



Den norske gassmaskinen er i stadig utvikling

Ola Nestaas, **Gassco**

Den norske gassmaskinen

Norsk gass eksporterte 1 350 TWh til Europa i 2022

Norsk rørgass landes nå i Skottland, England, Frankrike, Belgia, Tyskland og Danmark

Europas energikrise har satt norsk gass på dagsorden

[Gassco web](#)



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Ressursene på norsk sokkel

Equinor og Gassco lagt under sikkerhetsloven: – Naturlig at vi skjerper beredskapen

Sentrale selskaper i oljebransjen skal samarbeide tettere med myndighetene. – Kan få tilgang på gradert informasjon, sier statsminister Jonas Gahr Støre.



Statsminister Jonas Gahr Støre har tatt grep for å øke beredskapen på norsk sokkel etter lekkasjene i Østersjøen. TERJE BENDIKSEY / NTB

Av Kjetil Malkenes Novland og Martha Holmes
Oppdatert 28. september

DN

DN

Ekspert om gasslekkasjene i Østersjøen: – En advarsel til Norge og Europa

Den franske gassspert Thierry Bros sliter med å se for seg andre ansvarlige enn Russland, men vil ikke trekke forhastede konklusjoner. – Jeg forstår ikke helt, innrommer han.

2 MIN | PUBLISERT: 27.09.22 – 14.08 | OPPDATERT: 19 DAGER SIDEN



01:08 Se videoen: Her er gasslekkasjen i Østersjøen


Mikael Holter | Følg meg

Energ

– sikkerheten på norsk sokkel er høy

Olje- og energiminister Terje Aasland sier de ikke vet mer om årsakene til lekkasjen. Professor mener trusselbildet for petroleumssektoren har endret seg.

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Olje- og energiminister Terje Aasland deltar på åpningen av Statoil Pipe-varianteringen i Østersjøen tirsdag. Statsoverveierne i Danmark og Polen var også til stede. (Foto: Olje- og energidepartementet)

Katrine Nordanger Mjelde og Jonas Solgård

Mandag kveld ble det oppdaget en lekkasje på Nord Stream 2, og tirsdag morgen ble det bekreftet at også Nord Stream 1 lekker – på to steder. Folke tyske medier er det mistanke om sabotasje.

franceinfo | vidéos radio jt magazines | ENSEIGNEMENT | EMPLOI

"Nous devons nous inquiéter" : après le sabotage de Nord Stream, les producteurs norvégiens renforcent la sécurité de leurs gazoducs

Depuis le début de la guerre, la Norvège est devenue le premier fournisseur de gaz en Europe. Les revenus issus de l'industrie gazière et pétrolière ont été multipliés par trois cette année.

Boris Hallier, @Kopernik - franceinfo
Radio France

Publié le 30/09/2022 12:37 | Temps de lecture : 3 min.



Photo: Lucernum, PDS de Dessau, entreprise qui opère les 9 000 kilomètres de gazoducs entre la Norvège et l'Europe. (BORIS HALLIER / RADIO FRANCE)

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Brent spot \$87.30 +1.63%	Brent futures (1 mo) \$87.28 +2.00%	WTI spot \$81.70 +1.86%	WTI futures (1 mo) \$81.63 +2.06%	UK Nat Gas (1 mo) 348.00p +3.4%
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SAFETY | See all articles

Alert me about Safety



Norwegian police investigate new drone sighting at oil installations

Kaarsto plant exports gas via the Europipe 2 pipe, where Equinor-mandated security checks were just completed





“Tysk-norsk energisamarbeid”

Pressemelding fra [Regjeringen](#) i september 2023;
Vi tar hydrogensamarbeidet ett skritt videre

