GIGATONNE BY 2030

CAMPAIGN BY CEM CCUS & MI CDR

Carbon Management Project Awards

CARBON CAPTURE UTILIZATION & STORAGE

AN INITIATIVE OF THE CLEAN ENERGY MINISTERIAL

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CEM17

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Riyadh, SaudiArabia 2026

CARBON DIOXIDE REMOVAL MISSION

MISSION INNOVATION

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Overview of the Awards

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CARBON MANAGEMENT =

Carbon capture, utilization and storage **(CCUS)**

+

Carbon dioxide removal **(CDR)**

TODAY:

Megatonne reality

TOMORROW:

Gigatonne opportunity

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Showcase

REAL-LIFE INDUSTRIAL-SCALE PROJECTS IN OPERATION OR UNDER CONSTRUCTION

Inspire

NEW PROJECTS TO REACH FINAL INVESTMENT DECISION

Accelerate

DEPLOYMENT TO GIGAGATONNE SCALE



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Award submissions

- 17 proposals received
- Brazil, Canada, China, Japan, Norway, Saudi Arabia, Sweden, UAE
- Full chain 4, parts of chain 13
- CDR or CDR element: 8
- Scale: 3000tpa to 5Mtpa
- 10 projects “Large-scale”; 7 projects small or medium
- Variety of capture types
- Variety of transport modes
- Predominantly geologic storage; a few EOR, three utilization projects

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Expert Committee

CEM CCUS Co-Lead
Peta Beard, UK

CEM CCUS Member
Carlos Agenor, Brazil

MI CDR Co-Lead
Gillian Whorms, Canada

MI CDR Member
Atul Sharma, Japan

CEM-MI Host
Abdulah Alkhedair, Saudi Arabia

Global CCS Institute
Anhar Karimjee

IEAGHG
Tim Dixon

State of CDR
Steve Smith

Carbon Management Europe
Eve Tamme

CEM Secretariat (observer)
Andrew Swanson

MI Secretariat
Eleanor Webster

Secretary:
Juho Lipponen, Coordinator CEM CCUS and MI CDR

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What we were looking for from projects

- Material CO_2 reduction or removal opportunities
- Industrial and commercial-scale real-life experience
- Scale-up experience OR opportunity
- Opportunity to create hubs and economies of scale
- Partnerships through parts of or full value chain
- Solutions that can help next projects flourish
- Novel business and risk-sharing models

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2026 Award Winners

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Award Winner 1

LONGSHIP

Norway

In operation



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Award Winner 1

- Europe's first complete, **full-scale CCS value chain** — spanning capture, transport and storage — including the first operating CCS facility in the cement sector alongside a waste-to-energy capture project, with a storage site designed from the outset for expansion and cross-border volumes.
- A key **anchor project in Europe**, establishing a whole-chain system not only for Norwegian point sources, but also for projects in countries around the North Sea.
- Strong centralized coordination by the Norwegian Government – and equally strong industry contribution. **Innovative risk-sharing model**, with Norwegian state absorbing first-mover risk while industry retains delivery and operational responsibility.
- Demonstrates **several complementary business models** within one value chain: low-carbon cement and green-premium market access for low-carbon cement, a mix of state support, avoided-emissions costs and carbon-removal revenue waste-to-energy, and a pure play transport-and-storage service model.

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LONGSHIP

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Award Winner 2

POLARIS - ATLAS

Canada

In construction





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Award Winner 2

- This project combines capture from a refinery SMR facility, a chemical ethylene oxide unit and a boiler – all to be sent to a nearby storage site, open to various CO_2 sources. The submission displays **a solid combination of large-scale CO_2 capture, transport and storage**.
- The project is one of the first demonstrations of Shell's CANSOLV post-combustion capture technology at commercial scale (1 Mt CO_2/yr and above). The **capture part heavily leverages lessons learned** — and re-engaged experienced personnel — from Shell's Quest CCS facility. The project will also disseminate lessons, including knowledge-sharing required under the Canadian federal CCUS Investment Tax Credit.
- The CO_2 store is structured as a scalable, **multi-user, fee-for-service storage hub**, with long-term agreements with emitters providing revenue certainty and a phased build-out.
- Reinforces the **hub-based decarbonisation model, demonstrating how multiple CO_2 sources can connect to a shared storage infrastructure**, which strengthens the global evidence base for cluster-based CCUS. The project will provide lessons on coordinating interfaces between multiple capture facilities, transportation infrastructure and storage operations.

