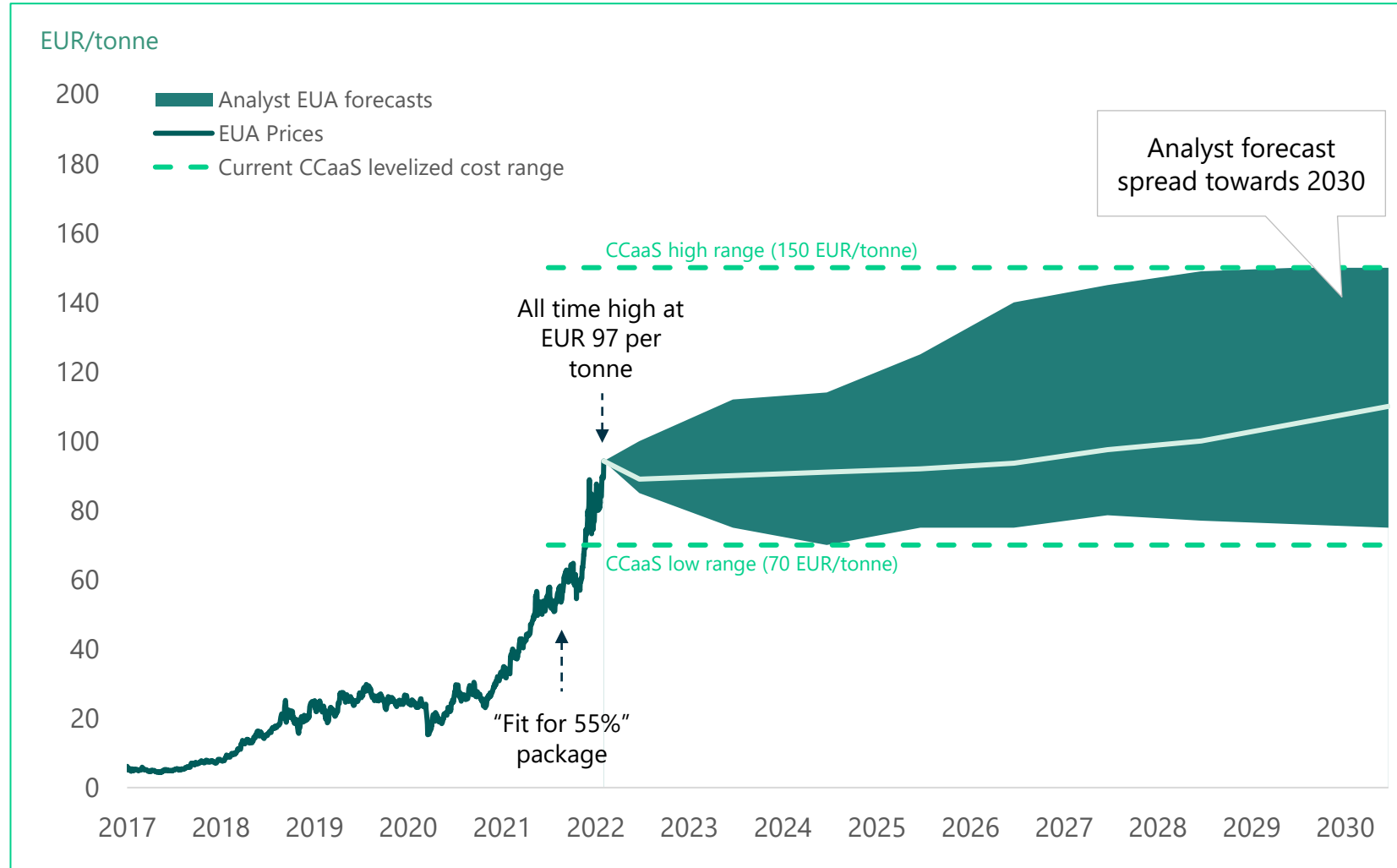
Secured FEED for Keadby 3 (SSE Thermal)

- SSE and Equinor have awarded FEED to a consortium of Aker Solutions, Siemens Energy and Doosan Babcock where Aker Carbon Capture is the technology partner
- The FEED is currently ongoing
- The Keadby 3 Carbon Capture Power Station has a capacity up to 2 million tonnes CO₂ per year