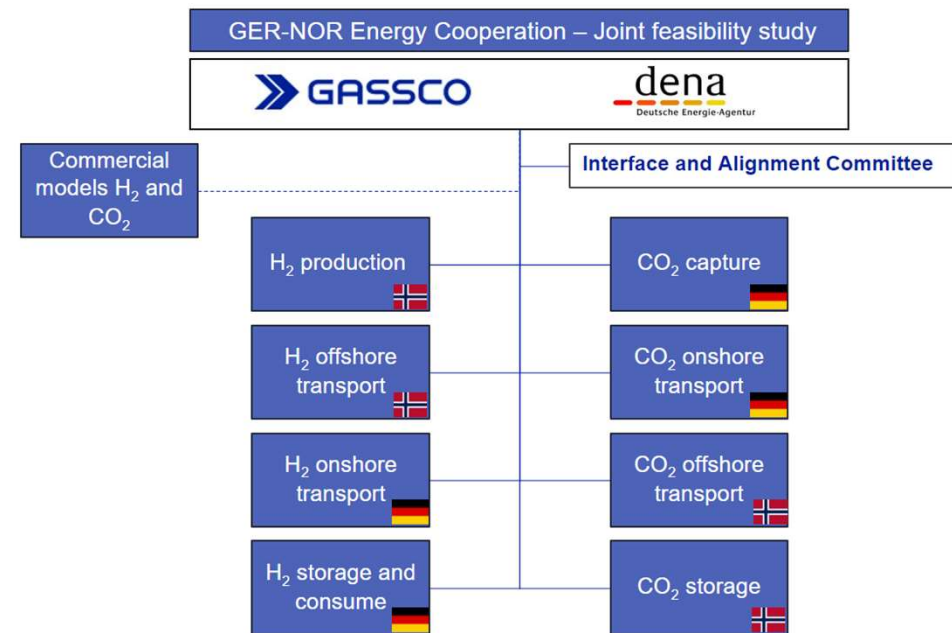


European Hydrogen Backbone
Potential transport routes-2030

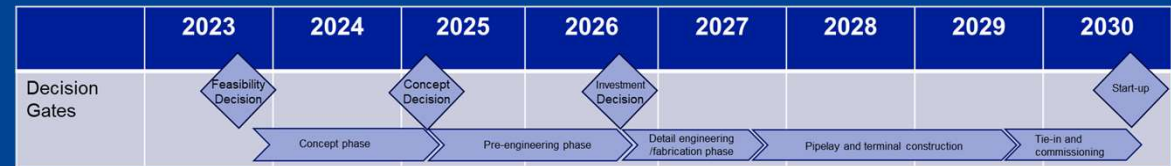
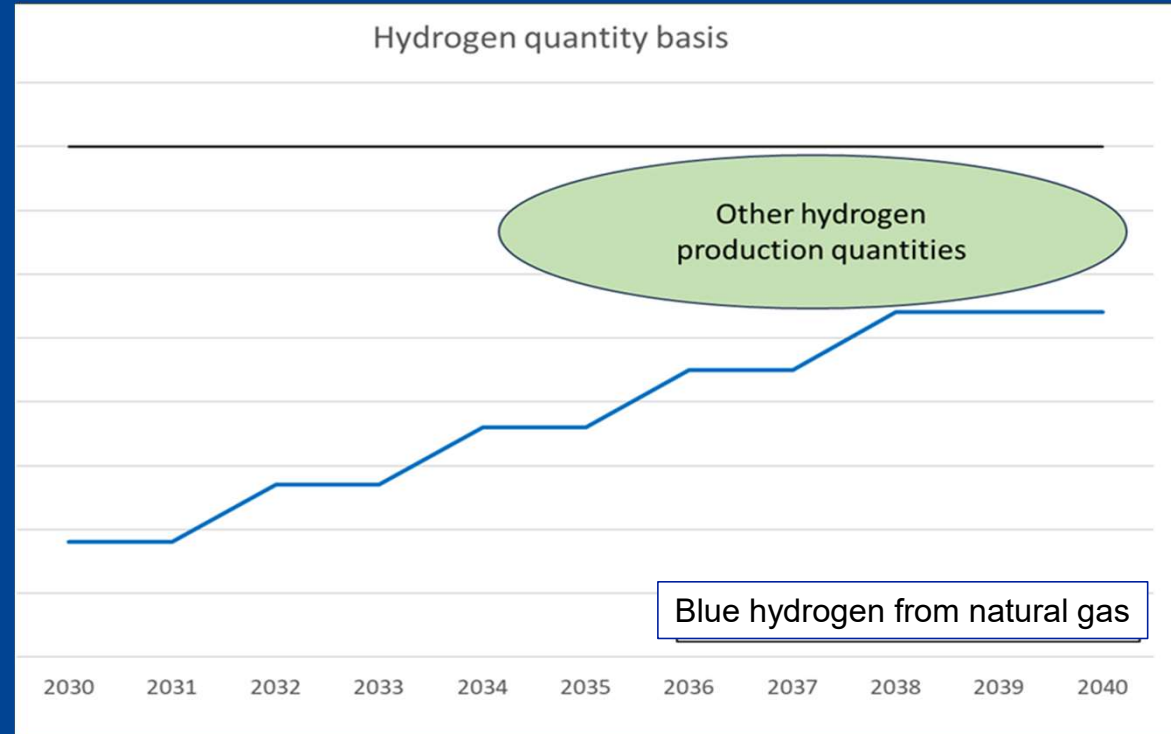
