



Northern Lights

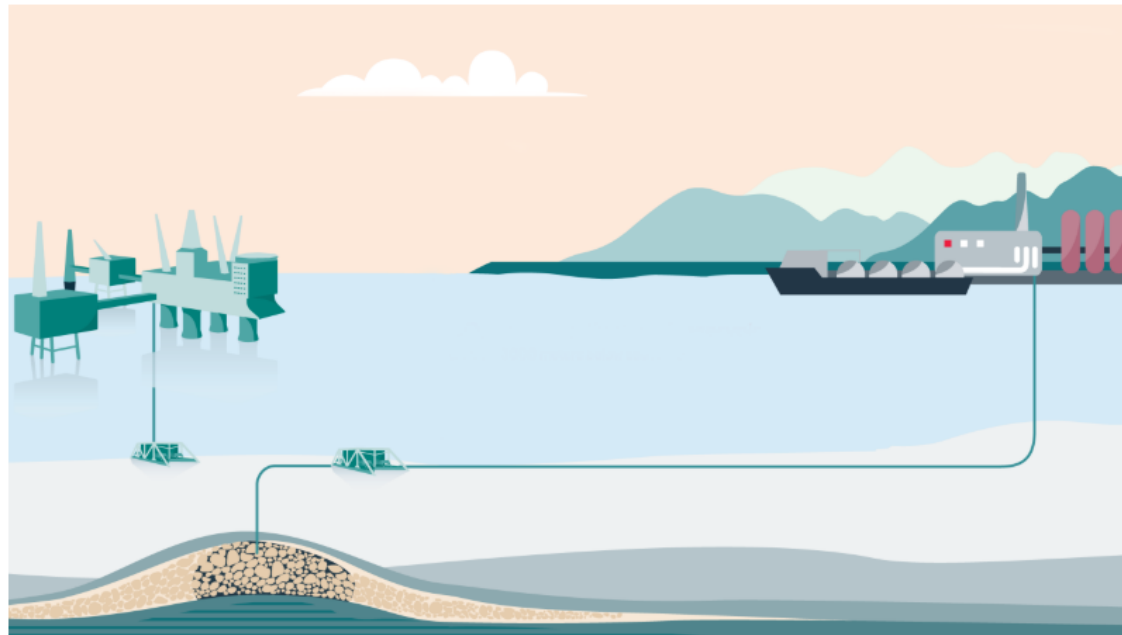
A European CO₂ transport and storage network

