# Program 08:30 – 10:20

Sinnataggen, Majorstua, Oslo.
Moderator: Gunnar Grini, Norsk Industri

08:00 – 08:30 Breakfast and coffee

08:30 – 08:35 Welcome by Anniken Hauglie, Deputy CEO, NHO

08.35 – 09.05: “Market for key clean technologies and presentation of report”. Timur Gül, Chief Technology Officer, International Energy Agency (IEA)

09.05 - 09.35: Possibilities for Norwegian industries:

- Hanne Simensen, Executive Vice President, Aluminium Metal
- Hans Olav Raaen, CEO, Yara Clean Ammonia
- Henrik Inadomi,  EVP New Energies, Aker Solutions

09.35 - 09.50: Update on geopolitics and Clean Industrial Deal, Hans Petter Rebo, Norsk Industri

09.50 - 10.05: Norwegian government's response. Ministry of Energy, Astrid Bergmål, State Secretary

10.05 - 10.20: Concluding remarks and consequences for the industry, Harald Solberg, CEO, Norsk Industri

International Energy Agency

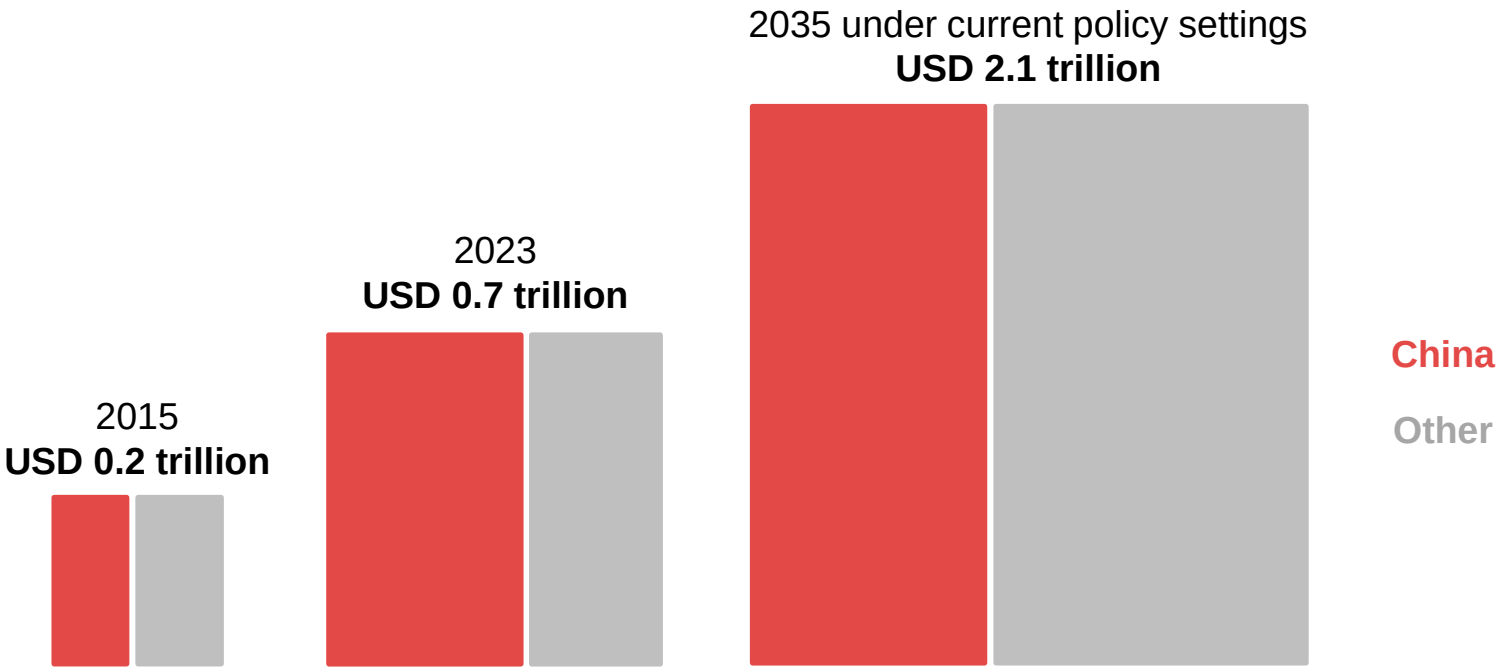
# Energy Technology Perspectives 2024

Dr. Timur Gül, IEA Chief Energy Technology Officer

NHO, Oslo, 12 March 2025

# Clean & modern technologies are a sizeable economic opportunity

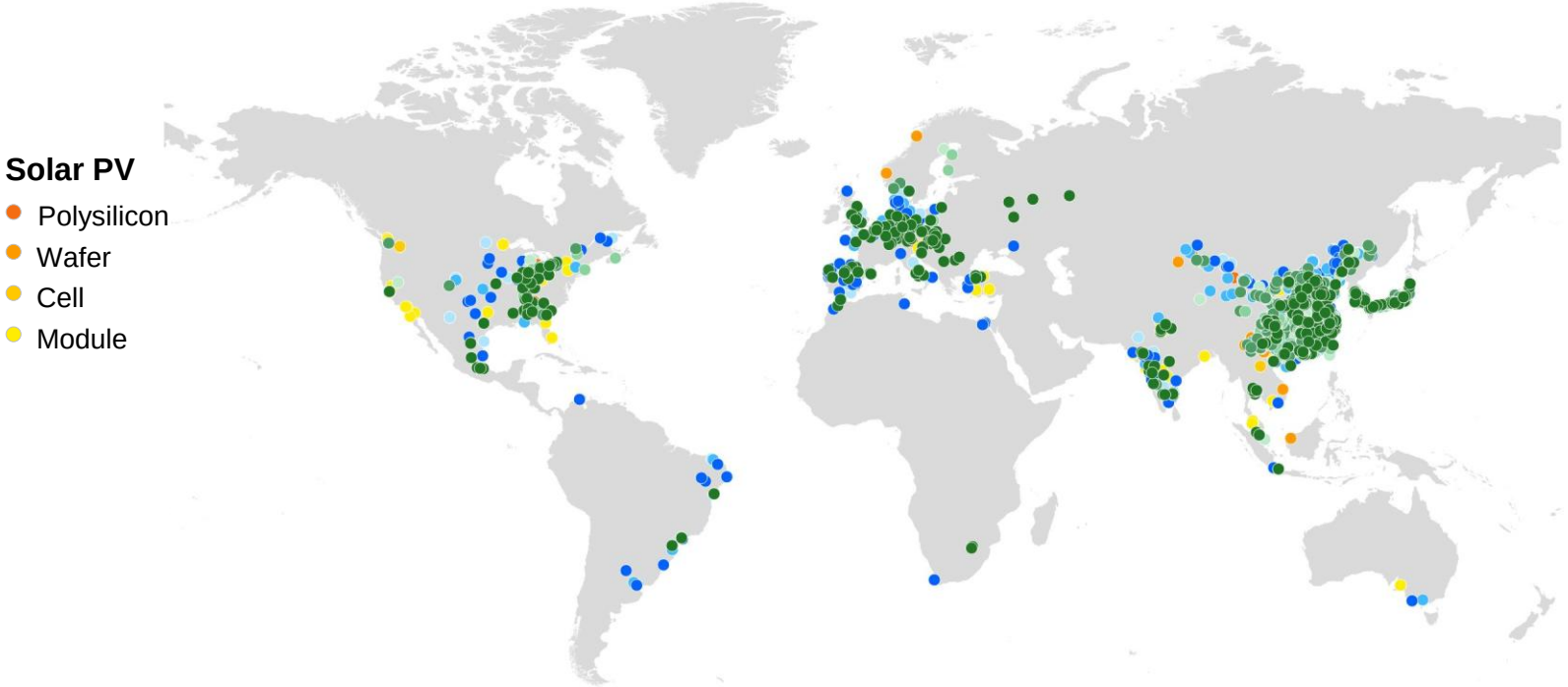
Global market value for clean energy technologies




**The market for clean technologies is set to triple to 2035 under current policy settings, close to value of the global crude oil market in recent years.**

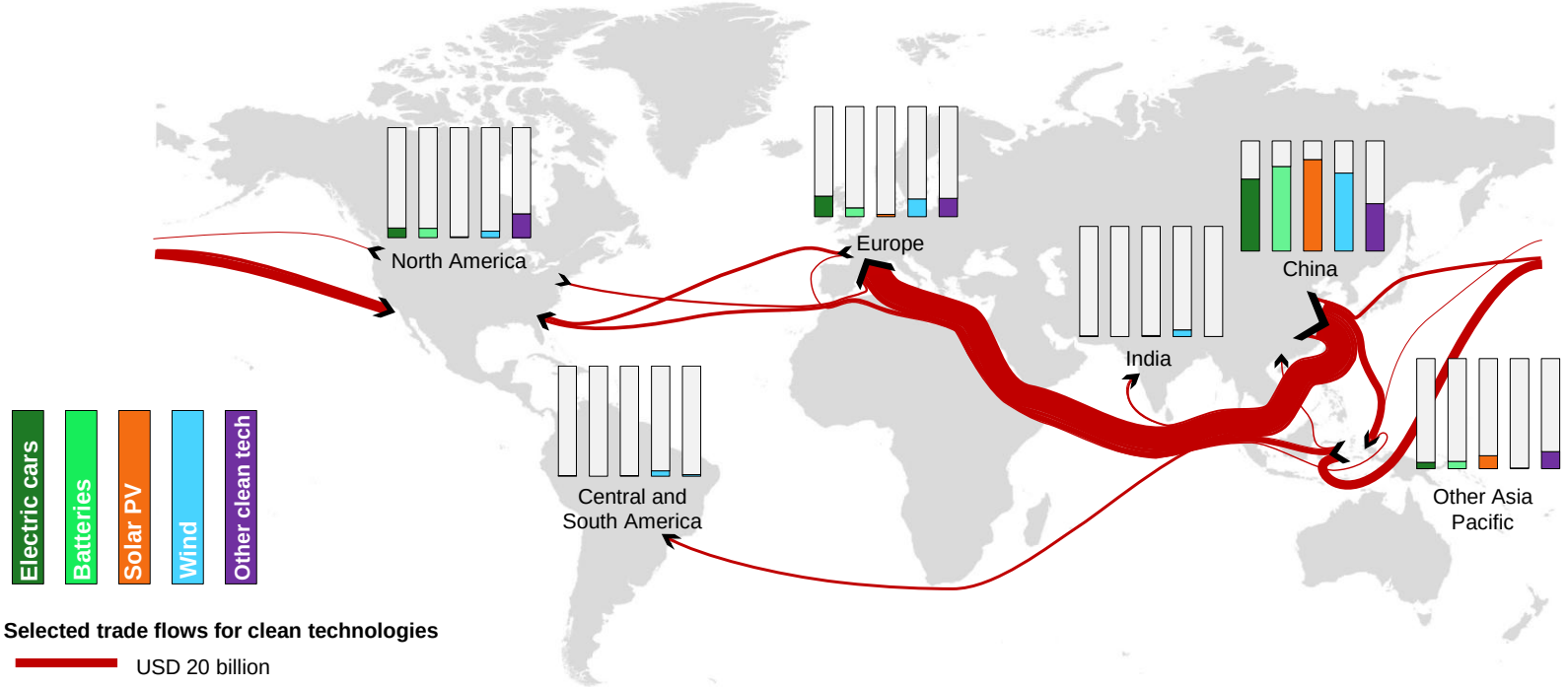
# Investment in clean technology manufacturing is booming