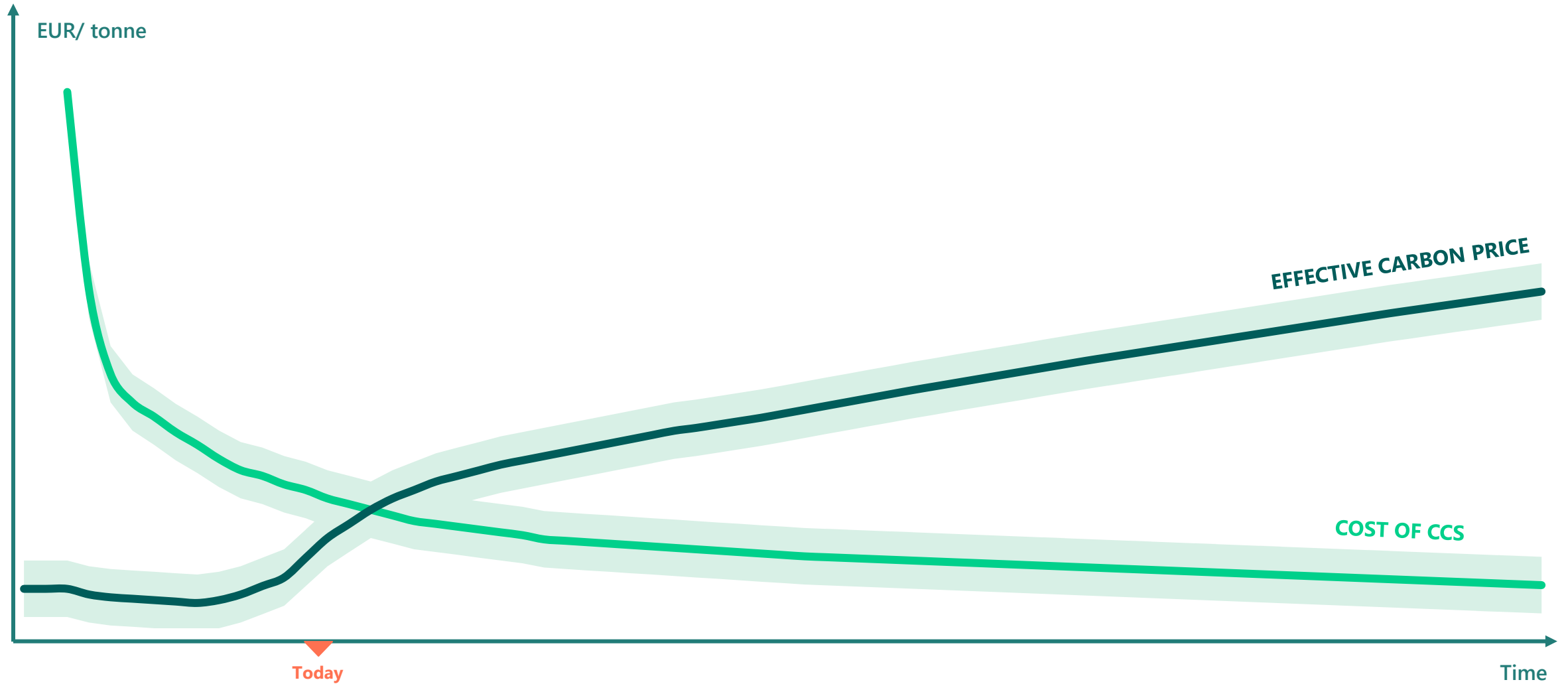
Outlook and innovation

Full CCS value chain economics turning positive



- EUA now stands at around 65 EUR per tonne CO₂
- UKA now stands at around 74 EUR per tonne CO₂
- Analyst 2030 targets continue to range from EUR 80 to EUR 150 per tonne CO₂
- IEA sustainable development scenario requiring EUR ~115 per tonne¹
- Some Carbon Capture as a Service projects are already economically viable above EUR 70 per tonne CO₂

