



GLOBAL CCS
INSTITUTE

WEBINAR

Feb
02

CO₂ Shipping Opportunities and Prospects for CCS Projects



Monday 2nd February 2026 2.00PM GMT | 3.00PM CET | 9.00AM EST

OUR MISSION TO ACCELERATE DEPLOYMENT OF CCS

WHO



WE ARE AN
INTERNATIONAL
CCS THINK TANK

OVER
200

MEMBERS ACROSS
GOVERNMENTS, GLOBAL
CORPORATIONS, PRIVATE
COMPANIES, RESEARCH
BODIES, NGOS



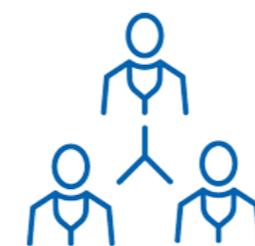
WHAT



FACT-BASED
INFLUENTIAL
ADVOCACY



CATALYTIC
THOUGHT
LEADERSHIP



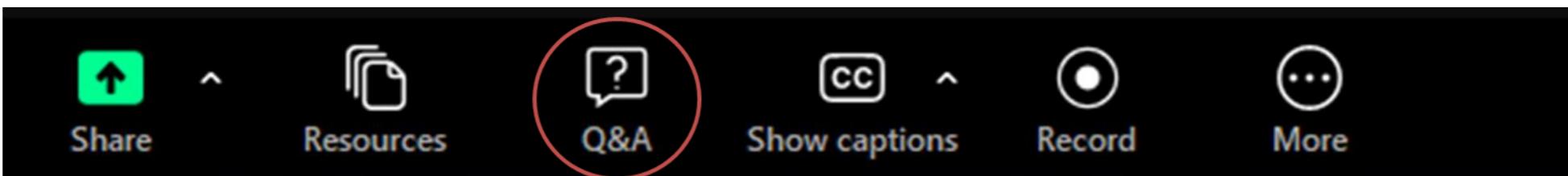
AUTHORITATIVE
KNOWLEDGE
SHARING

WHERE



BEFORE WE START

- Please note this webinar will be recorded and made available on our website in the coming weeks.
- We will collect questions during the presentation.
- After the presentation, and moderated discussion the moderator will pose questions to the presenter.
- Please submit your questions through the Q&A panel on Zoom.



AGENDA

Welcome from Global CCS Institute

- Angus Gillespie, Strategic Adviser, Global CCS Institute {Moderator}

Speaker Remarks

- Angus Gillespie, Strategic Adviser, Global CCS Institute
- Erik Mathias Sørhaug, Business Development Director CO₂ Shipping and OCC DNV Maritime, DNV
- Thomas Minsaas, Shipping & Logistics Operator Northern lights

Moderated Discussion

- Erik Mathias Sørhaug, Business Development Director CO₂ Shipping and OCC DNV Maritime, DNV
- Thomas Minsaas, Shipping & Logistics Operator Northern lights
- Angus Gillespie, Strategic Adviser, Global CCS Institute {Moderator}

Audience Q&A



Download the report on our website or scan the QR code below.