Clean technology manufacturing facilities in operation, 2023



# Investment in clean technology manufacturing is booming

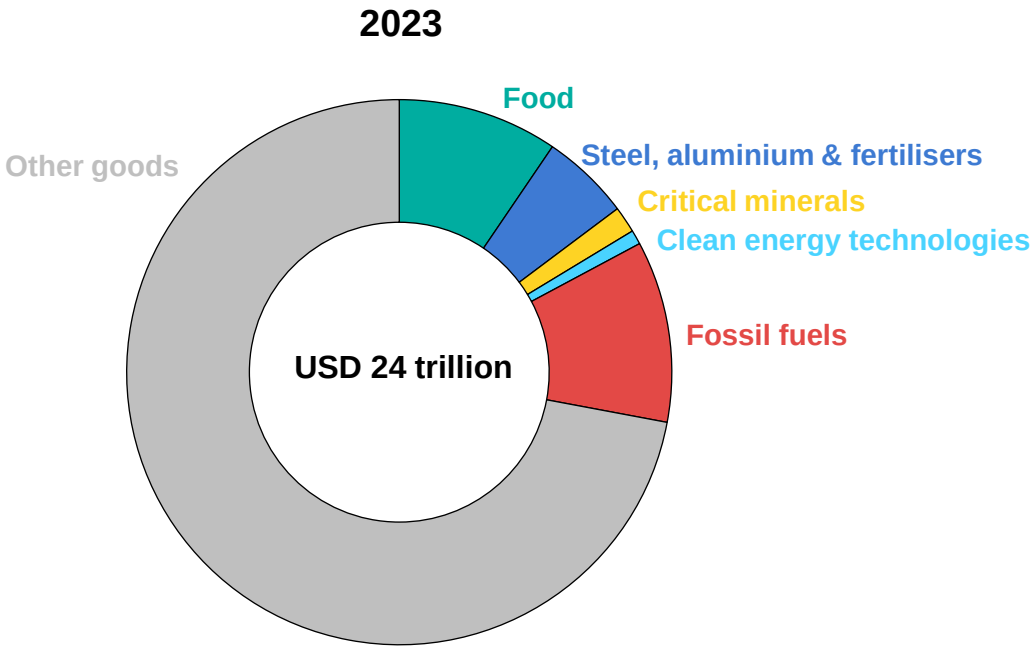
Share of global clean technology manufacturing output by technology, 2023




**The manufacturing of clean technologies is highly concentrated geographically, with China accounting for around 70% of the global manufacturing output value for the six key clean technologies.**

# International trade is essential to the global economy

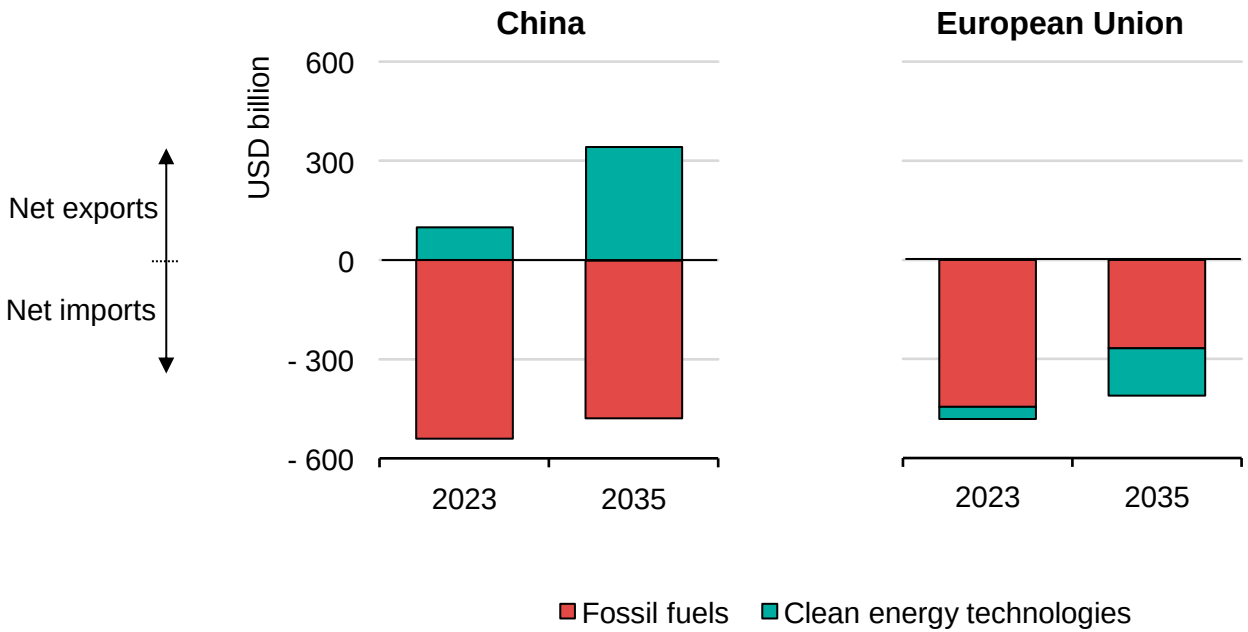
International goods trade by value




**The value of clean energy technology trade is set to triple to 2035.**
**The pace of decline of the value of fossil fuel trade depends on the speed of the clean energy transition.**

# China remains the world's clean technology powerhouse

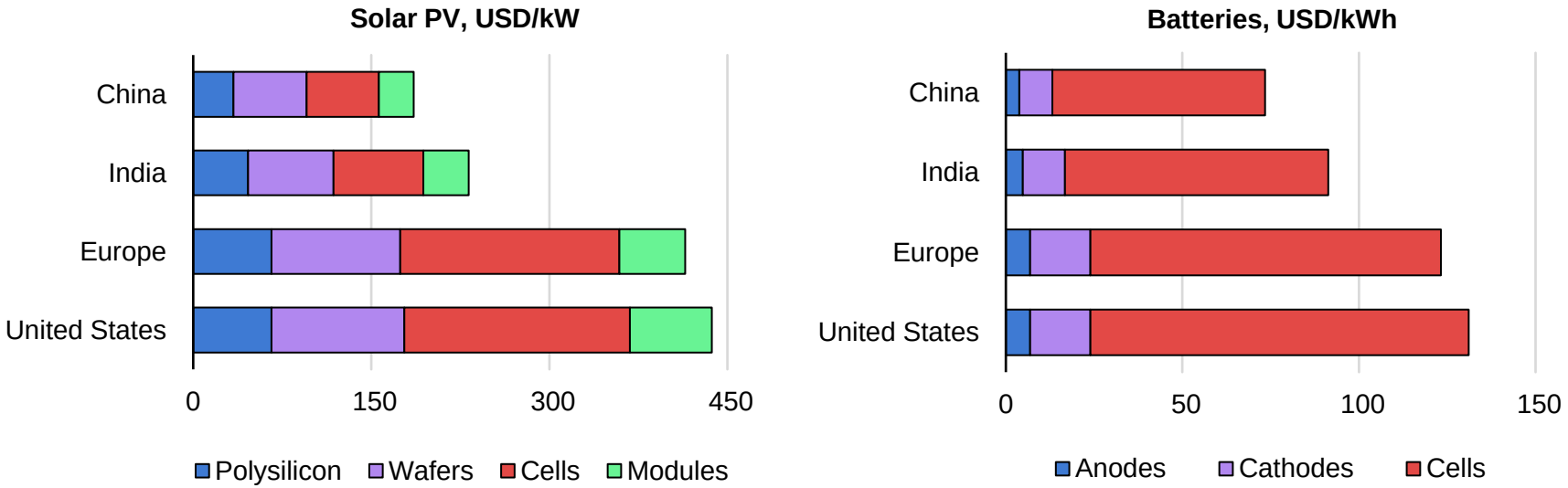
Net trade of fossil fuels and clean energy technologies under current policy settings




**The value of China's clean tech exports in 2035 is roughly equivalent to the projected 2024 oil export revenue of Saudi Arabia & the United Arab Emirates combined. The EU's import bill shifts to clean tech, which is a boon to resilience.**

# There is significant regional variation in capital costs…

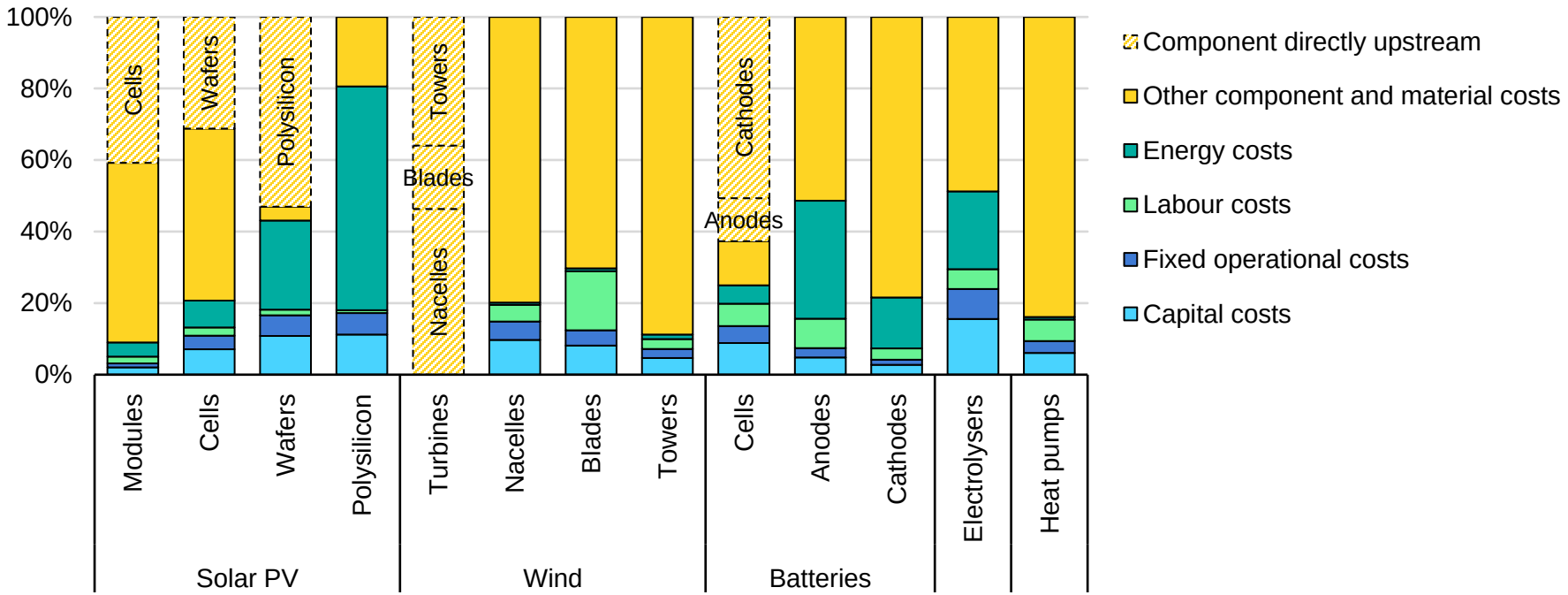
*Clean technology manufacturing facility capital costs*