CCS economics turning positive



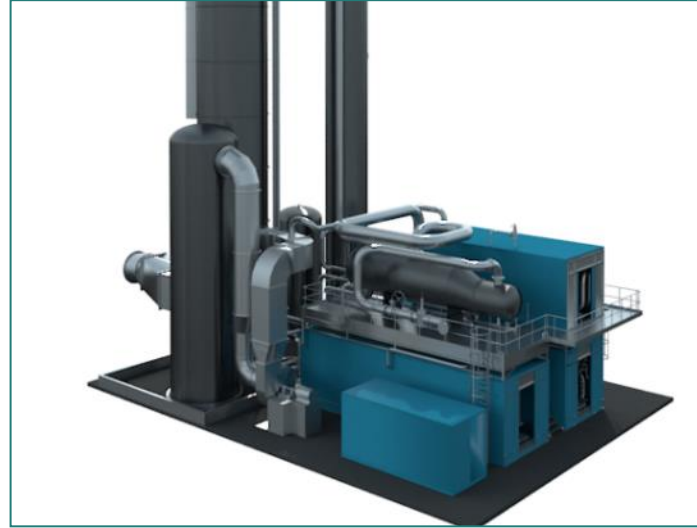
Our three product offerings are leading the way



Big Catch

Launched: 2008
Capacity: > 400,000 tonnes/year

- Made to order
- ~30-36 months delivery time¹
- Larger footprint
- Using bulk materials – cost efficient
- Retrofit potential



Just Catch™

Launched: 2018
Capacity: 40,000 & 100,000 tonnes/year

- Modularized and cost efficient
- ~16-24 months delivery time¹
- Easy transport and installation
- Compact design – 25m x 20m
- 100% automated



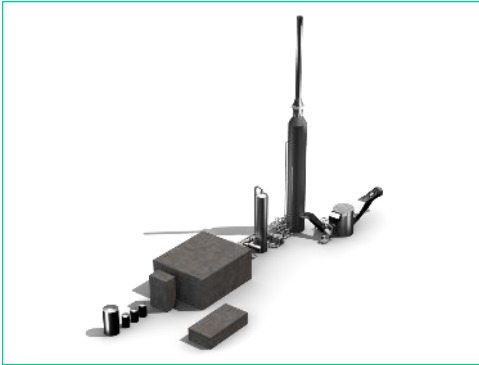
Offshore Just Catch™

Launched: 2019
Capacity: 120 – 360,000 tonnes/year

- Modularized and cost efficient
- ~20 – 24 months delivery time¹
- Self-contained system
- Compact design
- Retrofit potential

One technology – several offerings

Key offerings



Big Catch™

Capacity: > 400,000 tonnes/year

- Made to order
- ~30-36 months delivery time¹
- Larger footprint
- Using bulk materials – cost efficient
- Retrofit potential



Just Catch™

Capacity: 40,000 and 100,000 tonnes/year

- Modularized and cost efficient
- ~15 months delivery time
- Easy transport and installation
- Compact design – 25m x 20m
- 100% automated

Delivery models

EPC



License and key equipment



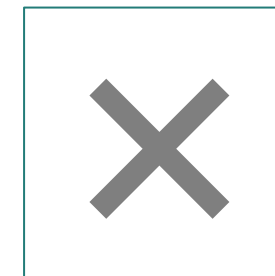
Financing and Service Models



EPC



License and key equipment



Carbon Capture as a Service



Carbon Capture as a Service: Carbon capture made easy™

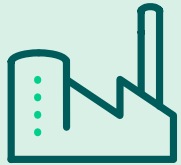
From a complex management of the full CCS value chain...