Facilities – Summit June 2020

Cristel Lambton

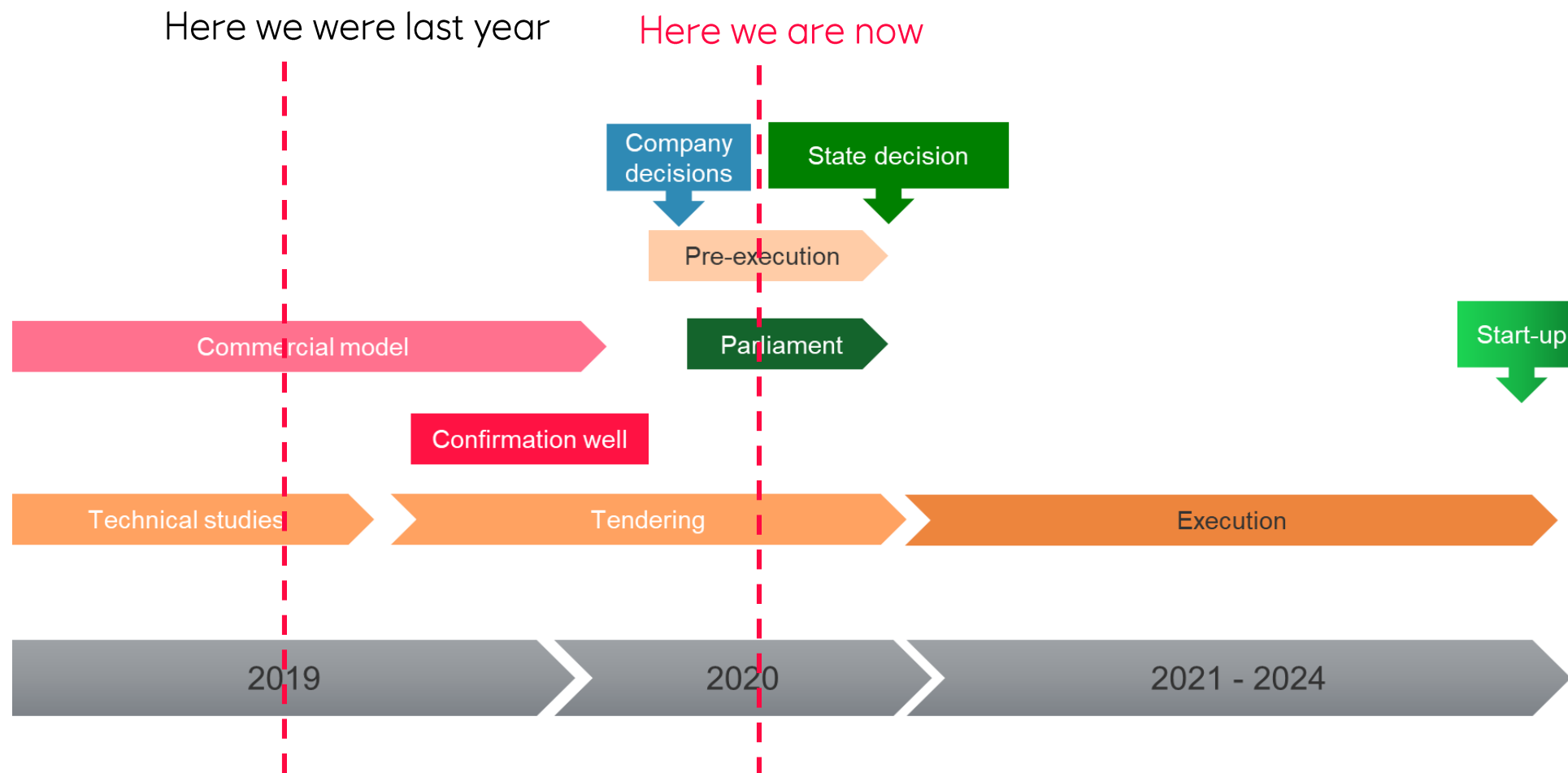
Historic investment decision for transport and storage of CO₂