**An analysis of cost data for 750 projects shows significant variation in average capital costs by region – a recent announcement for a large integrated solar PV facility suggests even lower costs (USD 140/kW) are possible in China**

# …but other factors influence total manufacturing cost

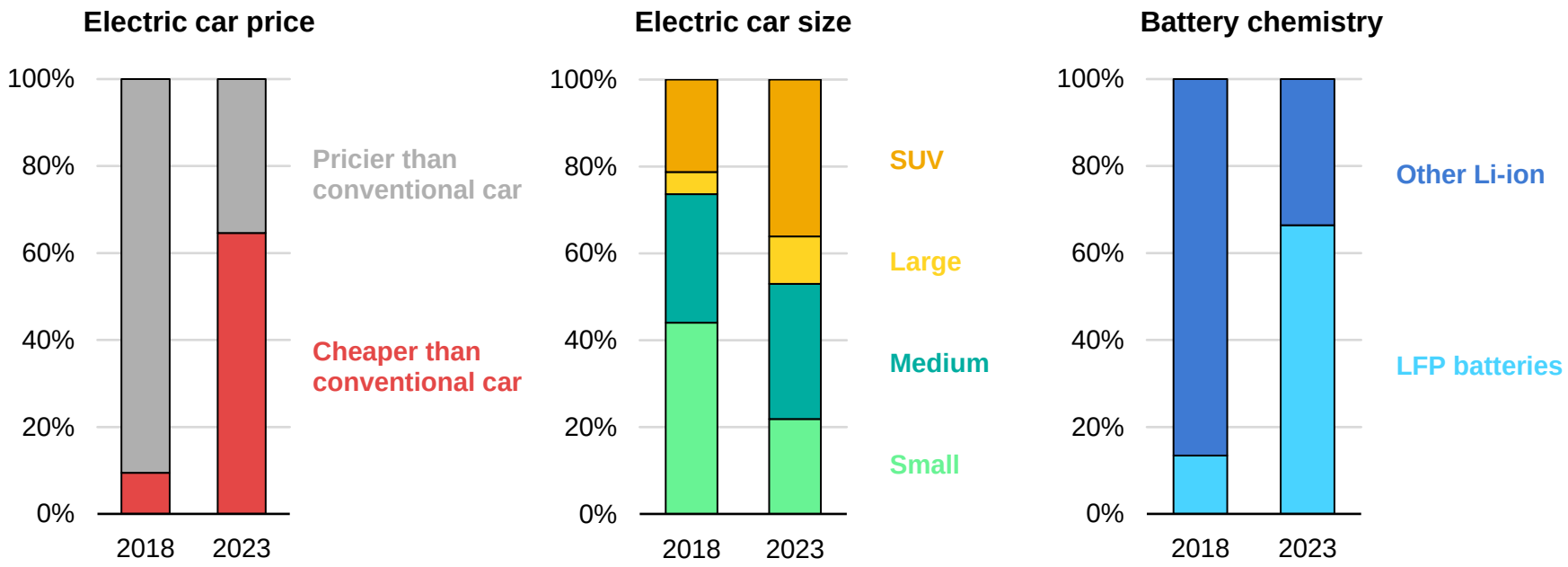
*Factors contributing to manufacturing cost for key clean technologies in China*




**Capital costs contribute significantly to the regional variation in clean technology manufacturing cost, but account for only modest proportions of the total – materials and energy account for much larger shares**

# In China, electric cars are getting larger… and cheaper

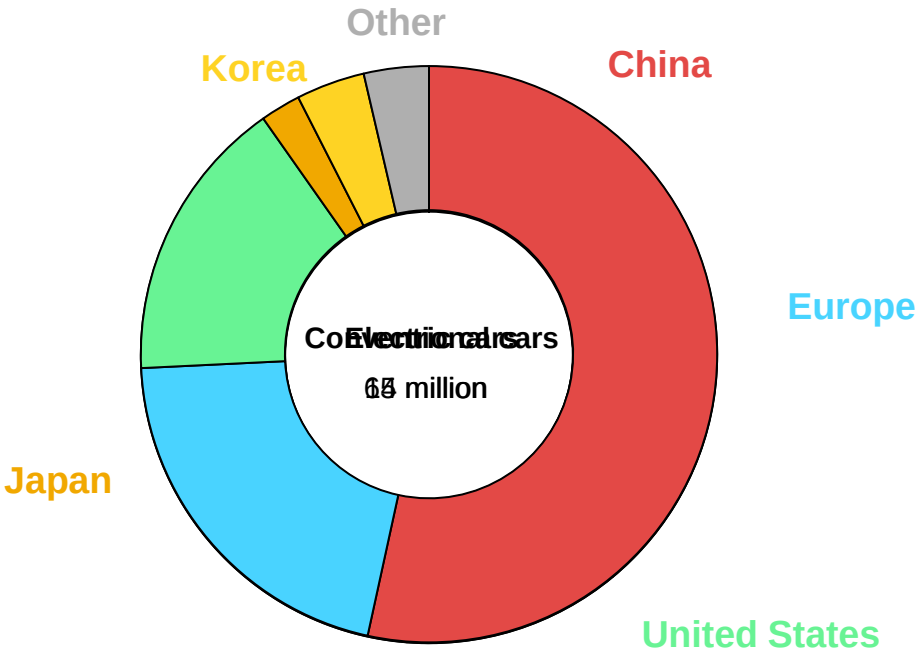
Share of battery electric car sales in China




**In 2023, over 60% of electric cars sold in China were cheaper than their average ICE equivalent.**
**Strong competition in the growing market of electric SUVs and cheaper battery chemistries are bringing prices down.**

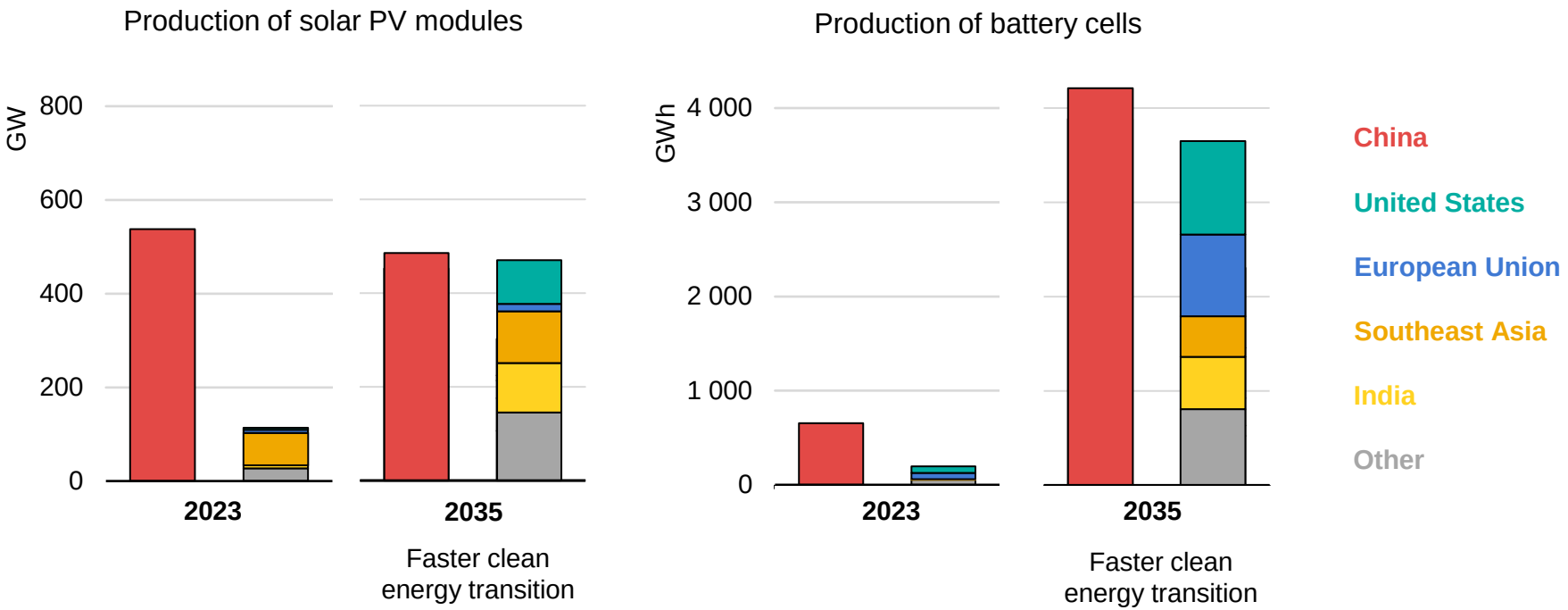
# A new electric car industry is emerging

Share of global car markets by automaker headquarters, 2023




**Chinese companies provide more than half of global electric car sales, compared with just 10% for conventional cars.**

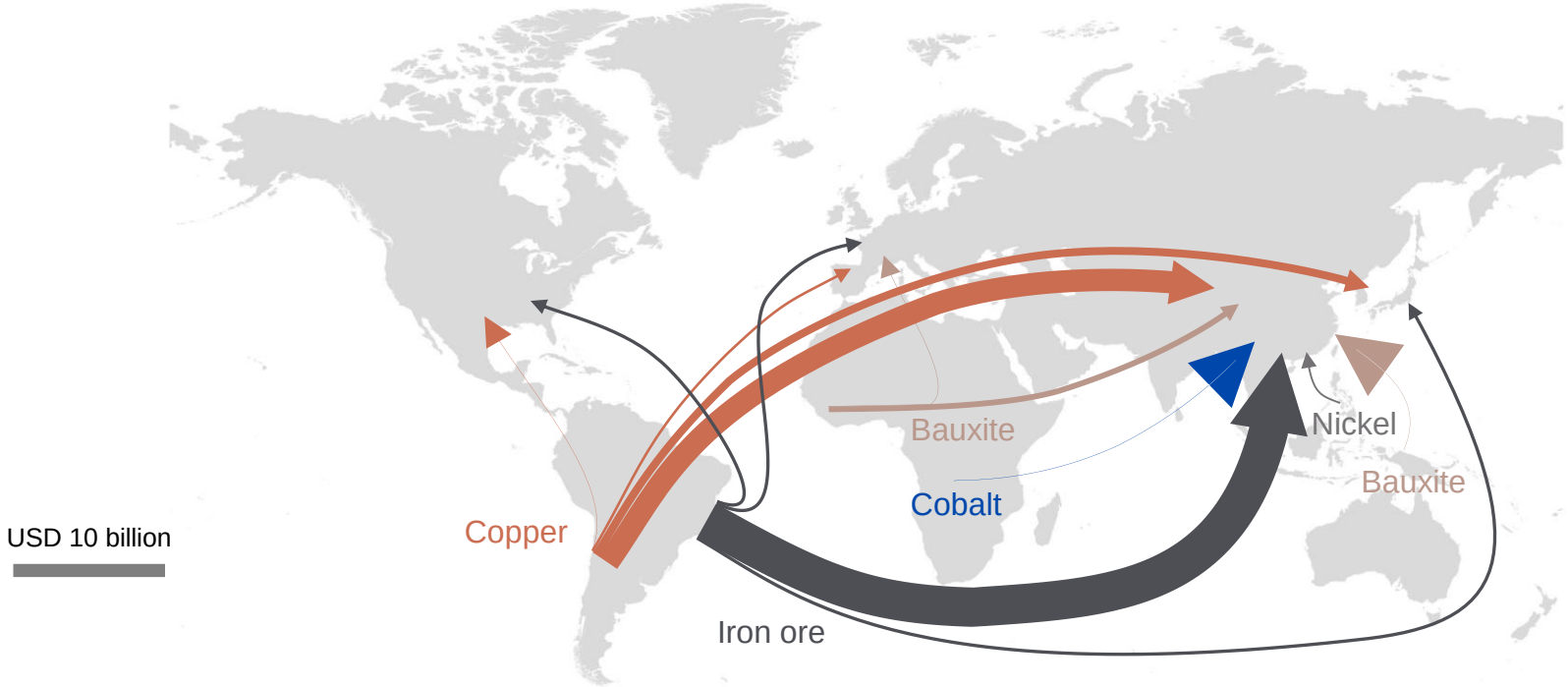
# Industrial policy & competitiveness shape the outlook for trade