SPEAKERS



Angus Gillespie

Global CCS Institute
Strategic Adviser
* MODERATOR *



Erik Mathias Sørhaug

DNV
Business Development Director
CO₂ Shipping and OCC DNV
Maritime



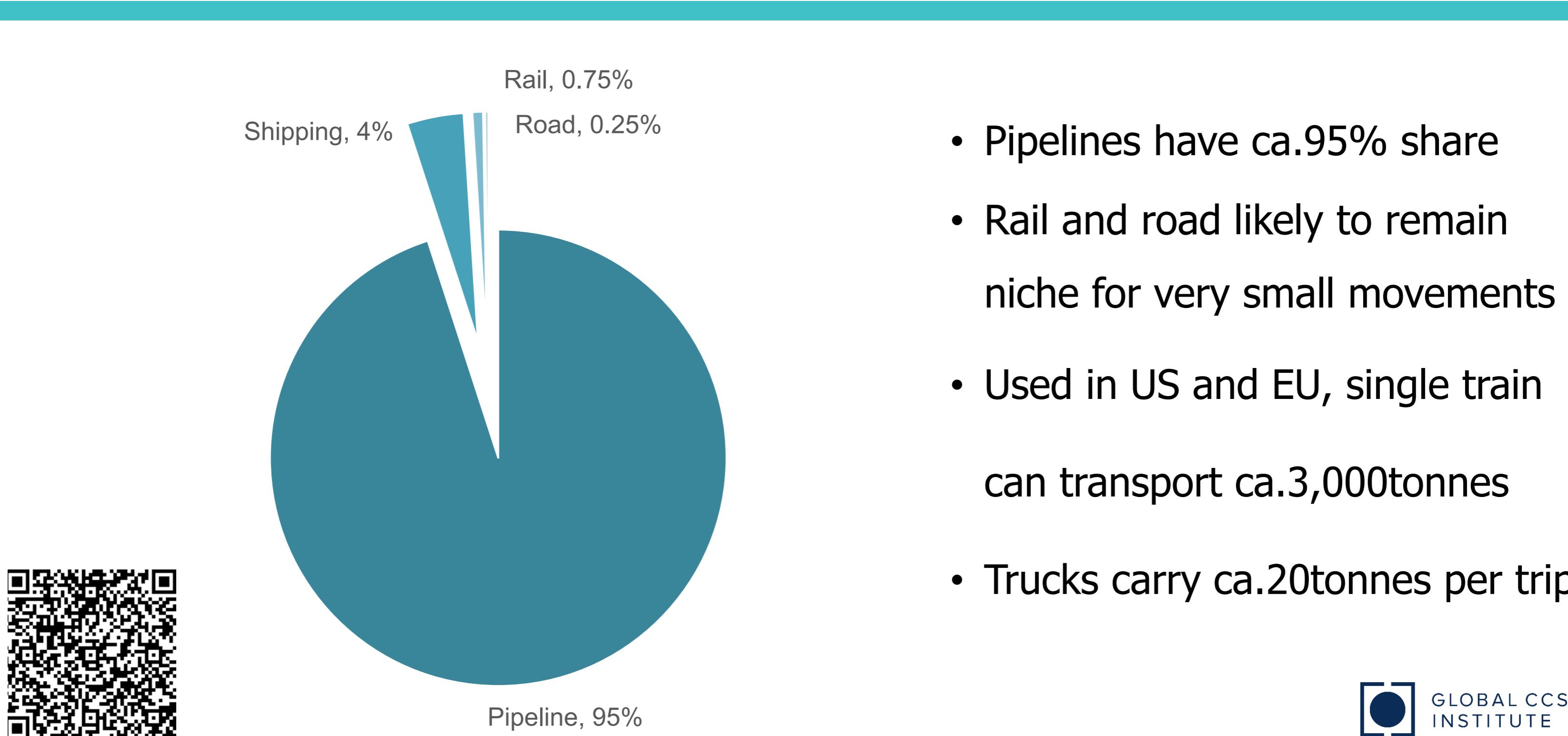
Thomas Minsaas

Northern Lights
Shipping and Logistics Operator



GLOBAL CCS
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PIPELINES DOMINATE CO₂ TRANSPORT AT PRESENT



A BROAD RANGE OF FACTORS UNDERPIN THE PROSPECTS FOR GROWTH IN CO₂ SHIPPING

Drivers

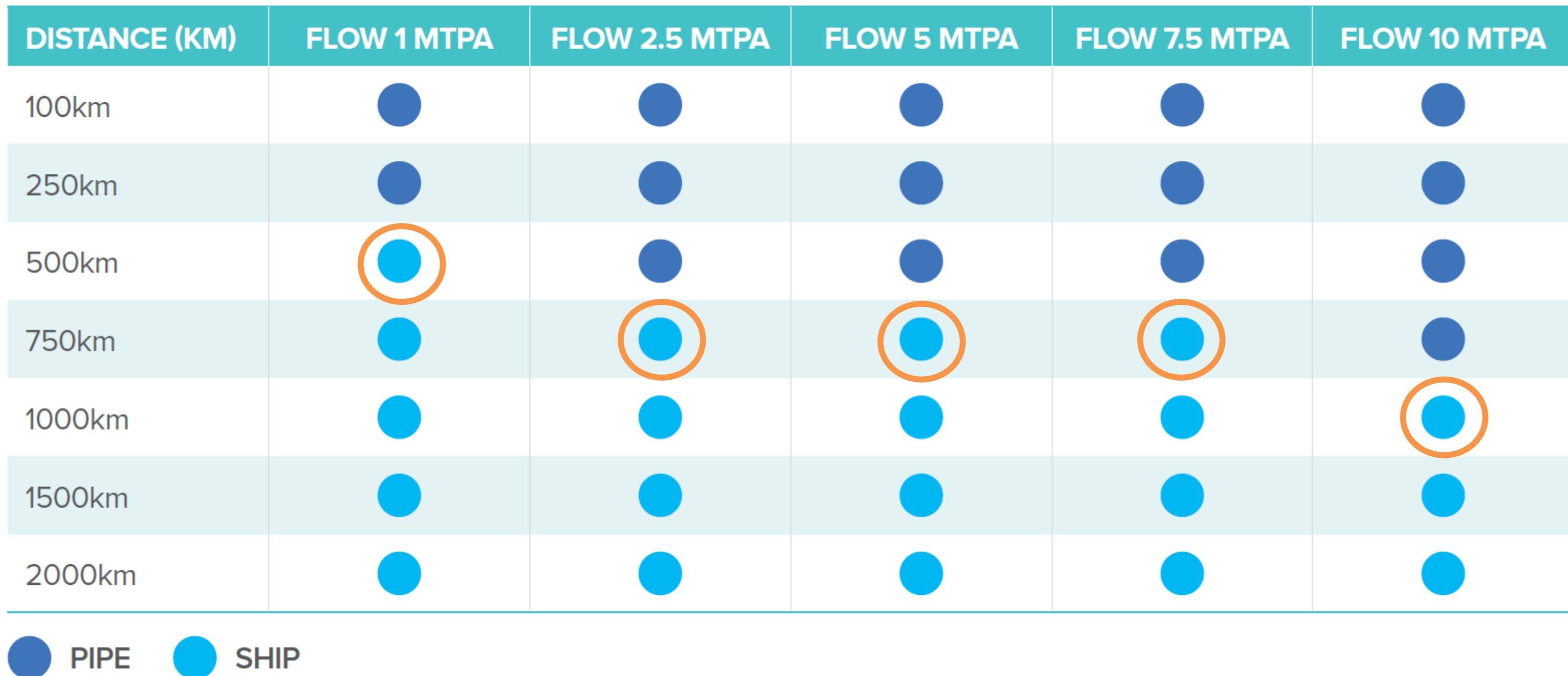
- Evolution of CO₂ vessel designs
- Growth of ports with CO₂ handling facilities
- Growth in regional CCS hubs
- Supportive marine laws and regulation

Advantages

- Can lower CO₂ transport costs
- Can improve CCS project business case
- Support of CCS hubs
- Increased flexibility for CCS projects
- Helps manage stranded CO₂ emissions