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Award Winner 3

BECCS STOCKHOLM

Sweden

In construction



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Award Winner 3

- A leading bio-CCS or BECCS project, allowing to reach **negative emissions**. Retrofits CCS onto Europe's largest bio-combined-heat-and-power (bio-CHP) plant, commissioned in 2026 and fuelled by local forestry residues.
- Uses **mature Hot Potassium Carbonate (HPC) capture technology**, used industrially for over 50 years and piloted on-site since 2020 to calibrate the chemistry for bioenergy flue gas.
- Innovative **multi-source funding model** with revenue from 1) selling carbon Removal certificates into the voluntary carbon market (>50% of revenue), 2) Swedish state aid and 3) an EU Innovation Fund grant. The project was debt-financed with EIB, Nordic Investment Bank and commercial banks.
- The project's sustained policy engagement helped create the **world's first BECCS accounting methodology** and Sweden's state-aid programme for bio-CCS, and fed into other international protocols and standards for permanent removals.

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Award Winner 4

CHINA HUANENG LONGDONG

China



In operation

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Award Winner 4

- **World's largest CCUS facility on a coal-fired power plant** (1.5 Mtpa), achieved using a low-energy, proprietary HNC-7 solvent and process intensification that cut net efficiency loss by 20% and enabled a world-first 30–100% flexible load operation at this scale.
- Particularly **attractive project economics** through proprietary capture technology. Validates Huaneng's next-generation, low-energy self-healing solvent technology, achieving a third-party-certified regeneration energy of 2.2 GJ/tCO2 and achieved a third-party-verified capture cost of roughly $30/tCO2.
- Built **China's first closed-loop, end-to-end commercial CCUS chain** — capture at the plant, pipeline transport, enhanced oil recovery, and geological storage — with a consortium of power, oil-and-gas and academic partners.
- Financed partly through China's pioneering "Two New" green debt instruments, **creating a replicable low-carbon financing template**.

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Award Winner 5

DEEP SKY ALPHA

Canada

In operation



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Award Winner 5

- A unique and innovative platform **testing several different Direct Air Capture (DAC) technologies** under identical conditions with standardised instrumentation, taking advantage of a combined transport and storage opportunity.
- A technology-agnostic, multi-tenant model hosts up to ten different DAC technologies side by side on shared, grid-connected, storage-ready infrastructure, compressing the years-long demo cycle that each technology would otherwise have to run alone. **Opportunity to help achieve significant scale-up of DAC technologies**.
- Delivers the **first end-to-end DAC-to-permanent-storage value chain in North America**: capture, on-site purification/liquefaction (accepting streams as low as 85% CO_2), truck transport, and injection into deep saline aquifers in Alberta.
- The project is also building understanding of CO_2 transport and geological storage in Alberta's sedimentary basin and **will inform the development of Canadian regulatory frameworks** for DAC-to-storage value chains.

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Longship (NO)



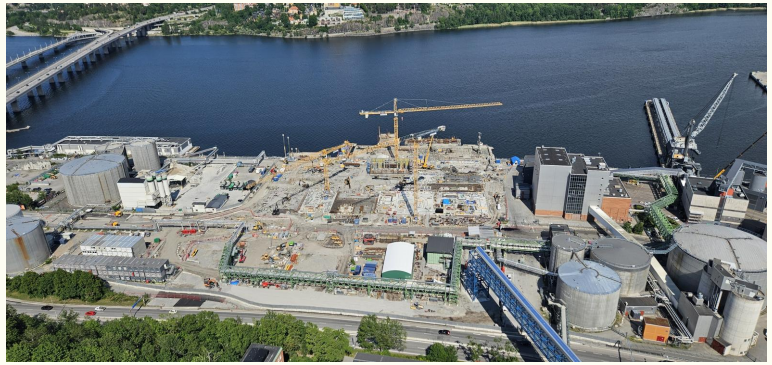
China Huaneng Longdong (PRC)



Deep Sky Alpha (CA)



BECCS Stockholm (SWE)



Polaris – Atlas (CA)



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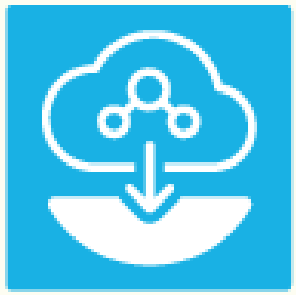
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