

# Nordic recommendations on Hydrogen, CCS, CCUS and E-fuels

- Report: Hydrogen, electrofuels, CCU and CCUS in a Nordic Context, 2022
- Workshop series

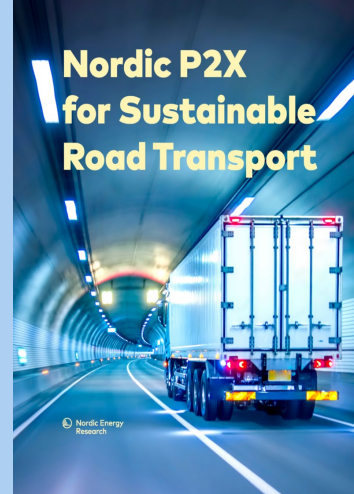
# Hydrogen, electrofuels, CCU and CCUS

## Completed:

- Sustainable Aviation Fuels - e-fuels
- SHIFT - flagship programme

## Ongoing:

- Report, workshop series
- NGCCUS – Networking Group for CCUS
- NMTEP – Phase 1, Maritime Transportation and Energy Programme
- Nordic hydrogen valleys as energy hubs – focus on ports



# Nordic level, I

- Involve stakeholders to address financial, technical, regulatory challenges
- Develop a Nordic model for hydrogen distribution and storage
- Develop the skills needed for hydrogen & electro-fuel production & CCUS





# Nordic level, part II

- Establish financial incentives: CO<sub>2</sub> -pricing, taxation, or reversed auctioning
- Develop a Nordic network for carbon storage facilities
- Collaborate on regulatory measures, incl. Art. 6 of the London Protocol
- Develop cross-Nordic training programmes
- Map the Nordic potential for biomass





# Bergen workshop

## Objectives:

- Strengthening Nordic collaboration on CCUS
- Public Perceptions of Carbon Capture and Storage
- Legal framework for CCS and CCUS - Regulatory barriers and opportunities
- Nordic opportunities to reach scale and speed

**Hydrogen, electrofuels,  
CCU and CCS  
in a Nordic context**  
2022



# Take-away lessons from the Stockholm launch

- Predictability
- Permitting
- Pricing





# Fredericia workshop

## Objectives:

- Realising Circularity and Industrial Symbiosis
- Explore strategies to enhance public support and involvement
- Exchange of ideas how to speed up Nordic deployment, permitting - collaboration



# Take-away lessons from the Fredericia workshop

## - Creating an industrial symbiosis

By exchanging material, water, and energy streams between partners, [the] Kalundborg Symbiosis increases resilience and financial gains, while simultaneously reducing the environmental impact and expenses.

## - Civil engagement in the transition to green fuels

Emphasis on the importance of early citizen involvement, a fair and transparent decision-making, and the possibility of local ownership to avoid opposition and time-consuming conflicts, which risk slowing down the green transition, including the development and implementation of green fuels.

## - Early involvement of local politicians

Involving and continuously informing both local and national authorities as early as possible is absolutely crucial. Goal: To avoid NIMBY and BANANA.

<https://www.nordicenergy.org/article/take-aways-from-the-workshop-in-fredericia/>





# Events in 2023

## Vasaa

- Clean energy choices for reaching a carbon neutral Nordic region

## Reykjavik

- Rea

## Hydrogen, electrofuels, CCU and CCS in a Nordic context

2022





# Carbon Capture & Storage

- Existing oil and gas infrastructure, CCS under construction (Denmark and Norway)
- Iceland pilots on CarbFix and DAC
- Sweden and Finland might export CO<sub>2</sub>





Action on clean hydrogen [and electricity from renewables] is needed to deliver net-zero by 2050.