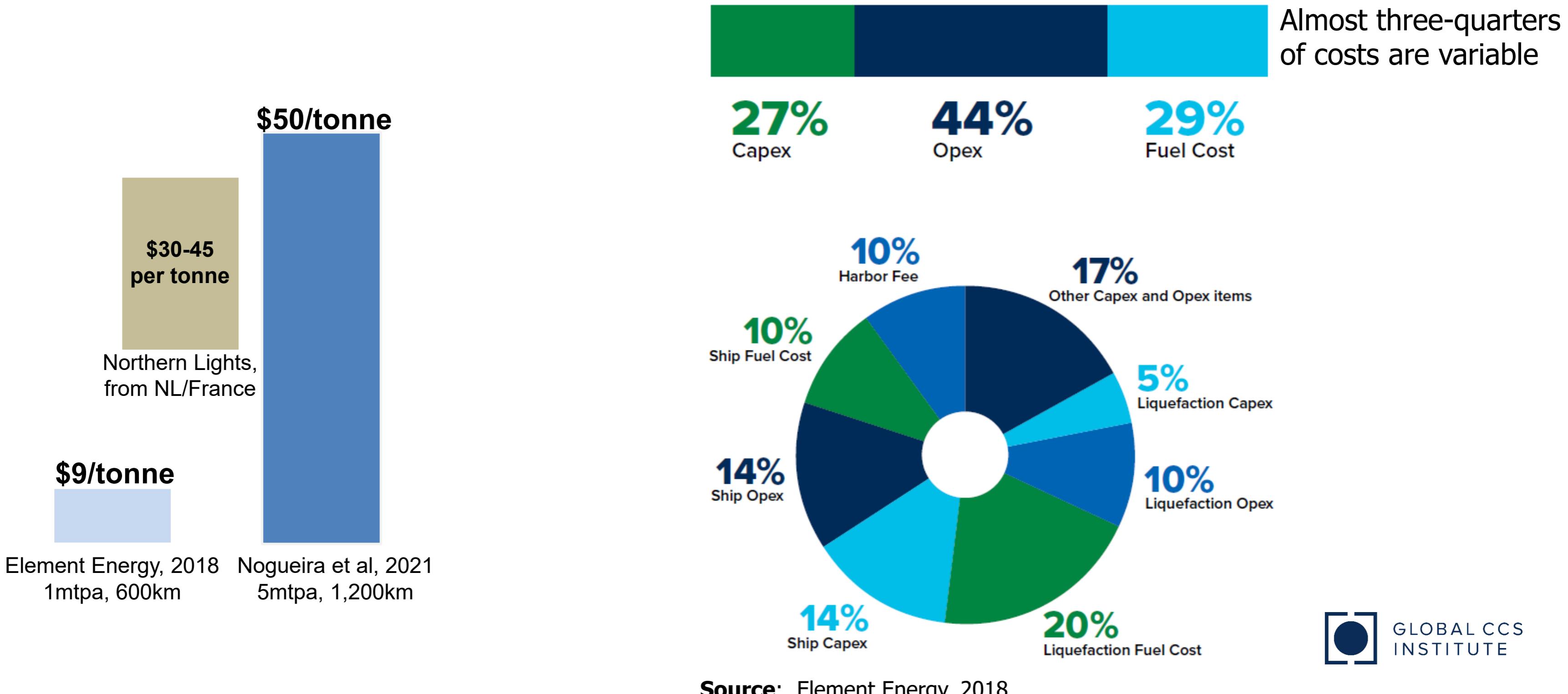


AN EXAMPLE OF A PIPELINE VS. SHIPPING TRADE-OFF MATRIX FOR CO₂ TRANSPORT IN CCS

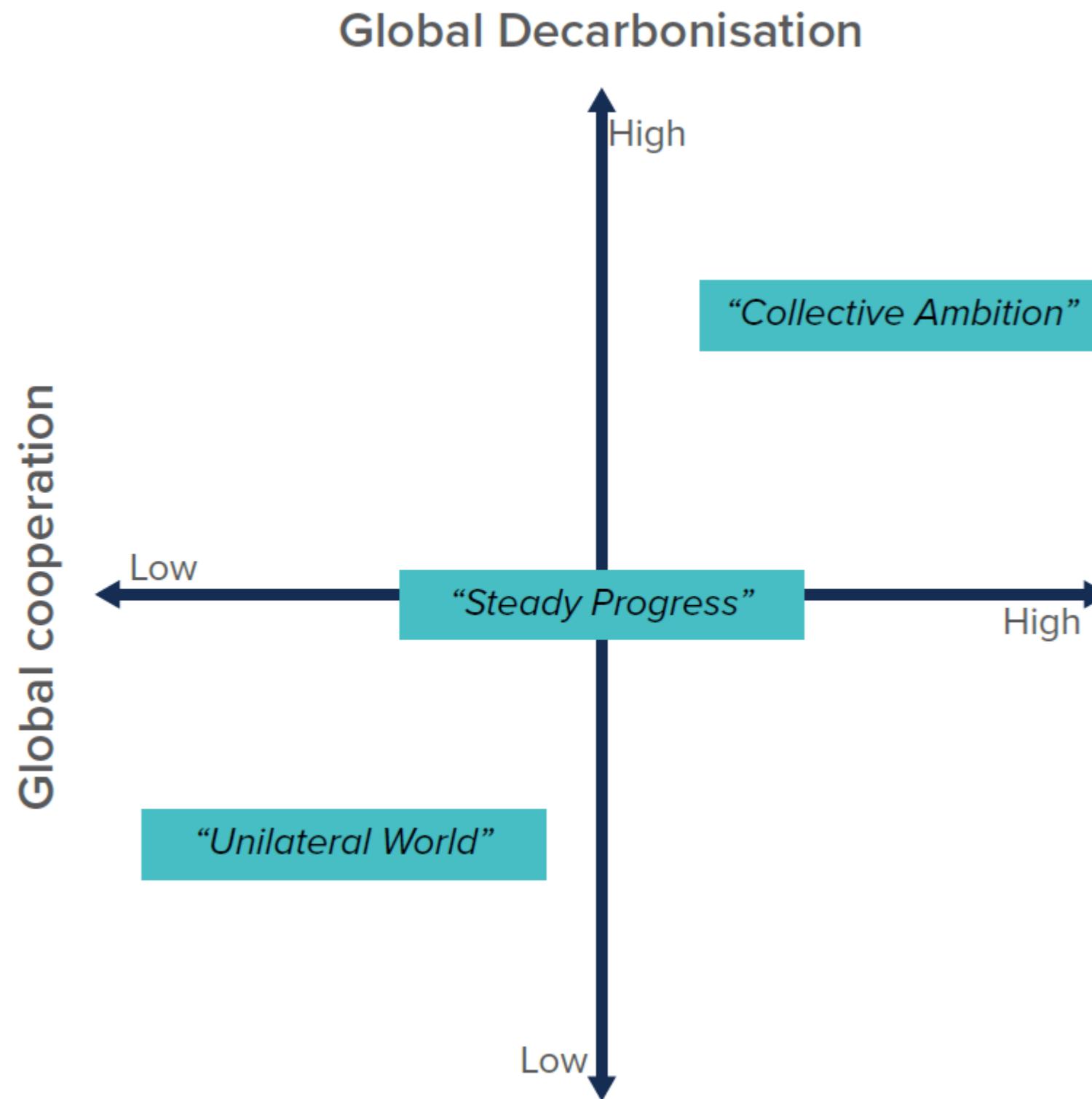


Source: GCCSI analysis, 2025

COSTS OF CO₂ SHIPPING DRIVEN MOSTLY BY SHIP EXPENSES AND LIQUEFACTION PROCESSES



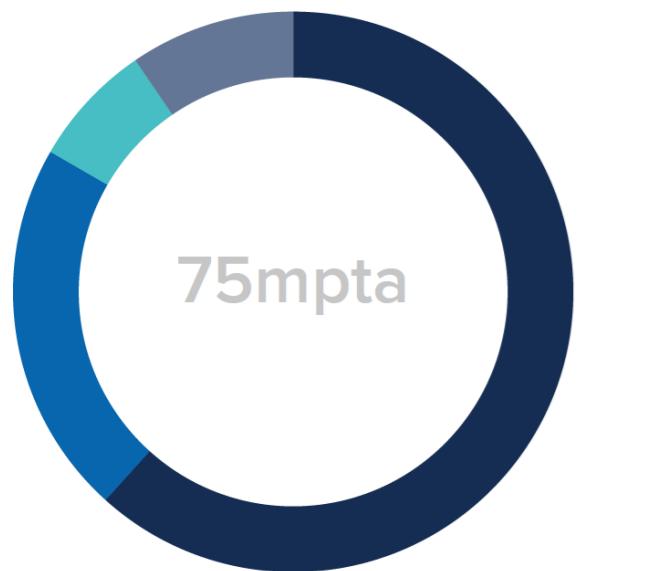
RECENT GLOBAL CCS INSTITUTE CO₂ SHIPPING PAPER USED SCENARIOS RATHER THAN PROJECTIONS