Interface, contracts and risk across the full CCS life-cycle



Financing



Carbon Capture



Liquefaction



Temporary storage



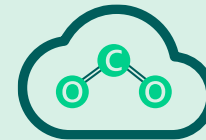
Transportation



Permanent storage



...to carbon capture made easy



CARBON CAPTURE AS A SERVICE
Carbon capture made easy™



Stronger together

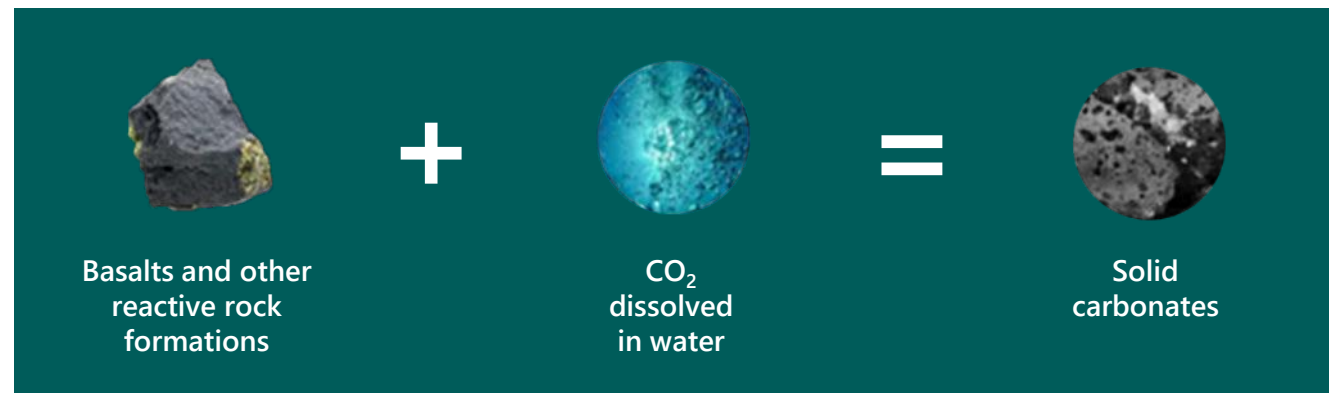
Aker Carbon Capture and Carbfix to offer full value chain CCS



- MoU to collaborate on cost-efficient CCS that will accelerate carbon removals
- Offer emitters the whole CCS value chain, capturing CO₂ and permanently storing it by turning it into stone underground
- Modular and scalable CCS solution
 - Onsite CCS
 - CCS with mineral storage hubs
- Mineralization to carbonate minerals in less than two years
- Suitable geological formations can be found in every continent

Carbfix

- Technology development since 2007
- CCS at Helliseidi Thermal Power plant in Iceland since 2012
- Planning Coda Terminal - A scalable onshore CO₂ mineral storage hub in Iceland



Aker Carbon Capture and Carbfix to Explore CCS at Elkem Iceland's ferrosilicon plant

- MoU to evaluate reducing CO₂ emissions of Elkem Iceland's plant through carbon capture and on-site mineral storage in basalt structures
- Cost-efficient full CCS value chain solution
- The core product at Elkem Iceland is ferrosilicon, which is one of the elementary raw materials for the steel industry.
- Today Elkem Iceland is the second largest ferrosilicon plant in the world, with an annual capacity of 120.000 tonnes.



Image: Elkem

Solutions for the WtE industry



Scope of work

Aker Carbon Capture and Hitachi Zosen Inova have signed a MoU aimed at accelerating carbon capture solutions in the waste to energy industry in Europe. The agreement outlines the two companies' ambition to combine Aker Carbon Capture's patented and HSE-friendly CCS technology with HZI's proven capabilities as a turnkey supplier of waste to energy plants.

Customer	Hitachi Zosen Inova
Area	Europe
Type	Partnership

HZ Inova has delivered around 70 plants in Europe the last two decades.