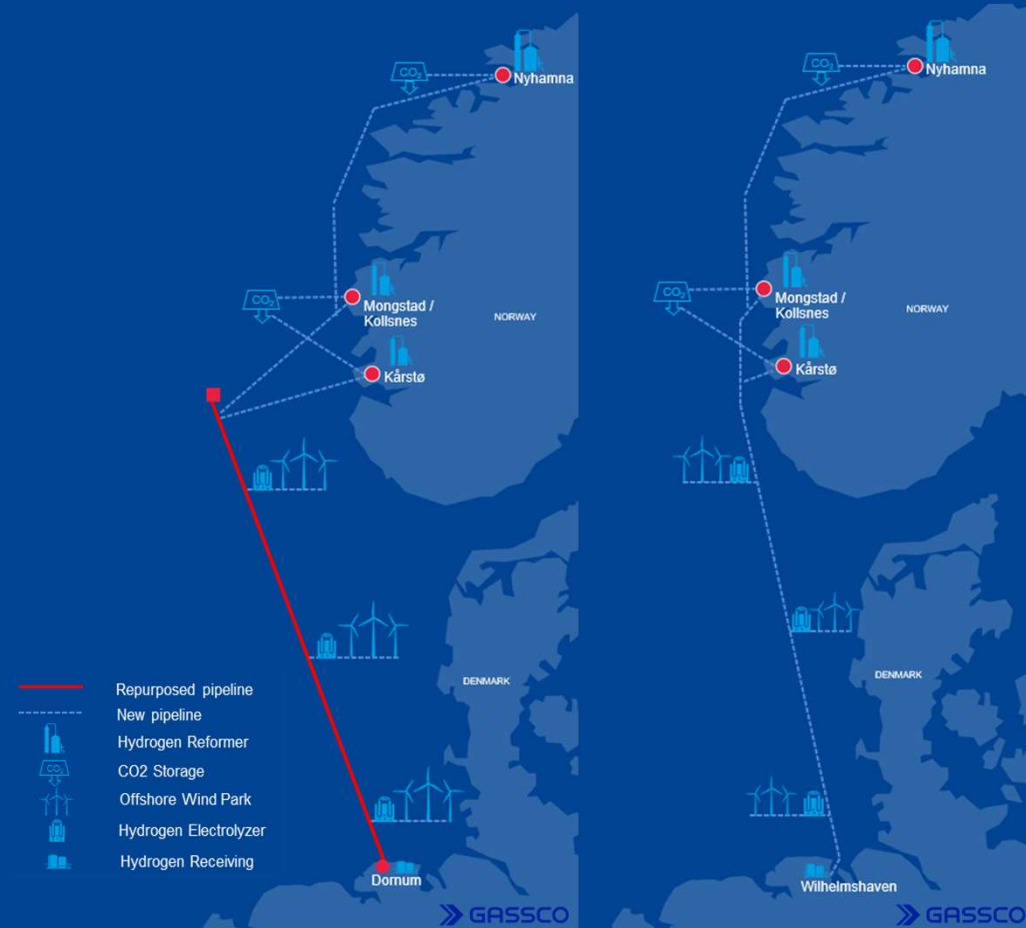


GER-NOR Energy Cooperation – Joint feasibility study

The objective of the joint feasibility study is to verify the viability of a GER-NOR hydrogen and CO₂ value chain.