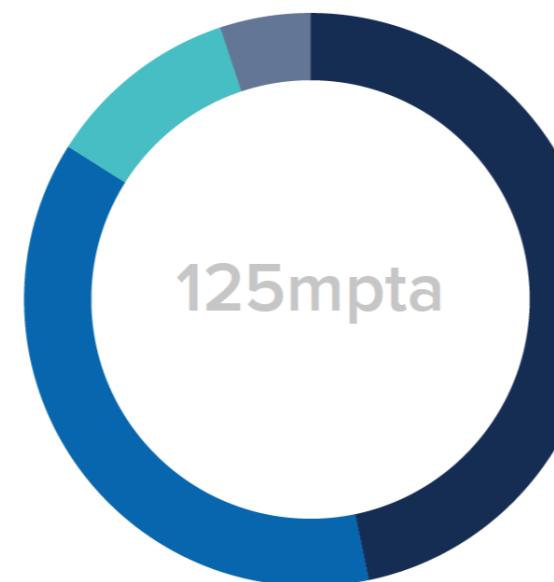
- Scenarios used in situations of high uncertainty
- Key unknowns – intensity of global decarbonization and collaboration
- Narrative leads data analysis
- Used GENZO, the Institute's optimisation model for quantitative illustration of scenarios

ALL SCENARIOS RESULTED IN A MAJOR RISE IN CO₂ SHIPPING BY 2040

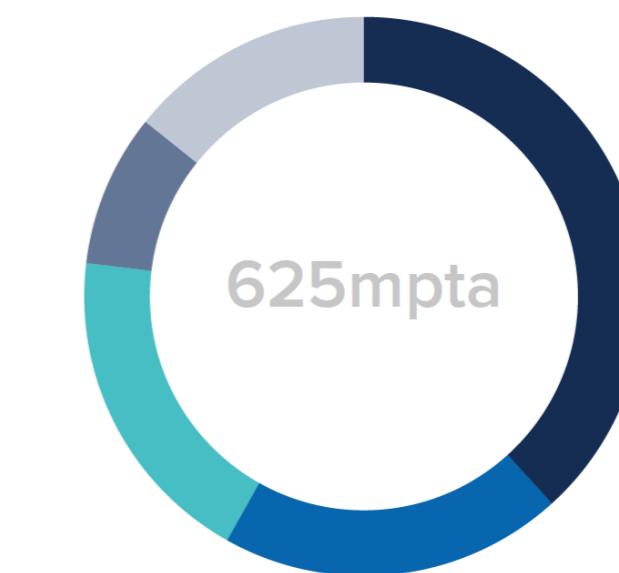
Steady Progress



Unilateral World



Collective Action



- Climate policies continue at incremental pace
- Political and economic cycles impeded sustained progress on CCS
- CCS deployment rate helped by cost reductions and rising carbon prices

- Energy populism drives fragmentation of policies
- UNFCCC weakens and NDCs are diluted
- Cross-border trade barriers persist and are even reinforced
- Shipping boosted by CBAMs and development of storage hubs

- Urgent, focused, unified climate response
- UNFCCC strengthens and accelerates its programs
- CCS deployment rate approaches IEA NZ scenario
- International network of CCS hubs emerges



CO₂ Shipping - DNV

**Erik Mathias Sørhaug – Business Development Director CO₂ shipping and OCC
DNV Maritime**

02 February 2026

A global assurance and risk management company

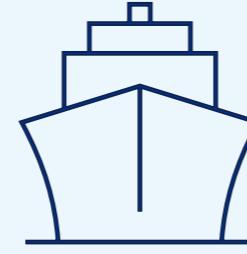
~15,000
employees

100,000+
customers

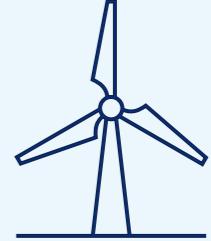
100+
countries

5%+
of revenue to R&D

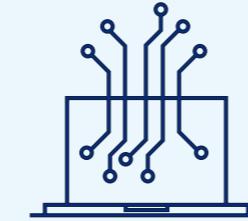
Ship and offshore
classification and advisory



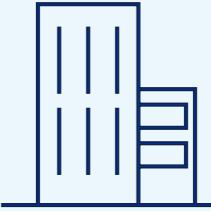
Energy advisory, certification,
verification, inspection and
monitoring



Software, cyber security,
platforms and
digital solutions



Management system
certification, supply chain and
product assurance



How DNV work support the development of the CCUS value chain

• Classification

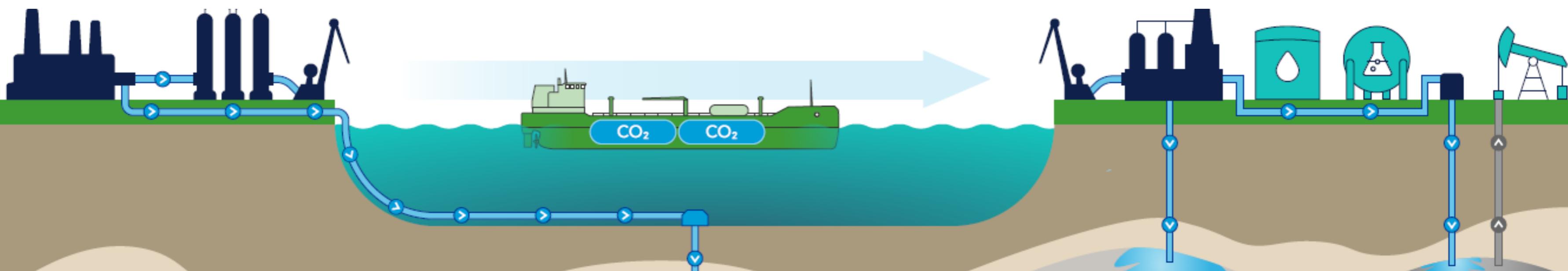
- Approval in Principle & General Approval for Ship Application
- Classification - Newbuilding & Fleet in operation
- Developing rules and class guidelines

• Advisory

- Independent advisor for CCUS projects across the value chain
- Green Shipping Program
- Laboratories and testing
- Developing standards and recommended practices