**Industrial strategies can help boost the competitiveness of clean technology manufacturing.**
**The policies established by countries around the world will affect the outlook for manufacturing & trade.**

# Emerging economies supply the first steps in technology supply chains

Trade flows of raw materials from emerging markets and developing economies, 2023




**International cooperation and strategic partnerships will be vital to enable emerging economies to step up the value chain and increase diversification in global supply chains for energy technologies and their components**

# Emerging economies supply the first steps in technology supply chains

Key manufacturing opportunities in the High Potential Case

- ✓ Skills of the workforce
- ✓ Good energy infrastructure
- ✓ Large lithium & iron ore reserves
- ✓ High fertiliser demand

**Wind blade manufacturing increases x4 by 2035**

**Third largest battery manufacturer by 2050**

**Second largest exporter of near-zero emissions ammonia by 2050**

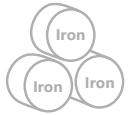
**International cooperation and strategic partnerships will be vital to enable emerging economies to step up the value chain and increase diversification in global supply chains for energy technologies and their components**

# Emerging economies supply the first steps in technology supply chains

Key manufacturing opportunities in the High Potential Case

- ✓ Good renewable resources
- ✓ Large cobalt reserves
- ✓ Existing large fertiliser production
- ✓ Available energy infrastructure (North & South Africa)

**EV manufacturing accounts for 3% of North Africa's GDP by 2050**



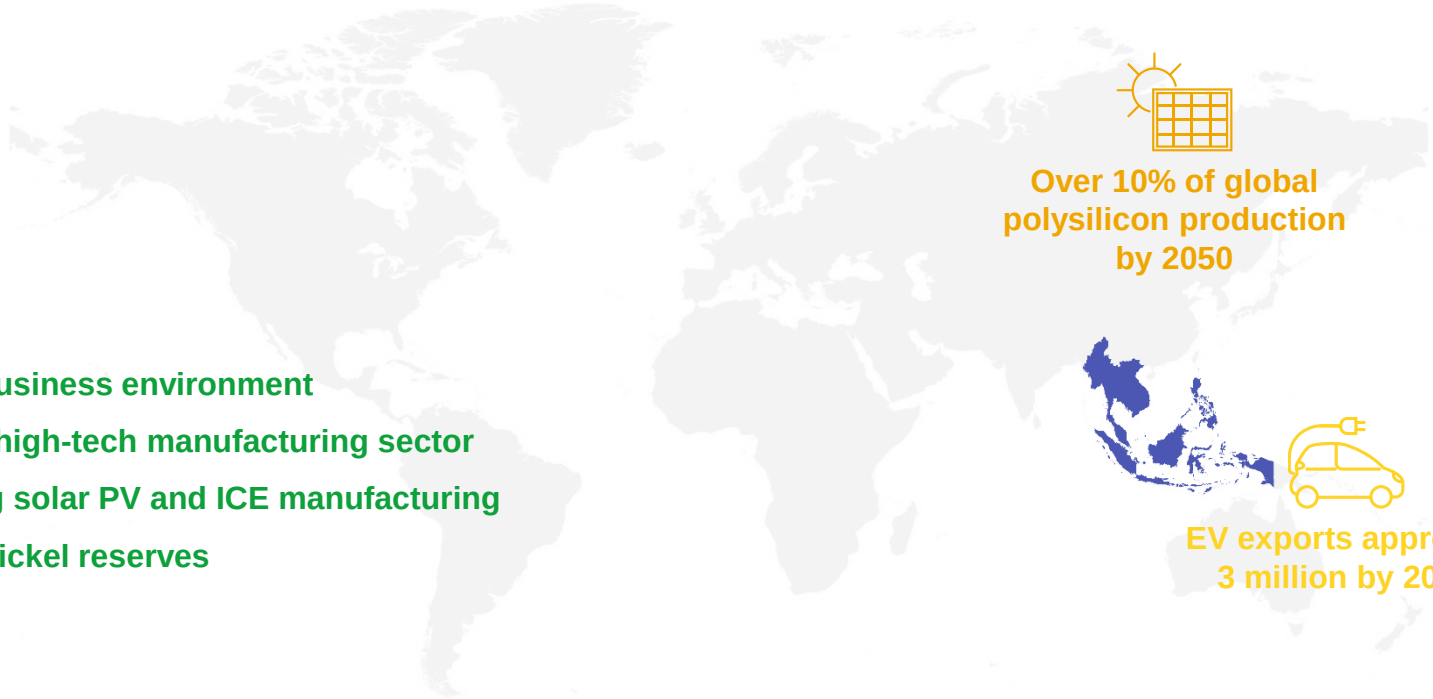

**Iron exports x4 more value than iron ore exports**

**Africa meets all ammonia demand with domestic resources by 2050**

**International cooperation and strategic partnerships will be vital to enable emerging economies to step up the value chain and increase diversification in global supply chains for energy technologies and their components**

# Emerging economies supply the first steps in technology supply chains

Key manufacturing opportunities in the High Potential Case




- ✓ Good business environment
- ✓ Strong high-tech manufacturing sector
- ✓ Existing solar PV and ICE manufacturing
- ✓ Large nickel reserves

**International cooperation and strategic partnerships will be vital to enable emerging economies to step up the value chain and increase diversification in global supply chains for energy technologies and their components**

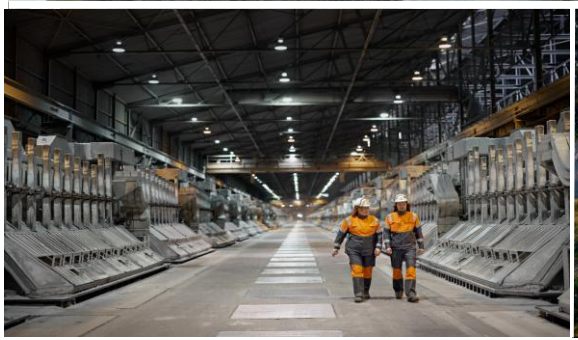
# Hanne Simensen,
# Executive Vice President, Aluminium Metal

# The aluminium opportunity in the clean energy technology market

Breakfast seminar, 12th March 2025
Næringslivets hus

The big picture:

# Norway ensures Europe's access to strategic materials



**40 %**

of all primary aluminium produced in the EU/EEA, is produced in Norway. Classified as strategic material.

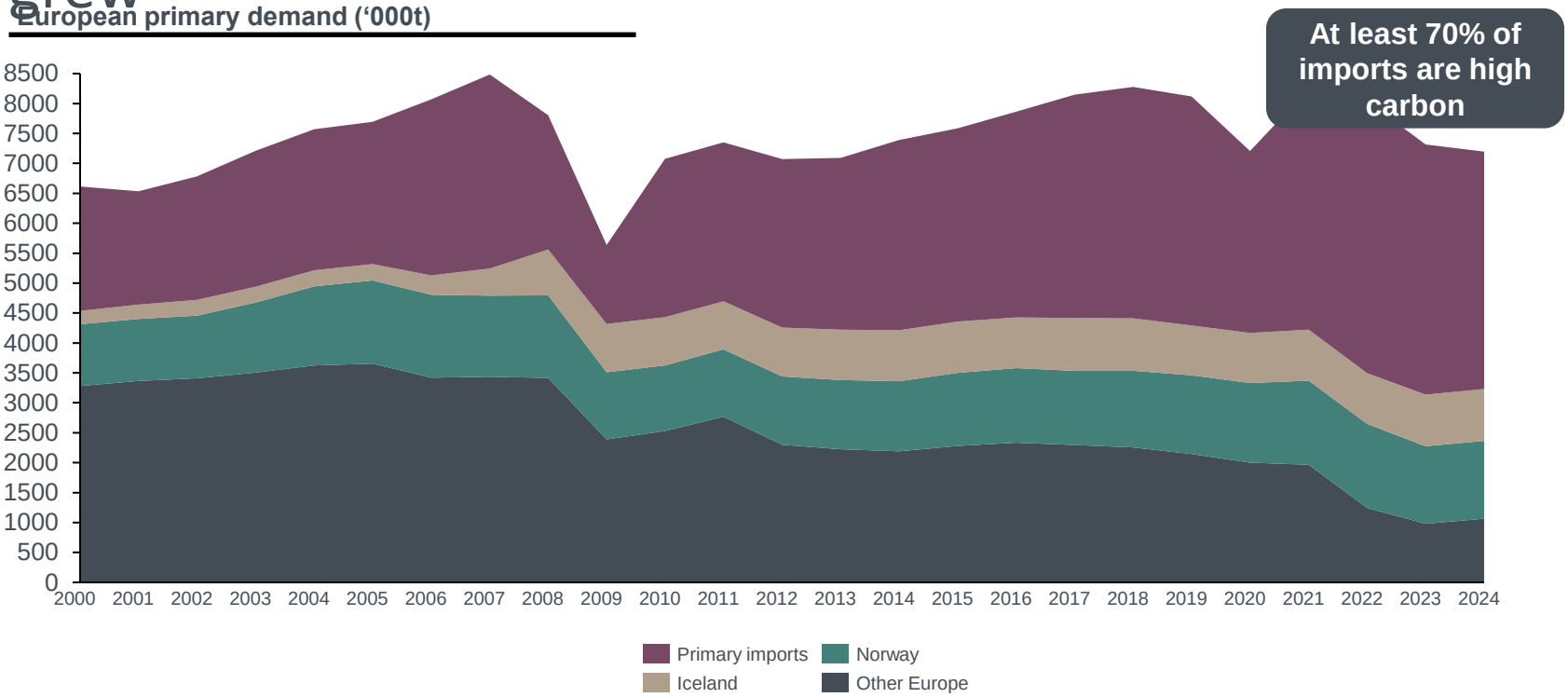
**99 %**

of all aluminium produced by Hydro in Norway, is exported to Europe

**- 75 %**

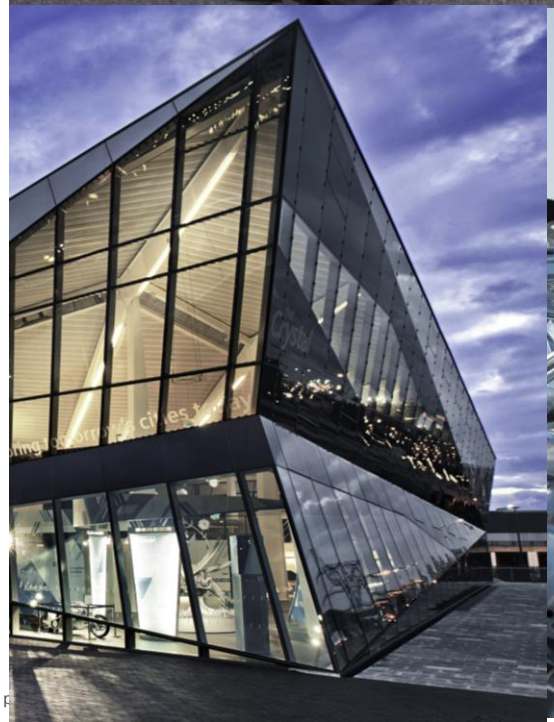
CO2-footprint from Norwegian aluminium produced with renewable power, compared to global average