Produksjons- og transportløsninger for H₂ kartlegges



Hydrogen Value Chain

- Hydrogen produced in Norway can have an ultra-low carbon footprint
- Hydrogen production and export from Norway is reliant on access to renewable power:
 - 1 kg blue H₂ requires ~3.5 kWh
 - 1 kg green H₂ requires ~60 kWh

New Value Chain HYDROGEN

LOW CARBON HYDROGEN

3.4 Kg Natural gas
3.5 KWh Electricity
6 l Water

→ 1 Kg Hydrogen
8-10 Kg CO₂ CCS

INPUT → **OUTPUT**

Electricity 1 GW → Installed Capacity 12 GW
Hydrogen 3 MTPA
CO₂ approx 25 MTPA

Approx 15 BCM of Natural gas is needed to produce 3 MTPA of Hydrogen

Energy density 1 Kg
Natural gas 15.4 kWh
Hydrogen 33.3 kWh

Density 15m³ m³ m³ m³
Natural gas 0.7 Kg
Hydrogen 0.1 Kg
CO₂ 2 Kg

RENEWABLE HYDROGEN

60 KWh Electricity
12 l Water

→ 1 Kg Hydrogen

INPUT → **OUTPUT**

Electricity 6.5 GW → Installed Capacity 4 GW
Hydrogen 1 MTPA

Offshore Wind Production
13 GW of capacity would be required to supply 6.5 GW

FROM CAPACITY TO ANNUAL PRODUCTION

To calculate how many Giga or Tera Watt hours can be generated by a facility with a given Installed Capacity, the formula below can be used. This will take you from MW to GWh and from GW to TWh.

INSTALLED CAPACITY × 9* × CAPACITY FACTOR = ANNUAL PRODUCTION

CAPACITY FACTOR		EXAMPLES	
Actual vs Theoretical output			
Onshore wind	≈ 30%	Onshore wind - Installed Capacity 13 GW	13 x 9 x 30% (CF) ≈ 35 TWh
Offshore wind	≈ 50%	Offshore wind - Installed Capacity 13 GW	13 x 9 x 50% (CF) ≈ 58.5 TWh
Hydrogen production (Low carbon and Renewable)	≈ 90%	Hydrogen production - Installed Capacity 12 GW	12 x 9 x 90% (CF) ≈ 90 TWh
		Hydrogen production - Installed Capacity 4 GW	4 x 9 x 90% (CF) ≈ 30 TWh

CO₂ FOOT PRINT

Production of 1 Kg Hydrogen using low carbon electricity in Norway

Low Carbon Hydrogen	0.6 - 1.1 Kg CO ₂ / Kg H ₂	Renewable Hydrogen	0.1 - 0.8 Kg CO ₂ / Kg H ₂
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Norwegian annual electricity production 140 TWh

* All energy described here is the Lower Heating Value (LHV) for Hydrogen. A combustion process produces water vapor and condensing this water vapor releases a significant amount of energy. The High Heating Value (HHV) efficiency calculation includes the energy while the Low Heating Value (LHV) calculation does not.

* Hours in a year divided by 1000

Note: Many of the numbers on this poster have been rounded to make things simpler.

3 MTPA LOW CARBON HYDROGEN

could be produced using clean electricity and approx. 10-15% of the current NATURAL GAS EXPORT

This process would capture ~25 MTPA CARBON

+

1 MTPA RENEWABLE HYDROGEN

could be produced using OFFSHORE WIND using electrolysis. This would need a minimum of 650 20MW offshore wind turbines

=

4 MTPA HYDROGEN

Supplied to Europe 120 TWh¹

=

10 MTPA HYDROGEN

is the RePowerEU goal

This means the 4 MTPA of Hydrogen supplied to Europe would cover 40% of the RePowerEU import goal