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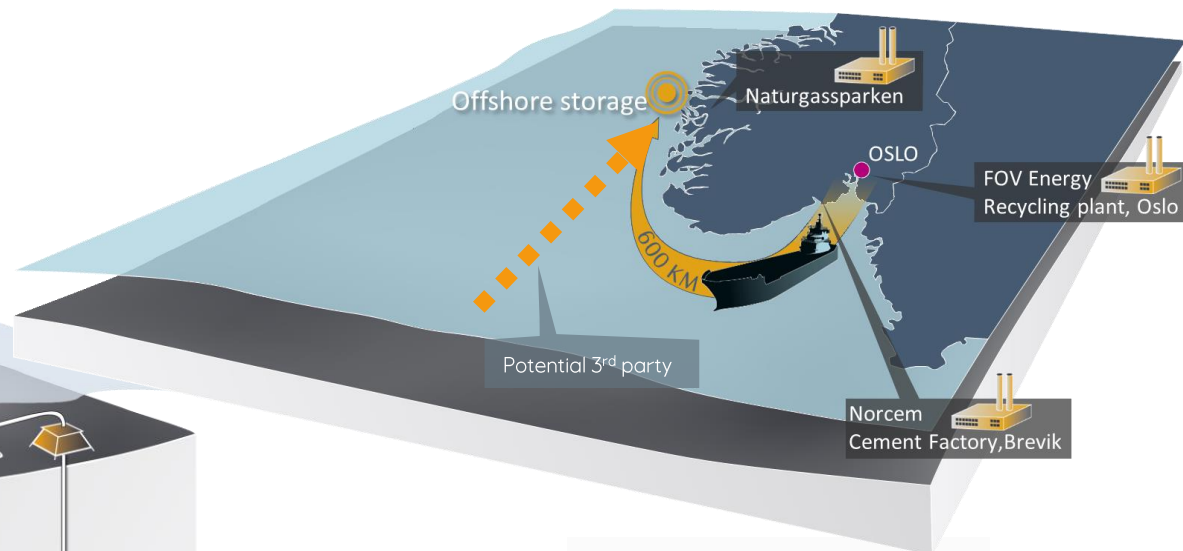
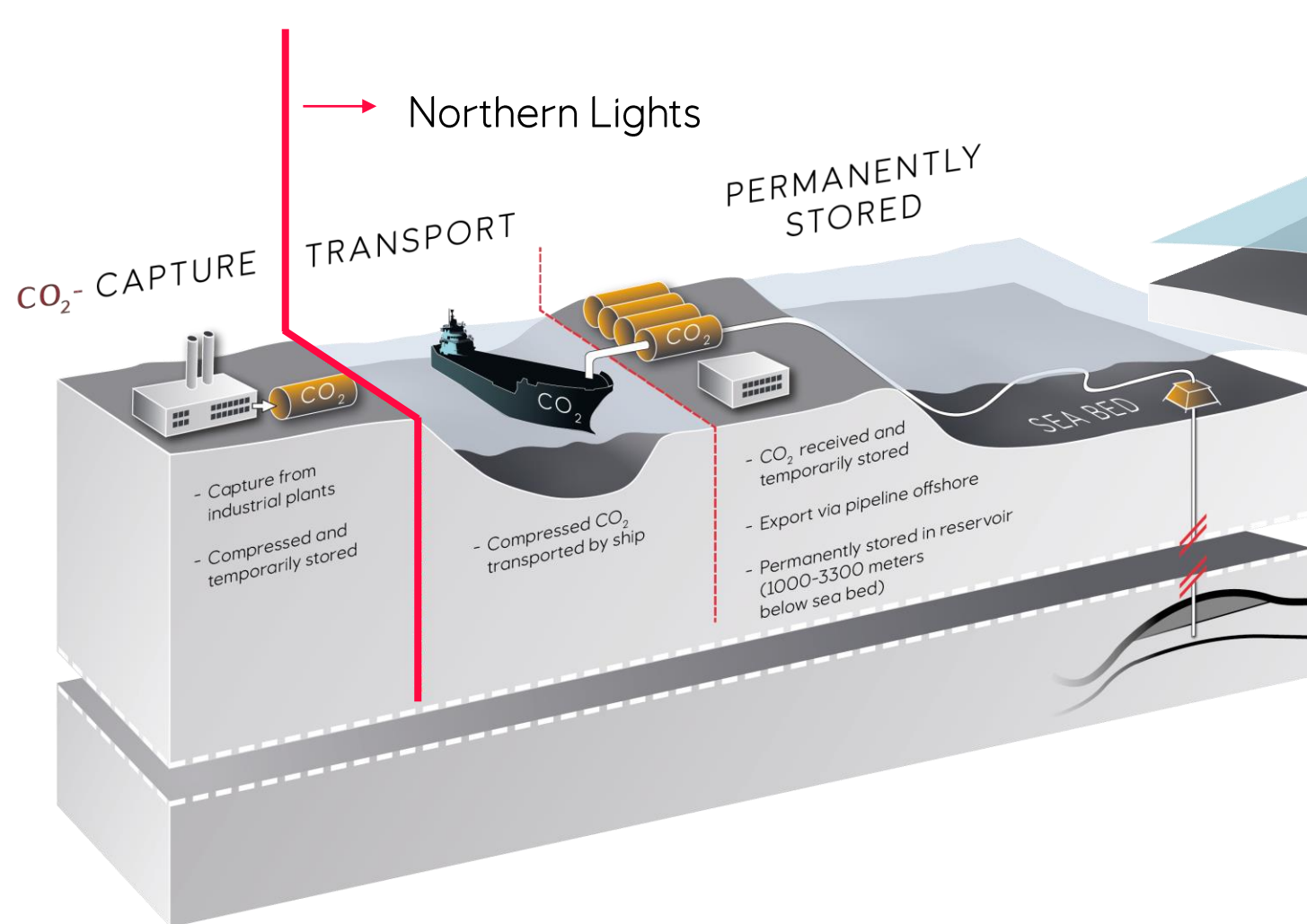


Equinor, Shell and Total have decided to invest in the Northern Lights project in Norway's first exploitation licence for CO₂ storage on the Norwegian Continental Shelf. Plans for development and operation have been handed over to the Ministry of Petroleum and Energy.