• Joint Industry projects

- Facilitating, leading and participating in Joint Industry Projects



DNV are leading a range of JIPs addressing core challenges along the value chain



Pipelines and wells



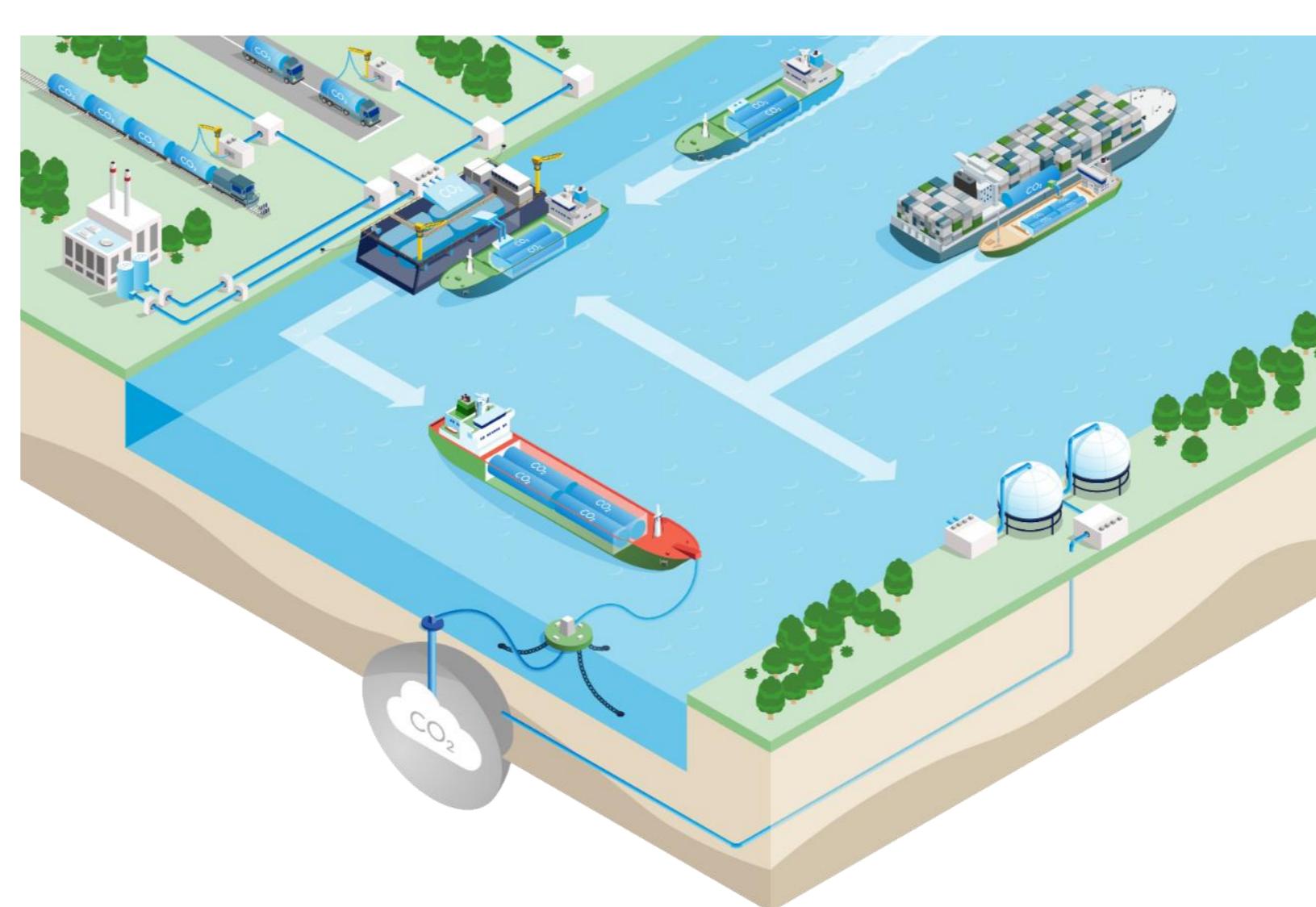
CO2Safe&Sour - Hydrogen sulfide challenges in carbon dioxide pipelines
Investigate the integrity of carbon dioxide pipelines subjected to hydrogen sulfide from the CCS stream

CO2SafePipe - Design and Operation of CO2 pipelines
Close knowledge gaps in the transportation of CO2 in pipelines.

Materials Performance in CCS Wells
This JIP is to address the damage modes associated with downhole and well head materials for CCS applications.

CO2-SCC - Innovations in subsea flexible pipe technology
Small-Scale Testing Qualification
Methodology for Armor Wires in CO2-SCC

CO-CO2 Cracking - CO2 Pipelines
Establish a comprehensive guidelines for mitigating CO/CO2 cracking in CO2 pipelines.



COOFFIN - CO2 offshore injection
develop a common approach to assess and qualify concepts for offshore injection of CO2.

CETO - CO2-efficient transport via ocean
Technology Qualification Low pressure value chain. Phase II to establish basis for CO2 specification at low pressure.

← Maritime and offshore →



Dispersion



Skylark – CO2 Dispersion
Pioneering excellence to address crucial challenges related to the safe operation of CO2 pipelines.

KFX CO2 - CO2 CFD simulation software
increase CCS safety by providing software that can perform simulation of complex thermodynamics and heat transfer processes and dry ice formation.

CO2Gasmet/Liqmet - Establishing flow meter traceability along the CO2 value chain
DNV takes the lead in CO2 flow meter qualification.

CO2MET - Mastering CO2 Fluid Compositions – Quality monitoring
Performance evaluation and guideline development for effective sampling and analysis.