Here's how

[DAVOS 2022](#) May 23, 2022

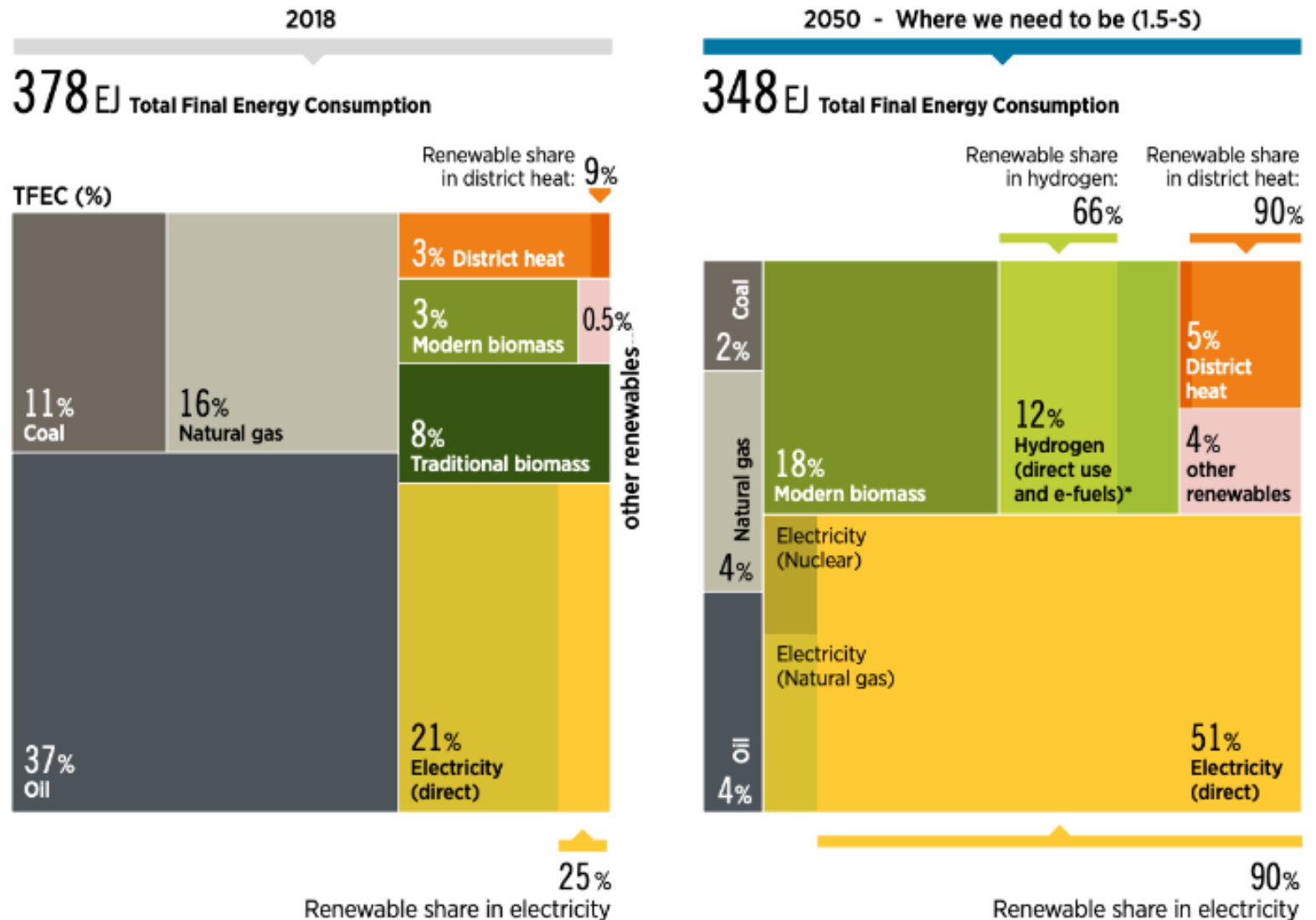
**Problem is:**

This only leads so far; experts suggest that the 1.5°C limit is likely to be reached between 2030 and the early 2050s, unless concerted action to reduce greenhouse gas emissions is taken. 22. feb. 2021

Limiting warming to around 2°C (3.6°F) still requires global greenhouse gas emissions to peak before 2025 at the latest and be reduced by a quarter by 2030. IPCC April 2022



**FIGURE 2.4** Breakdown of total final energy consumption (TFEC) by energy carrier in 2018 and 2050 (EJ) in the 1.5°C Scenario



Clean hydrogen and its derivatives will account for 12% of final energy consumption by 2050, Source: IRENA.



## Break-out session I:

### Business and technical opportunities - what would be reasonable?

Facilitator: Preben Birr-Pedersen

- \* Is CCS/CCUS a commercial venture or is there a need for a TSO and regulation?
- \* Can we deliver volume increase and reach a business scale on both Hydrogen and CO2 in the short term?
- \* Perceived and real barriers to CCS and CCUS, wish list of actions