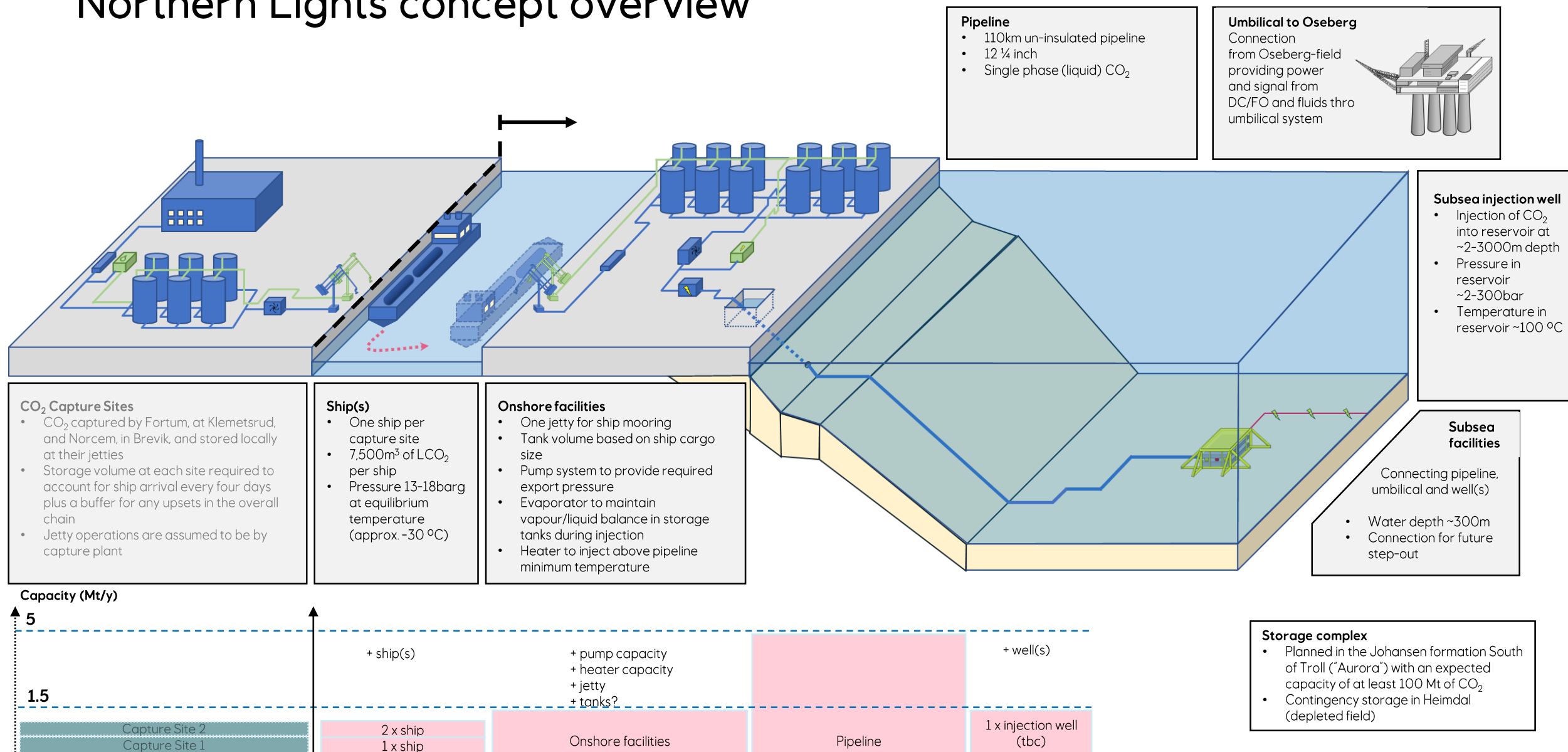
Northern Lights phase 1 schedule



Northern Lights – Transport, injection and permanent storage of CO₂



Northern Lights concept overview



Shipping engineering & design

- Scale-up food industry ships – proven technology
- Tender for 2 ships
- 7 500m³ FP LPG design
- Operation: 13-15barg (loading)
13-18barg (discharge)