CO₂ offshore transport (CO2T) feasibility study

- Large scale CO₂ transport from hubs in Wilhelmshaven and Zeebrugge to NCS storages
- 20-30 MTPA CO₂ per hub → 40-60 MTPA total transport capacity
- CO₂ from both hubs assumed stored at any of the NCS storage locations
- Feasibility study report scheduled by end 2023

Alternative A:
Combined pipeline



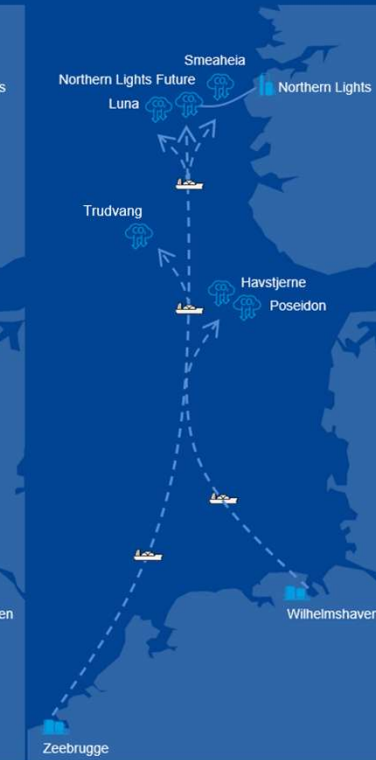
Alternative B1:
Dedicated pipelines



Alternative B2:
Europipe repurposed



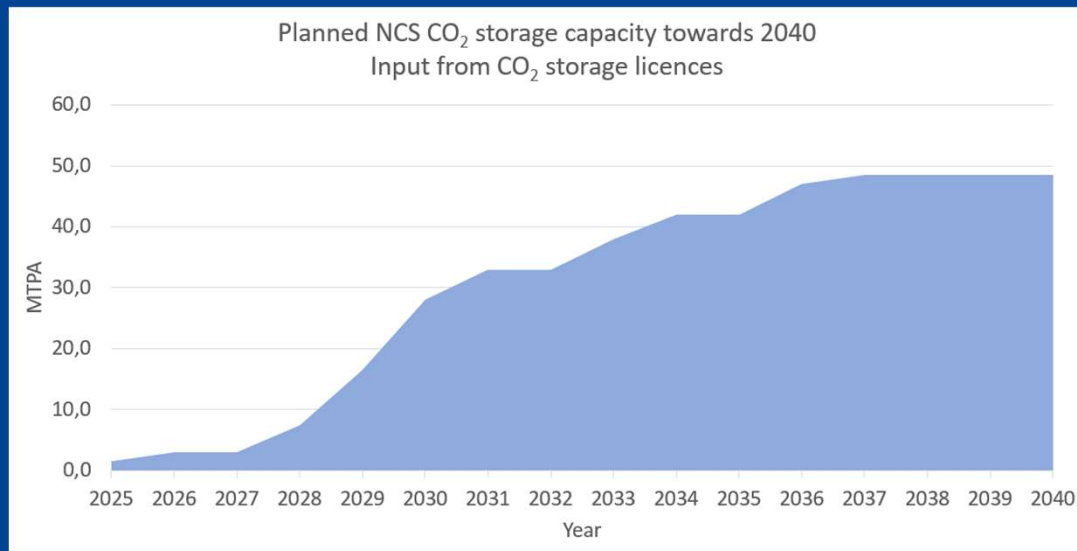
Alternative C:
Ship transport



- Repurposed pipeline
- New CO₂ pipeline
- - - Branch-off lines
- 🚢 CO₂ Carrier
- 🌊 CO₂ Storage
- 🏢 CO₂ Hub



CO₂ storage



Securing energy supply

By sustainable operations and development



Safe, reliable and effective

- Safety culture
- Asset integrity
- Security
- Competitive assets
- NCS system optimisation



Create infrastructure for the future

- Efficient and timely development
- Competitive NCS model
- New value chains



Reduce climate impact

- Energy management
- Reduce emissions

People – Competence – Organisation

Takk for oppmerksomheten!