Meetering



Technical and regulatory readiness CO₂ Shipping

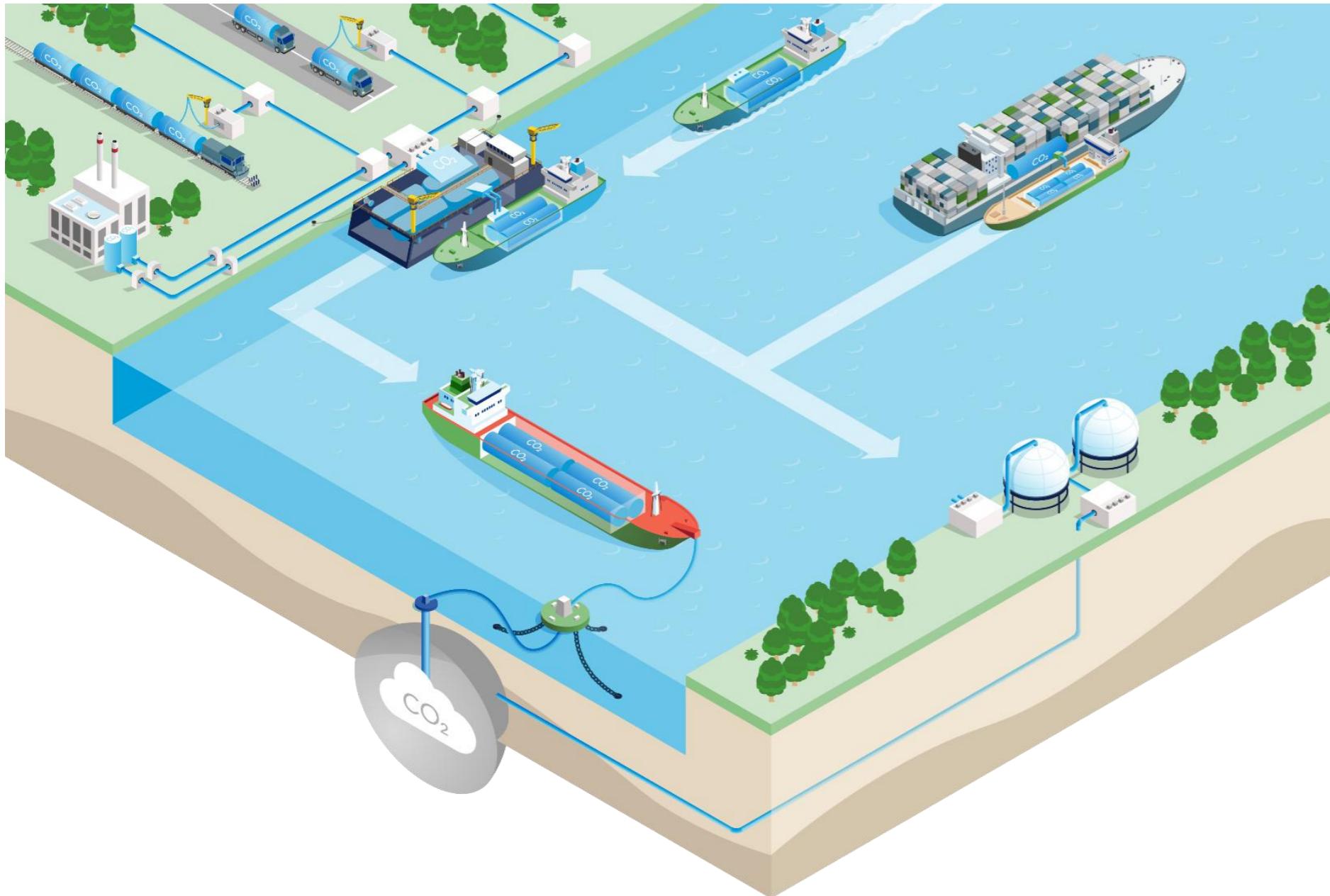
Status – Experience, regulations, guidelines and standards:

- CO₂ has been **transported** in small-scale **onboard ships** since late 80s
- Transportation of CO₂ in liquid state **covered** by existing rules and regulations
- **Standards and guidelines** for gas carriers and terminals are also **applicable for CO₂ Shipping**
- Moving from a **small-scale** food & beverage value chain to **large scale CCS** value chain introduce some **new challenges to ship design and operation**



Source: Northern Lights

Technical and regulatory readiness CO₂ Shipping



CO₂ carriers for CCS:

- First **MP CO2 carriers** dedicated for CCS transportation have been **delivered and are in operation**.
- Larger **MP** vessels up to **20k+ m³** can be built based on same technology
- Maturity for **LP** ships has been **demonstrated**. First **LP vessel** design delivered
- Further **technology development** may reduce **cost of CO₂ shipping**
- **CCS Cross-cutting** challenges relevant also for shipping

Rule & Class development – CO₂ carriers, CO₂ offshore units



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RULES FOR CLASSIFICATION

Ships

Edition July 2024

Part 5 Ship types

Chapter 7 Liquefied gas tankers

SECTION 26 CARRIAGE OF LIQUEFIED CO₂

1 General

1.1 Design basis

1.1.1 This section covers design of vessels for carriage of carbon dioxide CO₂. These vessels will be given notation **Tanker for liquefied CO₂** or **Barge for liquefied CO₂** or **FSU for liquefied CO₂** as given in Table 1 and shall comply with this complete chapter.

Guidance note 1:

Requirements which are given explicitly for flammable products are not required for transport of LCO₂ which is non-flammable.

...end of guidance note...

Guidance note 2:

The Society may on case-by-case basis consider alternative designs based on a principle equivalence. In such cases a risk assessment with reference to **Pt.1 Ch.1 Sec.1 [2.5.9]** shall be carried out to justify the alternative design. Acceptance by the Society and flag administration is normally required.

...end of guidance note...

1.1.2 The terms defined in Table 1 are used in this section.

Table 1 Definitions

Term	Definition
high pressure LCO ₂ carrier	vessel transporting liquefied CO ₂ with a pressure range from 2 MPa gauge and above
high purity CO ₂	grade of CO ₂ which is normally considered for food industry supply and considered a very clean product without any contamination
LCO ₂	liquefied carbon dioxide
low pressure LCO ₂ carrier	vessel transporting liquefied CO ₂ with a pressure range from triple point up to approximately 1.2 MPa gauge
reclaimed quality CO ₂	grade of CO ₂ which is a waste product from different types of industry and other carbon sources and will be possibly contaminated
medium pressure LCO ₂ carrier	vessel transporting liquefied CO ₂ with a pressure range from 1.2 MPa gauge up to 2.0 MPa gauge
triple point of CO ₂	critical triple point is considered to be 0.52 MPa absolute with corresponding temperature on -56°C

1.1.3 Table 2 gives relevant guidance information of the requirements in each section of the rules.

Table 2 Guidance for relevant requirements for CO₂ carriers

Rule reference	Guidance
Sec.1 General requirements	Complete section is relevant.

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 Liquefied gas tankers

Page



DNV

RULES FOR CLASSIFICATION

Ships

Edition July 2025

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Part 6 Additional class notations

Chapter 4 Cargo operations

SECTION 17 CO₂ RECONDITIONING - CO₂ RECOND

1 General

1.1 Introduction

The additional class notation **CO₂ RECOND** applies to vessels, classed either as ships or floating offshore installations, which are capable of taking liquefied CO₂ from the cargo tanks, and transfer of CO₂ with increased pressure and temperature for the required reservoir condition prior to injection into an offshore reservoir or to another receiver. The actual injection may be carried out by the vessel itself directly or via a separate installation.

1.2 Objective

The additional class notation **CO₂ RECOND** provides requirements for CO₂ reconditioning plants with related offloading arrangements to minimize the risk to the vessel, its crew and to the environment.

1.3 Scope

This section covers requirements for the design, construction, and testing of CO₂ reconditioning plants, offloading arrangement, onboard well related utility systems, and the impact this makes on the vessel. Systems downstream of the shutdown valves on the classed installation, such as risers, subsea systems and subsea control systems should be addressed separately and are typically covered by shelf state requirements.