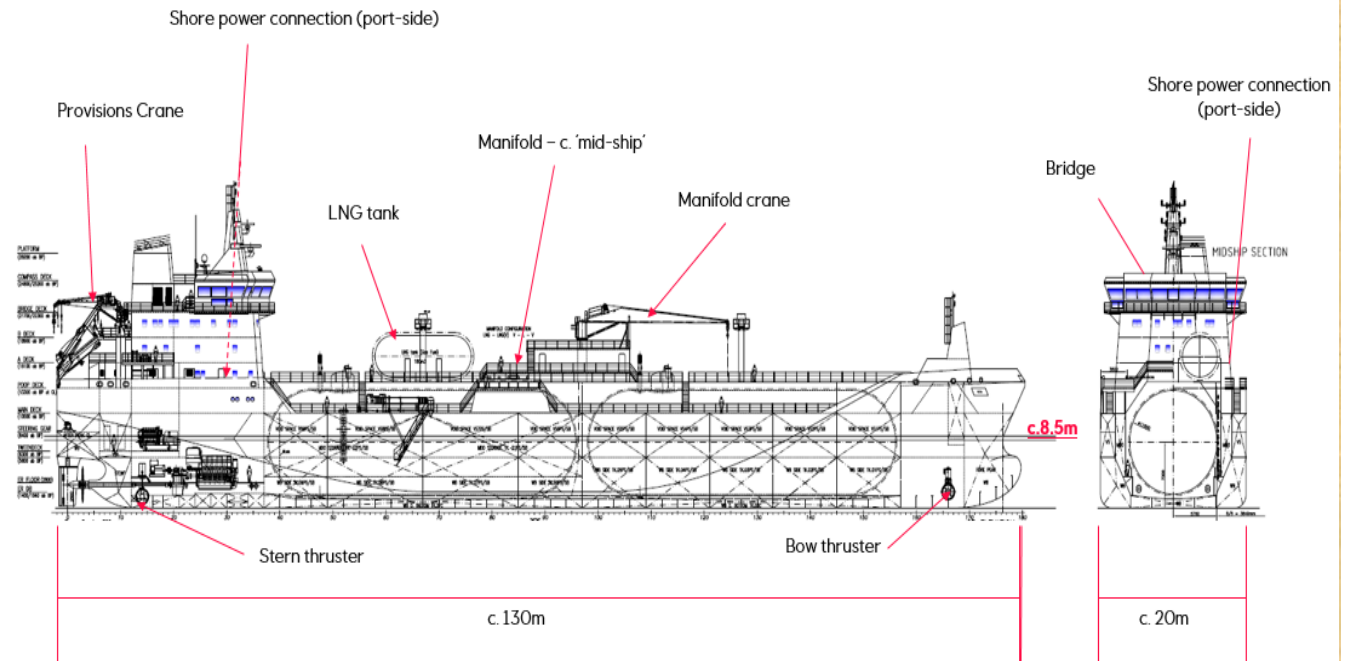
Efficiency optimisation through:

- Shore power supply
- 2 stroke BAT engines
- Optimal manoeuvring specification
- Simulation of CO₂ ops & berthing



Timeline ships

- Tendering currently ongoing
- CA planned 2021
- Construction works start 2022/23



Onshore facilities: design basis

- Located in Naturgassparken, Øygarden commune
- 1.5 MT/year of liquid CO₂
- Storage pressure and temperature of liquid CO₂ are 13-18 barg and -30 to -20 deg C.
- Purposely built for CO₂ handling
- Remotely controlled in normal operations
- Possibility to extend to future phases
- CA planned for Q4 2020
- Construction works start Q4 2020