Collaboration with Vattenfall



Scope of work

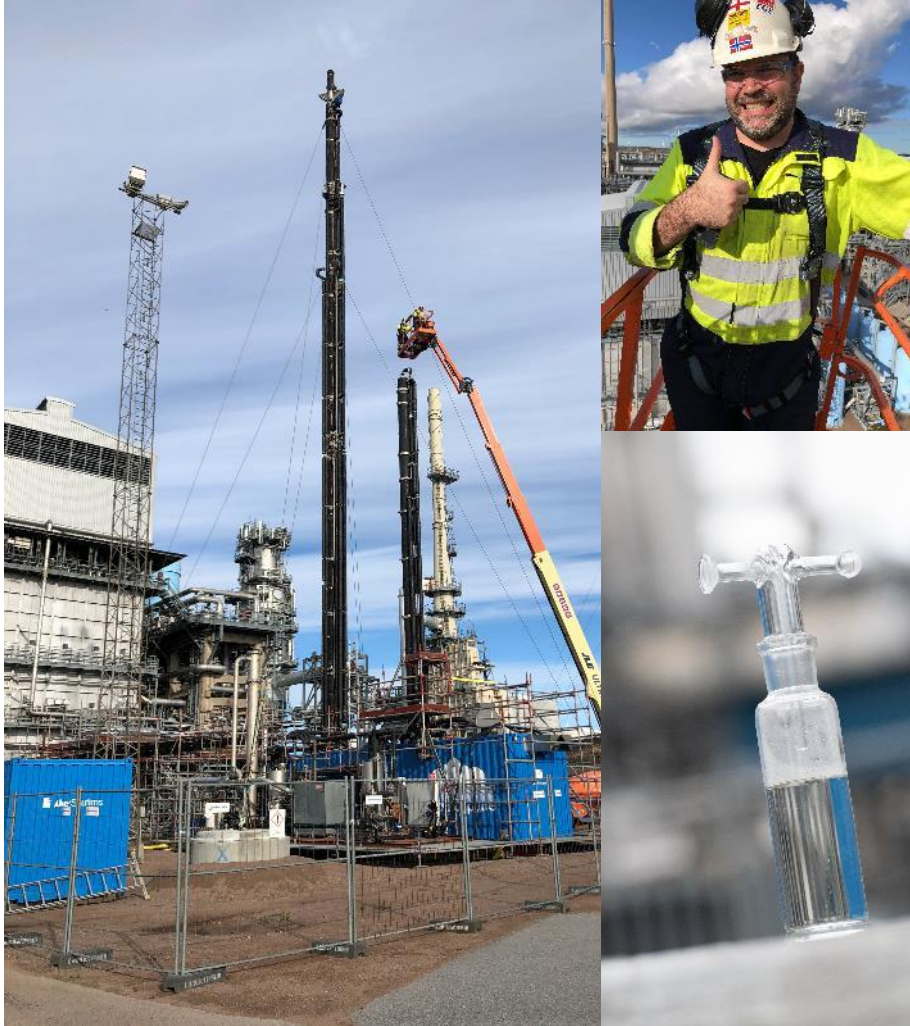
Aker Carbon Capture has signed a Memorandum of Understanding with Sweden's Vattenfall to accelerate the evaluation of future carbon capture plants in Sweden and Northern Europe.

The agreement will support Vattenfall's ambitions to achieve negative emissions in waste and bio CCS plants.

Customer	Vattenfall
Area	Europe
Type	Partnership

Vattenfall operates 15 bio energy plants in Sweden, Germany and the Netherlands.

Lysekil refinery



Scope of work

Preem and Aker Carbon Capture is working with SINTEF, Chalmers and Equinor at the Lysekil Refinery in Sweden. Aker Carbon Capture is performing a nearly one year test program on the flue gas as well as developing a feasibility study for a 400 000 capture unit. The project is one of Preem transition projects for their business in Scandinavia.

Customer	Preem
Area	Scandinavia
Study Phase	MTU test and feasibility
Contract Value	12 mNOK
Period	Jan 2020 – Dec 2020

Heat integration technology



Scope of work

Aker Carbon Capture and MAN Energy Solutions have signed a technology-cooperation agreement to develop energy-efficient compression solutions for carbon capture and storage (CCS) applications with heat recovery. The agreement supports the companies' joint target to reduce the cost of removing CO₂ emissions from industrial plants around the world.

Customer	MAN Energy Solutions
Area	Europe
Type	Partnership

The cooperation builds on MAN's experience in compressor technology, the integration of system components and their design and delivery, as well as Aker Carbon Capture's proprietary amine technology and efficient carbon-capture process design.

Greensand CO₂ Storage Project in Denmark



Scope of work

Aker Carbon Capture is supporting the Greensand project as one of 29 Danish and international companies and research institutes that have joined forces to carry out a dedicated pilot project. The project, which is led by Ineos Oil & Gas and Wintershall DEA, aims to demonstrate that CO₂ can be injected into the Nini West reservoir offshore Denmark, as well as supporting the deployment of cost-effective and environmentally safe monitoring technologies.

Open access infrastructure for transport and storage of CO₂ is key to deliver on the Paris agreement, and Aker Carbon Capture is proud to support national infrastructure projects with key capabilities and experience.



Thank you!



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