# Europe outside the Nordics lost most of its primary production over the last 25 years – import dependency grew



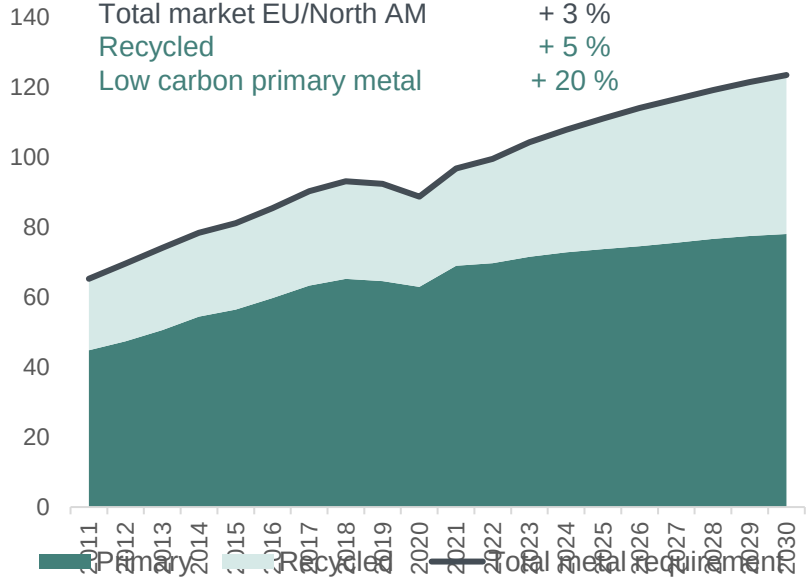

Source: CRU

# The world demands more aluminium

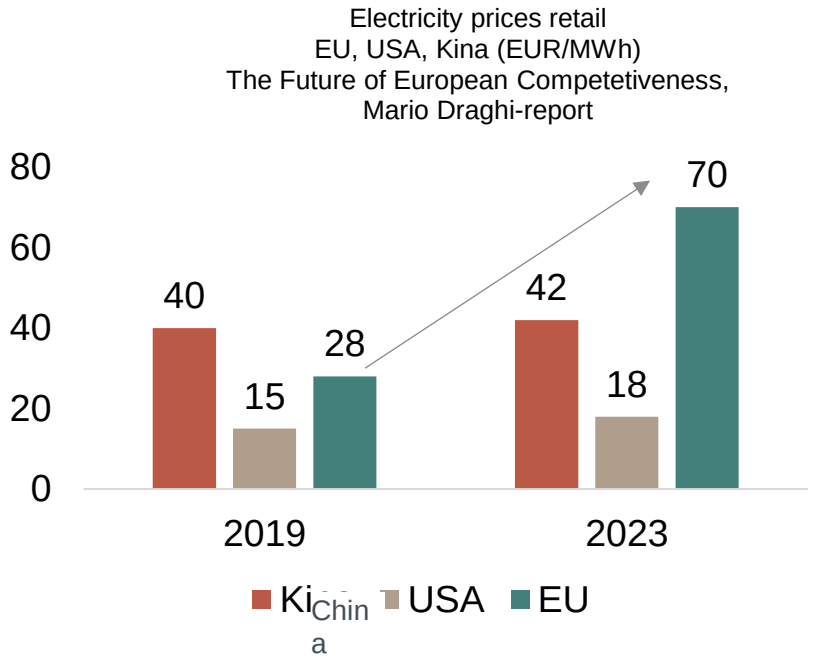
**Expected 2024- 2030**

| | |
|---|---|
| Total market EU/North AM | + 3 % |
| Recycled | + 5 % |
| Low carbon primary metal | + 20 % |

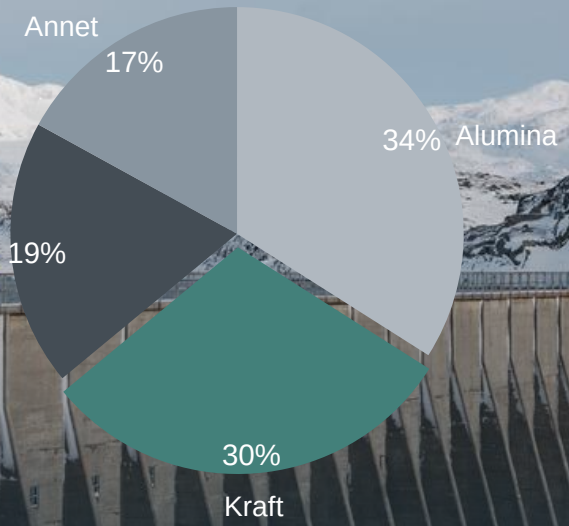



1 ) Tonnes of $CO_2e$ per ton of primary aluminium produced, including full value chain emissions. 2) Does not distinguish between p

# European power prices are challenging industry




# Aluminium production cost base




Andel av kostnadsbasen aluminium, globalt gjennomsnitt 2022

- Kilde: CRU


FINANCIAL TIMES

How short-term goals wreck great companies

My lesson in fairness from an anti-spam bot

Markets rebound after Sheinbaum's talk with Trump brings tariffs pause

Mexico vows border action • Levies held for a month • Shares pare losses • Canada awaits fate

US aid agency locks out staff as White House vows purge of 'radical lunatics'

RONALD PHILLI


THE TIMES

Prostate cancer What men need to know

Kate, your image is your superpower

Daisy Goodwin

NHS withholds Nottingham report to protect killer's privacy

PM won't back EU in trade war

Starmer refuses to criticise Trump plan for 10% tariffs on bloc


Hydro forbereder seg på Trump-toll

Industrigiganten har dialog med myndigheter i Norge, EU og USA.

VG VG Live VGTV VG+ Sport TV-guide Tips oss Kjøp VG+ Søk


FAGFORENINGSBOSS: Arve Baade på gulvet i aluminiumsverket i Sunndal som har rundt 700 ansatte. Foto: Privat

Arve frykter ikke Trump: – Tror vi skal klare oss

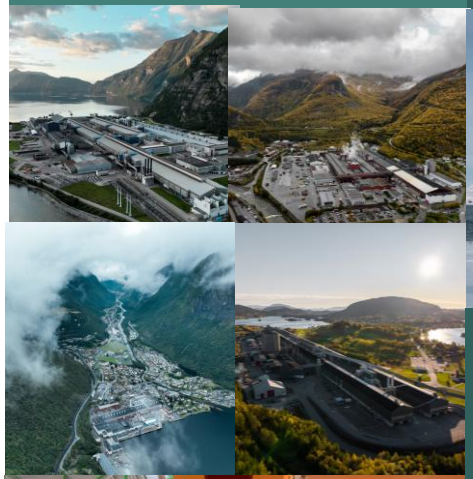
Could an EU-US deal be struck to avoid a full-blown trade war?

Also in this newsletter: Von der Leyen's simplification drive hits the road

European Commission president Ursula von der Leyen, left, met US vice-president JD Vance, in Paris yesterday, the first time sh spoke to a senior official from the new US administration face to face © Leah Millis/Reuters

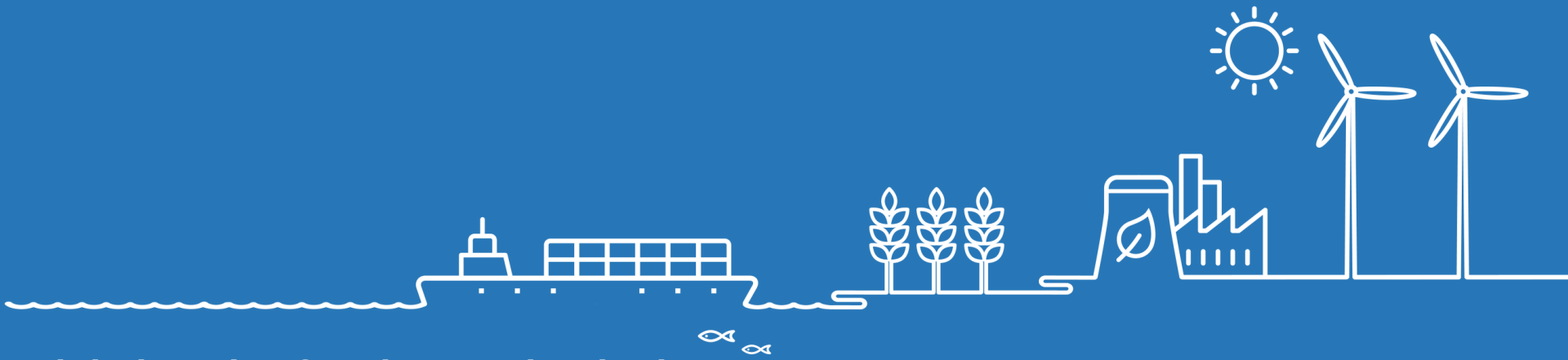
# Industry Norway, for the future

The next big projects from Hydro in Norway

| Develop and future proof our five aluminium smelters | Aiming to develop power to industry | More efficient production, lower emissions | World's first emission free production |
|---|---|---|---|
|  |  |  |  |
| Hydro Energy is exploring renewable power development<br><br>Energy efficiancy and fossil fuel replacement – biogas and pilots on plasma and hydrogen | | Continue to cut emissions and increase efficiency. Aiming to deliver REDUXA 3.0<br><br>Increasing use of recycled post consumer scrap | Industrial pilot for HalZero<br><br>Near zero carbon from recycling |