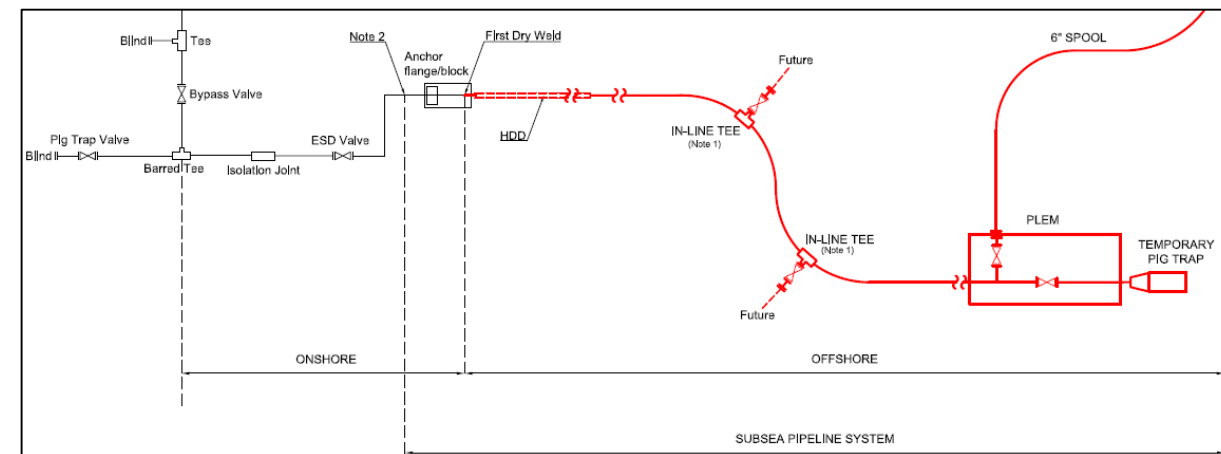
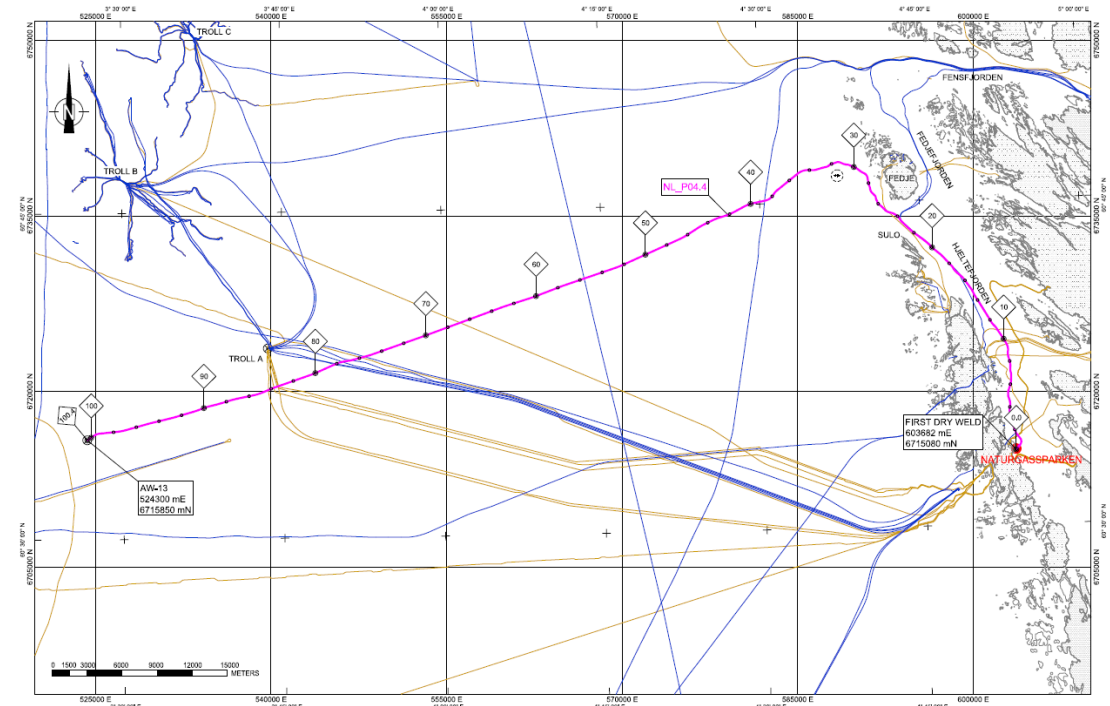
Onshore facilities: what are we building?