1.4 Application

1.4.1 These rules are applicable to vessels fitted with CO₂ reconditioning plant. The requirements in this section are additional to the requirements given in the following rules as applicable:

- Pt.5 Ch.7
- DNV-RU-OU-0102.

1.4.2 Vessels may differ in arrangements and equipment and the requirements in this section may be subject to adjustments to suit the installation.

1.5 Class notations

Vessels built in compliance with the relevant requirements as specified in this section may be assigned the class notation **CO₂ RECOND** as given in [Table 1](#).

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Cargo operations

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RULES FOR CLASSIFICATION

Offshore units

DNV-RU-OU-0102

Edition July 2025

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Floating production, storage and loading units

SECTION 6 SUPPLEMENTARY REQUIREMENTS FOR SERVICE NOTATIONS CO₂ STORAGE AND CO₂ INJECTION

1 General

Installations engaged in CO₂ injection projects may be classified as offshore installations. This may include both offshore floating storage units and integrated storage as part of a floating injection unit. This section identifies design and construction requirements for assignment of service notations CO₂ storage unit, CO₂ storage installation, CO₂ injection unit, and CO₂ injection installation. The requirements in this section are supplementary to those for main class 1A as stated in Sec.1 for floating offshore units and OI in Sec.2 for floating offshore installations.

2 Common requirements

2.1 Structural design

2.1.1 The structural strength shall be as required for the main class taking into account necessary strengthening of supporting structures for equipment applied in and forces introduced by the type of operation. In addition to the elements as listed in Sec.1 [1], this may include turret or submerged turret structures, as applicable.

2.1.2 The items listed in [2.1.1] shall comply with the relevant sections of DNV-OS-C101 and, for ship-shaped and cylindrical units, DNV-OS-C102.

2.2 Position mooring

2.2.1 Where the design assumes that the unit can be disconnected and moved to a more sheltered location the actual loading conditions experienced may be used as a basis of design of the mooring system.

Guidance note:

The implications for flag compliance of the unit moving with cargo on board should be clarified.

---n-d---o---g-u-i-d-a-n-c-e-n-o-t-e---

2.2.2 The ability and means of moving location shall be documented.

2.3 Electrical systems and equipment

The electrical systems shall be designed, manufactured, tested and installed in accordance with DNV-OS-D201, as relevant for this type of unit taking into consideration the absence of hydrocarbon related safety risks.

2.4 Automation, safety and telecommunication systems

Instrumentation and telecommunication systems and equipment shall be designed, manufactured, tested and installed in accordance with DNV-OS-D202 Ch.2 Sec.1 to DNV-OS-D202 Ch.2 Sec.5, as relevant for this type of unit taking into consideration the absence of hydrocarbon related safety risks.

2.5 Fire protection

Fire protection systems shall be designed, manufactured, tested and installed in accordance with DNV-OS-D301 Ch.2 Sec.1 to DNV-OS-D301 Ch.2 Sec.5, as relevant for this type of unit taking into consideration the absence of hydrocarbon related safety risks.

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Floating production, storage and loading units

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Chapter 2 Section 6
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Thank you for listening!

**Erik Mathias Sørhaug – Business Development Director CO₂ shipping
and OCC DNV Maritime**

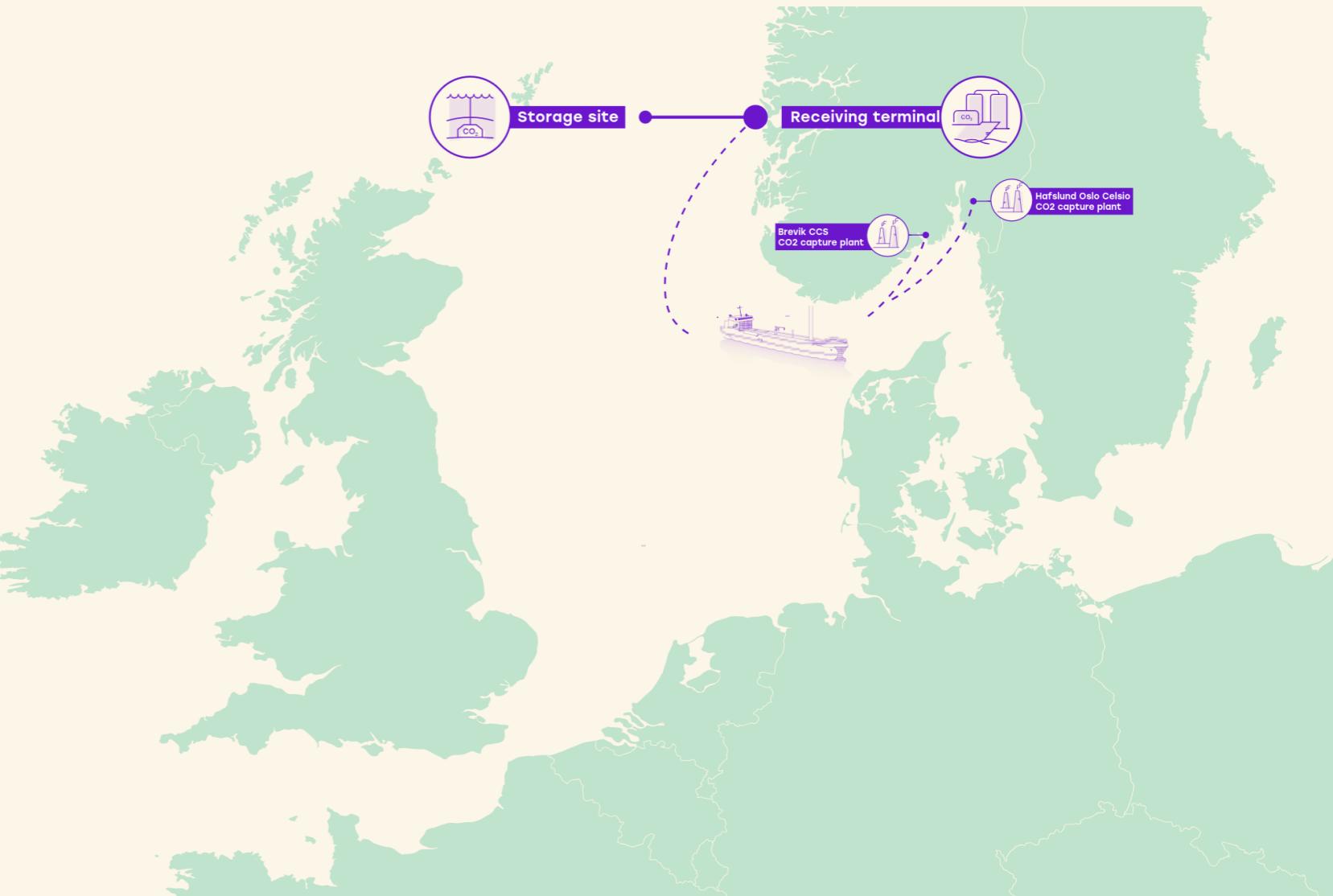


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The Longship project

- Norwegian government's full-scale CCS project
- Launched in 2020 after vote in parliament with broad political support
- Largest climate project in Norwegian industry history
- Aims to demonstrate the potential of CCS to the world
- CO₂ capture from two industrial sources
- Transport and storage by Northern Lights