*Industries that matter*

# Yara Clean Ammonia



**Global market for clean technologies**

*NHO / Norsk Industri 12 Mar 2025*

# YCA is a leading global ammonia platform well-positioned to capture the market for clean ammonia

## Yara Clean Ammonia

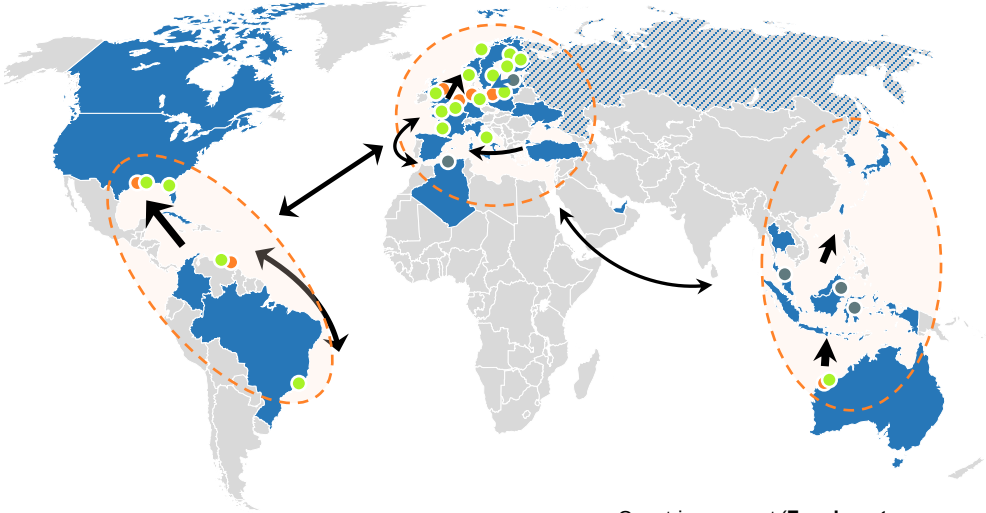
**Green & blue project development**

**Existing end-to-end infrastructure and trade**

| $H_2$ | | | |
|---|---|---|---|
| **Hydrogen production** | **Clean ammonia production** | **Logistics and trade** | **Marketing and distribution** |
| - *Upstream partnerships*<br>- *Clean energy sourcing* | - *Existing pilot projects*<br>- *Potential full-scale projects* | - *Existing Yara Ammonia Trade & Shipping[1] unit*<br>- *2024 results:*<br>• *Revenues ~1.8 BUSD*<br>• *EBITDA ~117 MUSD*<br>• *> 20% market share* | - *Marketing & customer development*<br>- *Application development* |

# YCA has an established global network with access to asset-backed supply

## Overview of YCA's global footprint




## Overview of YCA's global footprint

- Reliable, **asset-backed supply and attractive offtaker**
- **Deep industry know-how**, market insight and track record of safe handling
- **Specialized fleet of 16 ships**
- **Global network of 18 terminals** located in key locations[1]
- **Deep-sea connection** to key bunkering hubs
- **Scalable platform** and business model

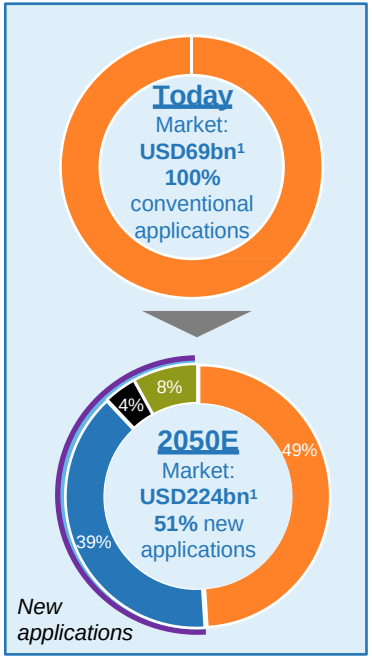
**#1 global player with >20% market share[2] and leading positions in key regions**



Source: Company information; Argus market study
1) YCA has exclusive access, and manages and optimizes use of Yara's ammonia tank infrastructure at terminals through sourcing and supply agreements with Yara
2) Based on volumes of traded ammonia in 2021 - Argus market study (2022)

# Demand from new applications is expected to come exclusively from clean ammonia

## Demand focused on key applications




### Shipping fuel

- Ammonia is the most promising scalable clean fuel solution
- Regulation to drive ship owners towards fleet conversion and orderbook commitments
- Current decarbonization toolbox is insufficient to achieve GHG reduction targets

### Power generation

- Ammonia in power generation can help decarbonize countries which have unfavorable conditions for renewables and therefore need a reliable, flexible back up power source
- Japan has stated clear targets for ammonia co-firing and is expected to be leading the market

### Agriculture/Industrial

- Grey ammonia is expected to continue to play an important role in the agricultural and industrial market
- Industry standards, cost incentives and end consumer demand to act as a pull for clean ammonia in fertilizers

### Hydrogen carrier

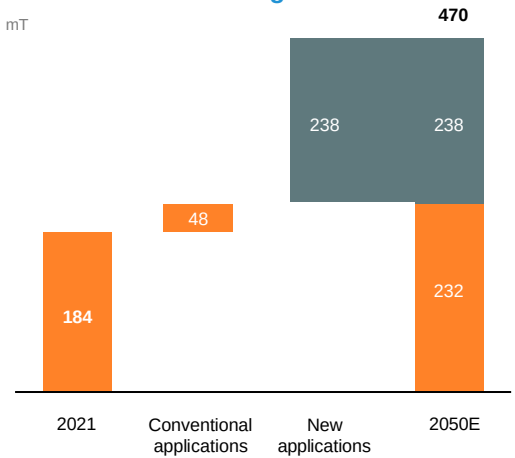
- Emerging hydrogen roadmaps at national level outlining ambitious targets
- Ammonia will be key for large-scale hydrogen import (i.e. linking demand centers and low-cost supply)
- Driven by ammonia's superior transport attributes, existing infrastructure and lower handling complexity



Source: Arkwright market study 2021
1) Market value in real 2021 terms, assuming an inflation rate of 2% starting 2021

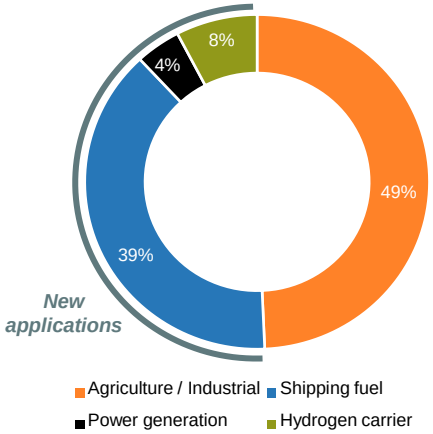
# Significant expected ammonia demand driven by a mix of conventional and new applications

## Ammonia market growth to 2050E



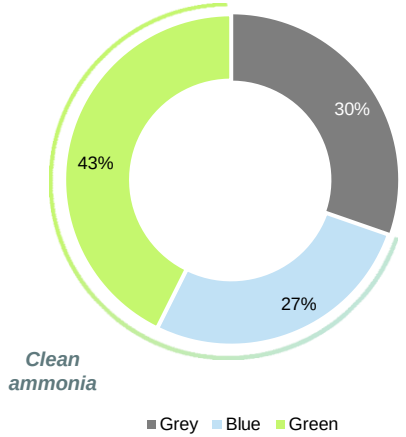

**The demand for ammonia is expected to grow significantly to 2050**

## 2050E ammonia demand by application



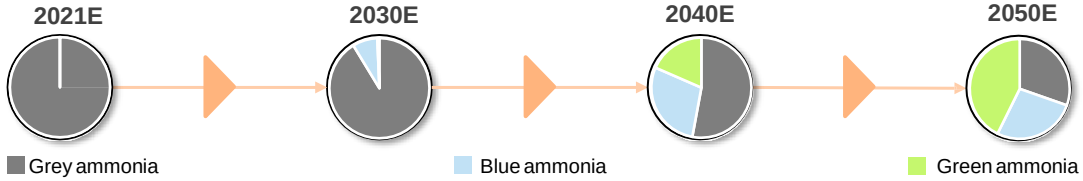

**~50% of 2050E demand expected to come from new applications**

## 2050E ammonia supply by type




**Majority of supply expected to come from blue and green sources**

## Ammonia supply expected to shift towards blue and green



## Yara is executing a 4-way strategy towards securing clean ammonia supply around the world

**RETROFITTING**
existing capacity

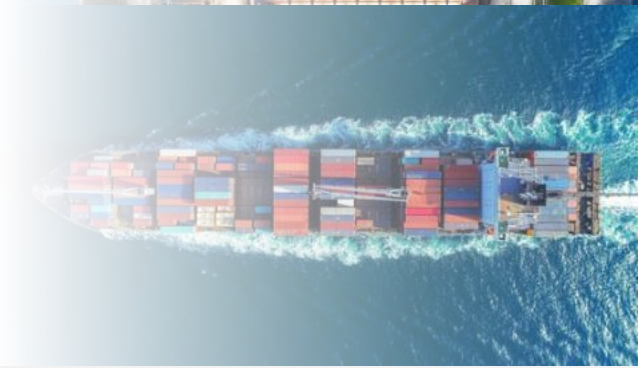
**BUILDING**
new capacity

**DEVELOPING**
partnerships

**ESTABLISHING**
offtake agreements

# Key highlights

1. **Potential huge demand for clean ammonia** as shipping fuel on top of a structurally robust market for conventional ammonia.
2. Access to **robust upstream projects** to develop YCA's integrated value chain, **providing reliable supply** to demands in new applications.
3. **Partnerships with reputable players along value chain**, tapping on expertise and overcome challenges to establish a safe and robust ammonia bunker value chain through projects and trials.
4. **Asset-backed global ammonia midstream platform** allowing YCA to potentially lower cost barrier through logistics optimization.
5. **Experienced and performance-oriented organization** with strong safety culture, allowing lessons sharing with stakeholders.
6. **Thought leadership into action leadership** on commercialization of ammonia-fueled vessels for own business and operations.




Thank you
YARA
Yara Clean Ammonia

# Energy Technology Perspectives

## IEA, NHO and NI

12 March 2025

Henrik Inadomi

EVP New Energies

Aker Solutions

# Creating values for customers, owners, society and people

Norway: 8,000 employees
12 locations / 4 yards

annual revenues
(2024)

last 24
months

in training
every year

of annual revenues in 2030
from energy transition*
(1/3 already by 2025)

for suppliers,
communities

* Revenue and order backlog from work related to renewables and transitional energy solutions. This mainly includes projects with solutions and technologies for offshore wind, hydropower, aquaculture, carbon capture utilization and storage (CCUS), hydrogen, electrification of offshore and onshore facilities and decommissioning & recycling.