- Import jetty
- Storage tanks for CO₂
- Loading arms and equipment for transport of liquid CO₂
- Process systems
- Quality control for CO₂
- Substation
- Administration complex



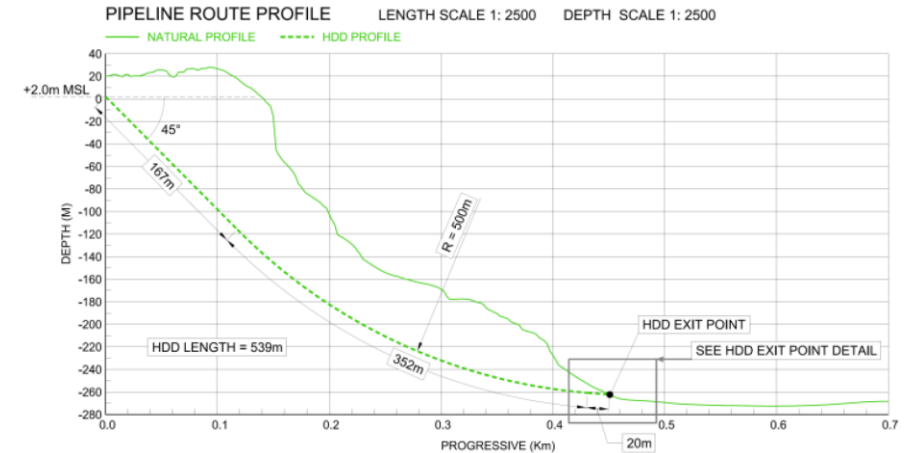
Pipeline: what are we building?

- 12" (OD) 100,4 km of C-Mn pipeline
- HDD tunnel with water circulation at landfall (-29°C)
- 1 PLEM, 2 In-line Tees, 1 spool
- Challenging nearshore section
- Offshore areas affected by intense fishing
- 27 crossings of other pipelines and cables