## Break-out session II: CO2 capture and storage. Standardization, regulation, challenges and possibilities

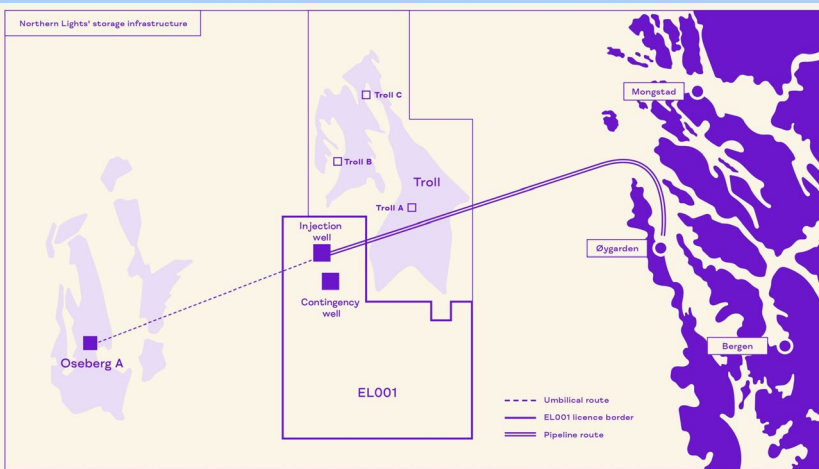
Facilitator: Ingvild Ombudstvedt, IOM Law

- \* Is CCS/CCUS a commercial venture or is there a need for a TSO and regulation?
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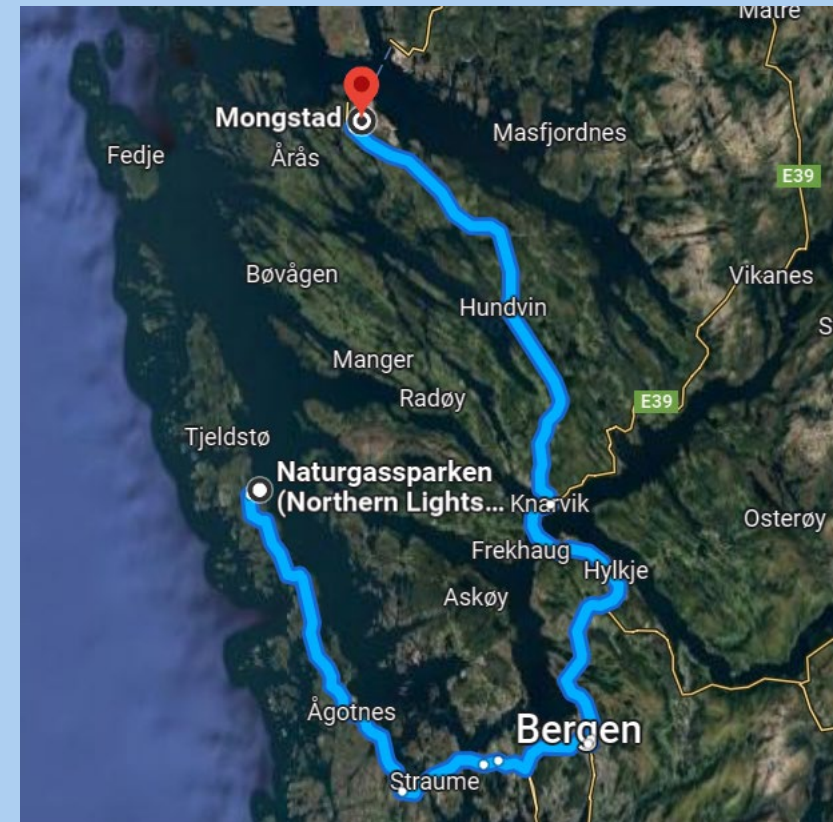
# Plenary

Outcomes of the breakout sessions  
Debate





# Northern Lights



# Site visits

# Technology Centre Mongstad





**Thank you for your attention!**



Nordic Energy  
Research

# Site visits - programme

9:00: Departure from Hotel Norge, Scandic, Nedre Ole Bulls Plass 4

10:00 –10:45: Presentation of Northern Lights

10:45 –11:15: Coffee Break

11:15 –12:00: Bus tour of Northern Lights' Facility

12:00 –13:00: Lunch and light refreshments

13:00 –13:45: The Nordic Networking Group on CCUS (NGCCUS), by Ane Gjengedal, Ministry of Petroleum and Energy, Norway, Chairwoman of NGCCUS

13:45: Walk to boat

14:00: Boat from Northern Lights to Technology Centre Mongstad

14:55: Arrival at Kilstraumen Brygge AS (boat)

15:00-15:45: Bus to TCMongstad and site visit (bus-tour)

15:45: Orientation by TCMongstad

16:15: Departure to Flesland and Bergen city (Sandwich on bus)

18:00: Arrival Flesland Airport depending on rush hour traffic

19:00: Arrival Bergen (downtown) - depending on rush hour traffic