# Business Segment Overview

## New Build

Revenue: 35 BNOK

Greenfield EPC Projects

O&G and HVDC

## New Energies

Revenue: 2.4 BNOK

Engineering Consultancy

Development of new renewables projects

## Life Cycle

Revenue: 13 BNOK

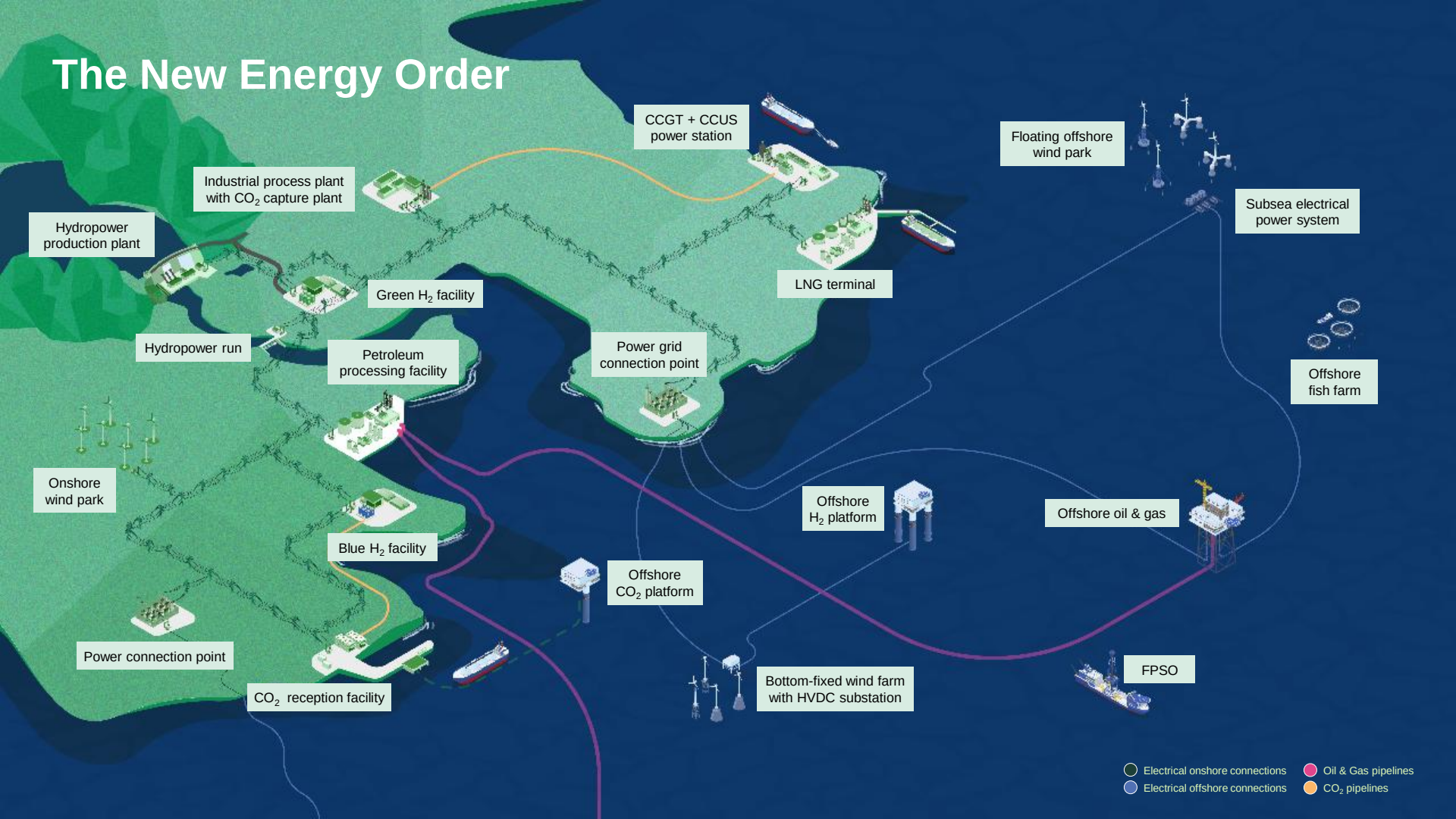
Brownfield Projects

## Power Solutions

Revenue: 1.0 BNOK

Hydropower, Power & Controls products

# The New Energy Order



# Celebrating innovation!

- Level 1, 18pt
  Press ENTER then TAB to view next text style
  Press SHIFT+TAB to view previous text style
  - Level 2, 16pt
    - Level 3, 14pt

**Level 4, 20pt**

Level 5, 18pt

Level 6, 18pt

Level 7, 18pt

Level 8, 18pt

Level 9, 18pt

1990-2000

Separation and Storage

## Sleipner Vest

Gas processing with CO2 capture, compression and injection

1Mtp / year

FEED 1993, CoD 1996

2000-2010

Transport

## Snøhvit $CO_2$ Pipeline

CO2-pipeline + landfall + maintance CoD 2007


2010-2020

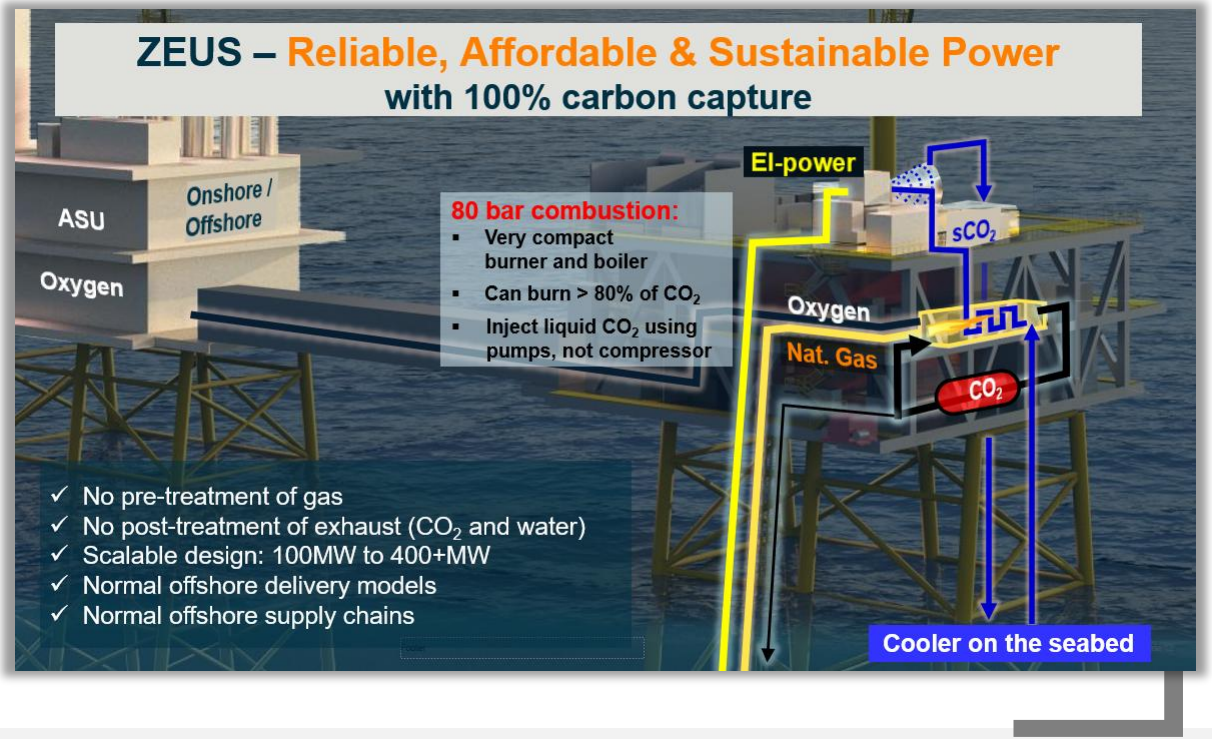
Capture

## TCM Mongstad

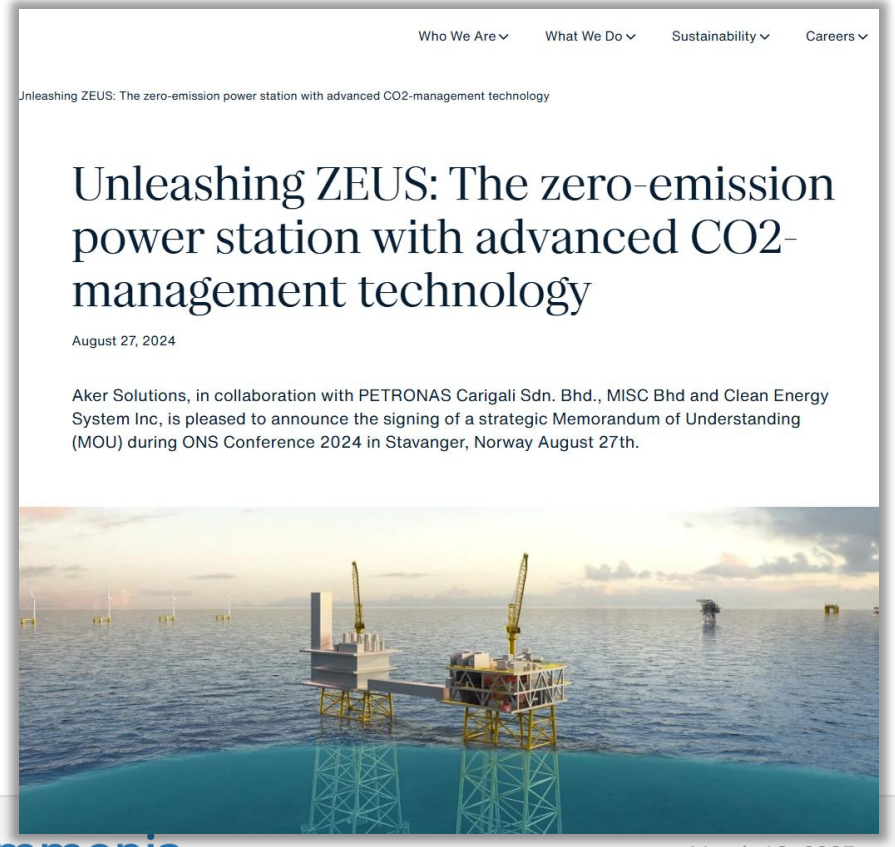
- EPC for Carbon Capture based on Amine Technology
- 80.ktp/year
- CCo DQ4 2011
- Precursor to SLBC

# Gas-fired power with carbon capture

Dispatchable decarbonized power – CCGT+CCUS and Zeus



# Zeus 5 MW pilot project with Petronas Aug 2024



Who We Are | What We Do | Sustainability | Careers

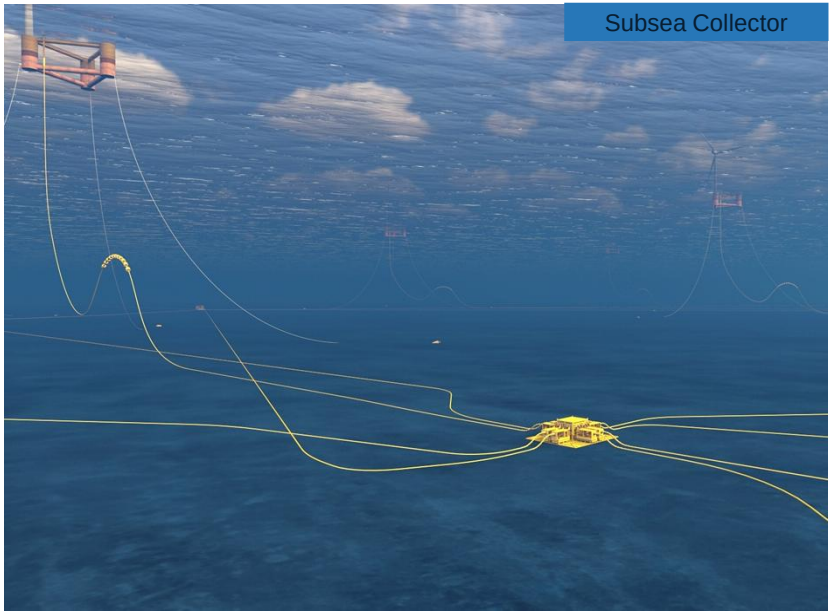
Unleashing ZEUS: The zero-emission power station with advanced CO2-management technology