**Co-funded by
the European Union**

Phase 1 – part of Norwegian authorities' Longship project

Phase 2 – co-funded by the EU



**Co-funded by
the European Union**

Phase 1 – part of Norwegian authorities' Longship project

Phase 2 – co-funded by the EU

CCS heritage

- Joint Venture between Equinor, Shell, and TotalEnergies
- Partnership established in 2017 – JV established in 2021
- 28 years of operational CO₂ storage experience on the Norwegian Continental Shelf (NCS)

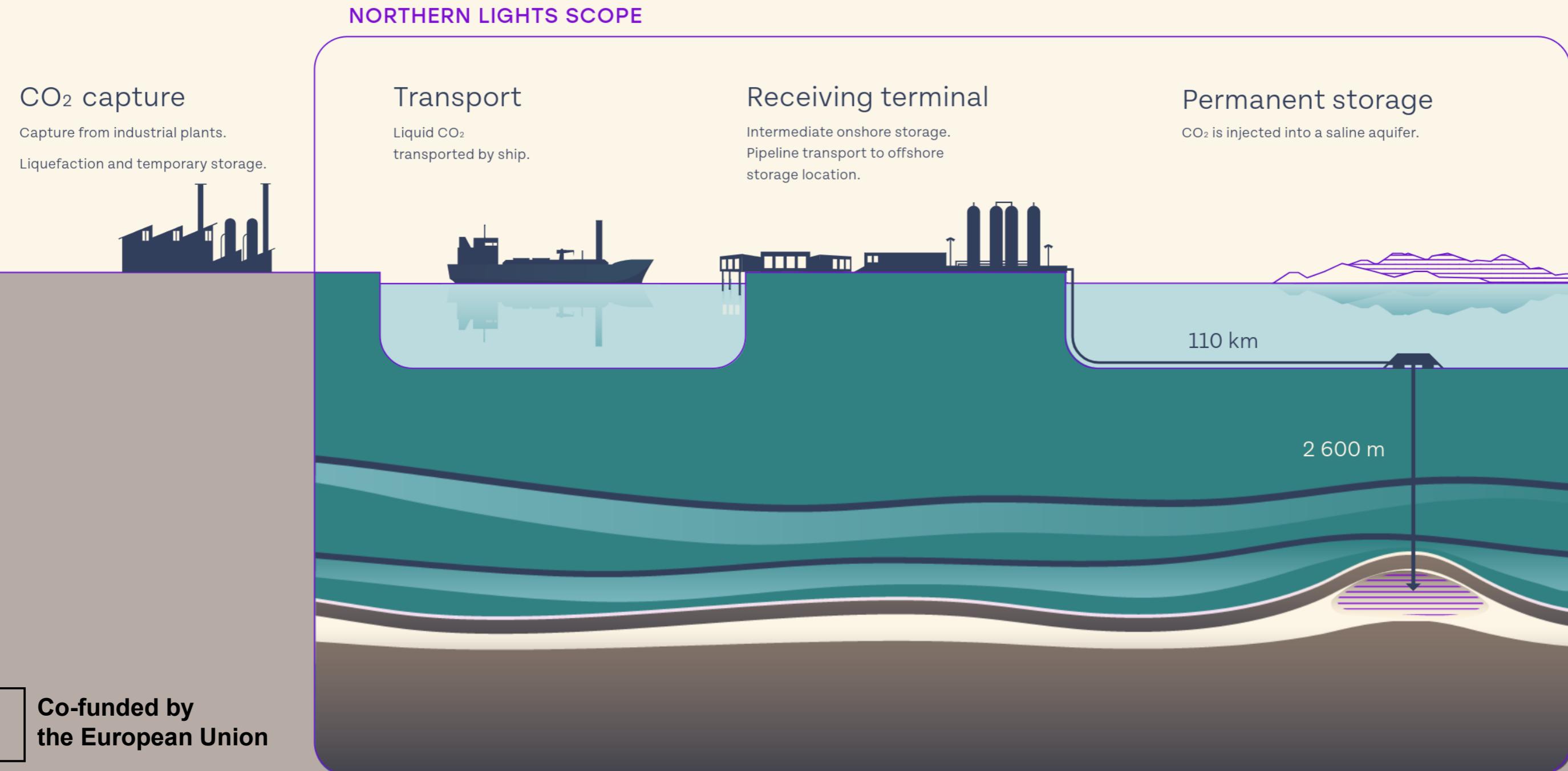


Co-funded by
the European Union

Phase 1 – part of Norwegian authorities' Longship project

Phase 2 – co-funded by the EU

Northern Lights value chain



Phase 1 – part of Norwegian authorities' Longship project

Phase 2 – co-funded by the EU

Øygarden facility



Co-funded by
the European Union

Phase 1 – part of Norwegian authorities' Longship project

Phase 2 – co-funded by the EU

MODERATED DISCUSSION



Erik Mathias Sørhaug

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Business Development Director
CO₂ Shipping and OCC DNV
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Thomas Minsaas

Northern Lights

Shipping and Logistics Operator



Angus Gillespie

Global CCS Institute

Strategic Adviser

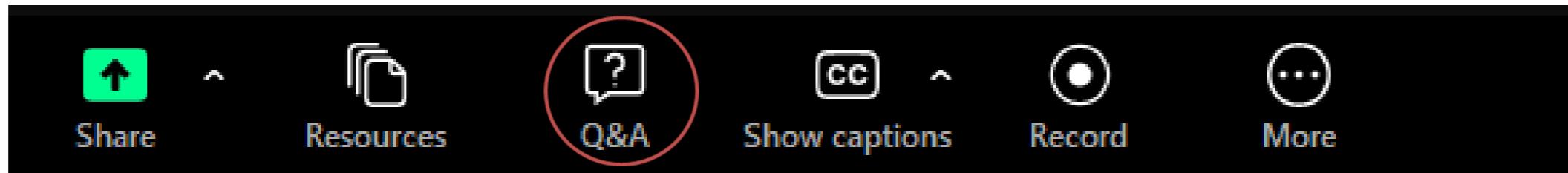
* MODERATOR *



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Q&A

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THANK YOU



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