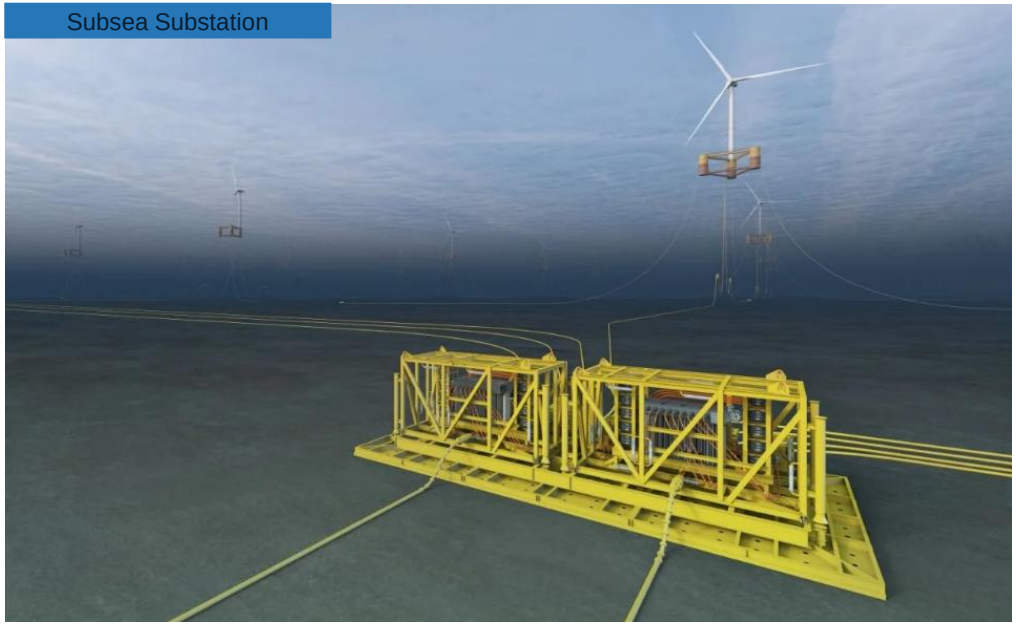
## Unleashing ZEUS: The zero-emission power station with advanced CO2-management technology

August 27, 2024

Aker Solutions, in collaboration with PETRONAS Carigali Sdn. Bhd., MISC Bhd and Clean Energy System Inc, is pleased to announce the signing of a strategic Memorandum of Understanding (MOU) during ONS Conference 2024 in Stavanger, Norway August 27th.

# Click to add title



# Steel and concrete

# Thank you!

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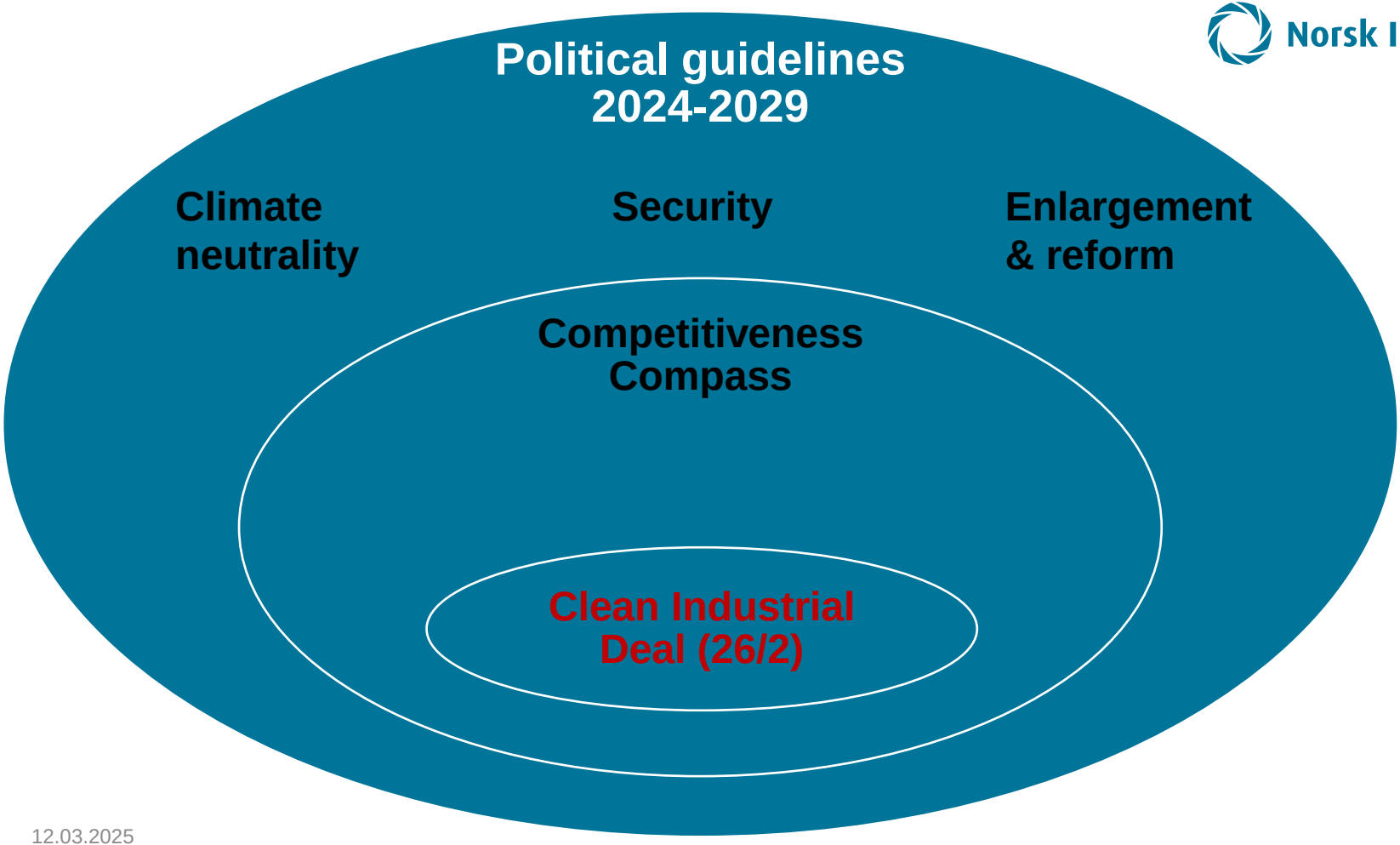
# Update on geopolitics and Clean Industrial Deal

## Hans Petter Rebo, The federation of Norwegian Industries


Political guidelines
2024-2029
Climate
neutrality
Security
Enlargement
& reform
Competitiveness
Compass
Clean Industrial
Deal (26/2)

# COMPETITIVENESS COMPASS

Decarbonisation and competitiveness

Closing the innovation gap

Simplification

Reducing excessive dependencies and increasing security


Single Market

Coordination

Financing competitiveness

Skills & quality jobs

# Competitiveness compass – flagship initiatives

## Q1-2025

- Vision for agriculture and food
- Clean Industrial Deal
- Affordable Energy Action Plan
- Strategic dialogue on the European automotive industry (comprehensive Action Plan 5/3)
- White Paper on the Future of European Defence
- Preparedness Union Strategy
- Internal Security Strategy
- Critical Medicines Act
- Omnibus simplification and definition of small mid-caps [26/2]
- Savings and Investment Union
- Union of Skills
- AI Factories Initiative

## Q2-2025

- Start-up and Scale-up Strategy
- EU Quantum Strategy
- Life Sciences Strategy
- Space Act
- Oceans Pact
- New State Aid Framework
- Joint purchasing platform for Critical Raw Minerals [Q2-3]
- Water Resilience Strategy
- Single Market Strategy

## Q3-2025

- European Strategy for Research and Technology Infrastructures
- Apply AI, AI in Science, and Data Union Strategy
- Sustainable Transport Investment Pact

## Q4-2025

- Digital Networks Act
- Quantum Act
- Chemicals industry package
- Quality jobs roadmap
- Industrial Decarbonisation Accelerator Act
- Trans-Mediterranean Energy and Clean Tech Cooperation initiative

Q4 2025- Q1 2026:

- 28th regime
- European Innovation Act
- EU Cloud and AI Development Act

## 2025

- Steel and metals action plan
- Carbon Border Adjustment Mechanism Review
- MFF, including Competitiveness Fund and a Competitiveness Coordination Tool
- European Port Strategy and Industrial Maritime Strategy
- High Speed Rail Plan
- Ambitious trade agreements, Clean Trade and Investment Partnerships
- European Business Wallet
- Review of the Horizontal Merger Control Guidelines [tbc]

## 2026

- European Biotech Act and Strategy [2025-2026]
- Electrification Action Plan and European Grids Package [Q1]
- Circular Economy Act [Q4]
- European Research Area Act
- Advanced Materials Act
- Revision of public procurement Directives
- European Climate Adaptation Plan
- Revision of the Standardisation Regulation
- Skills Portability Initiative

# CLEAN INDUSTRIAL DEAL – utvalgte tiltak (flagship actions)

| | |
|---|---|
| **Affordable energy** | • Action Plan (26/2/2025)<br>• Legislative proposal on the extension of the Gas Storage Regulation (Q1 2025)<br>• Guidance on CFDs and combining PPA and CFDs (Q4 2025)<br>• European Grid Package (Q1 2026) |
| **Lead Markets** | • Delegated act on low carbon hydrogen (Q1 2025)<br>• Industrial Decarbonisation Accelerator Act (Q4 2025)<br>• Revise the Public Procurement Directive (Q3-4 2026) |
| **Financing** | • Clean Industry State aid Framework (Q2 2025)<br>• Set up Industrial Decarbonisation Bank (Q2 2026) |
| **Circularity and access to materials** | • First list of strategic projects under the Critical Raw Materials Act (Q1 2025)<br>• Create an EU Critical Raw Materials Centre for joint purchases (Q4 2026)<br>• Circular Economy Act (Q4 2026) |
| **Global markets and international partnerships** | • Launch negotiations on Clean Trade and Investment Partnerships (Q1 2025)<br>• CBAM: simplification (Q1 2025), review (Q3 2025), extension (Q1 2026) |
| **Skills** | • Quality Jobs Roadmap (Q4 2025)<br>• Skills Portability Initiative (2026) |
| **Implementation: sectoral plans** | • Industrial Action Plan for an Automotive Sector (5 March 2025), Steel and metals action plan, (March 2025), Chemical Industry Package (late 2025), Sustainable Transport Investment Plan, Bioeconomy Strategy |

# Norwegian government's response

## Ministry of Energy, Astrid Bergmål, State Secretary

# Concluding remarks and consequences for the industry

## Harald Solberg, CEO, Norsk Industri