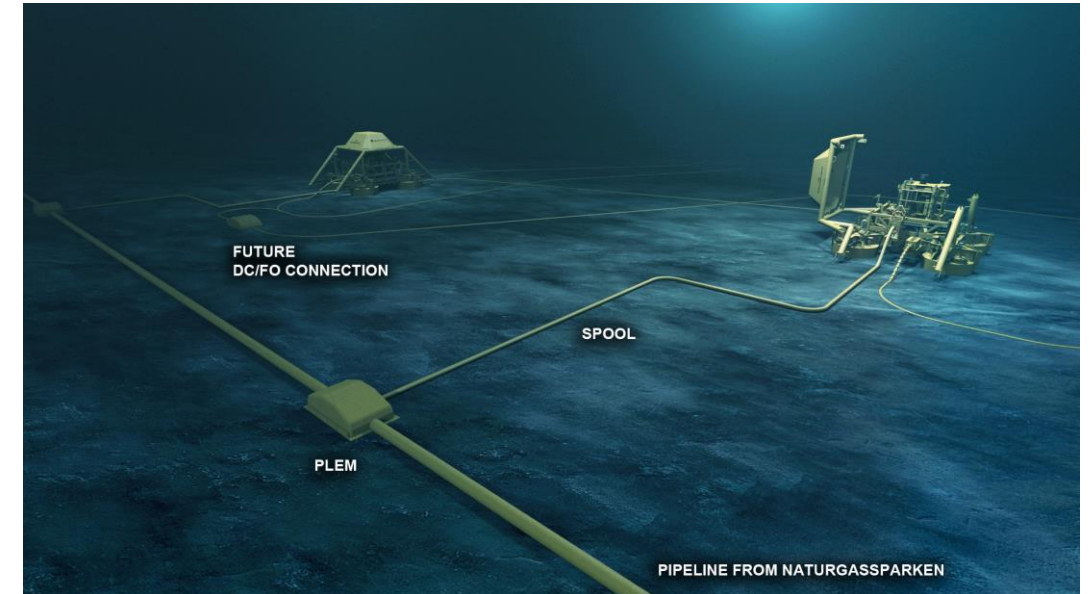
Pipeline status update

- Completed route selection
- Defined Horizontal Directional Drilling (HDD) at landfall
- Alternative solution for not heating CO₂ before injection
- Tees to prepare for extensions to other reservoir or other facilities connections
- Pipelay starts in 2023



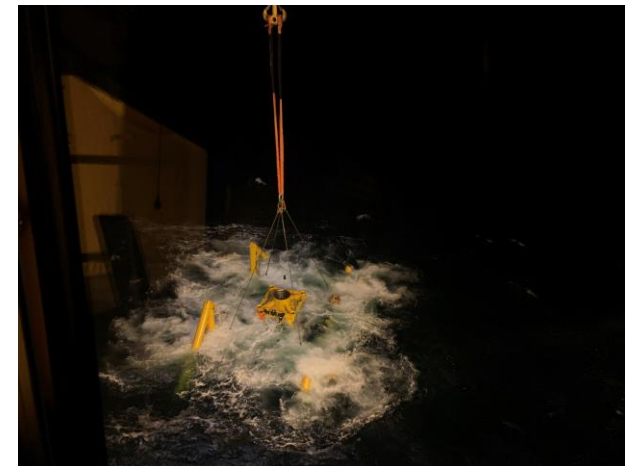
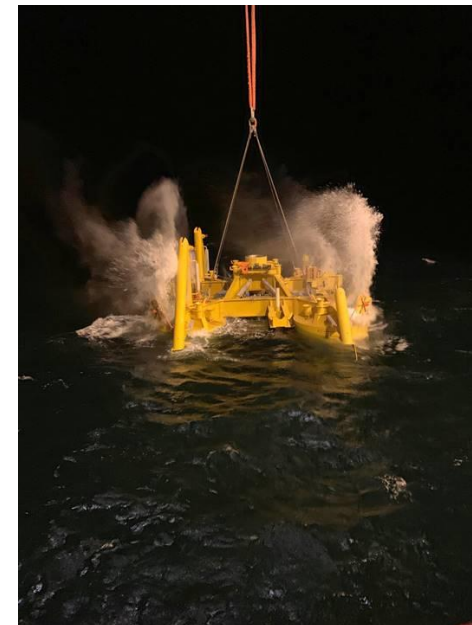
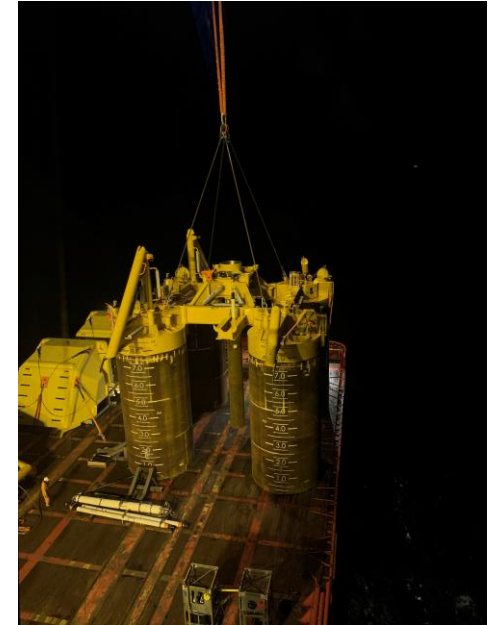
Subsea facilities: what are we building?

- 1 single well satellite structure incl. all subsea components and control system
- 1 fluid umbilical 36km (MEG and hydraulic)
- 1 DC/FO 36km (power and signal)
- Both to tie-in to Oseberg A platform
- Protection covers for overtrawlability
- Prepared for extension in daisy chain



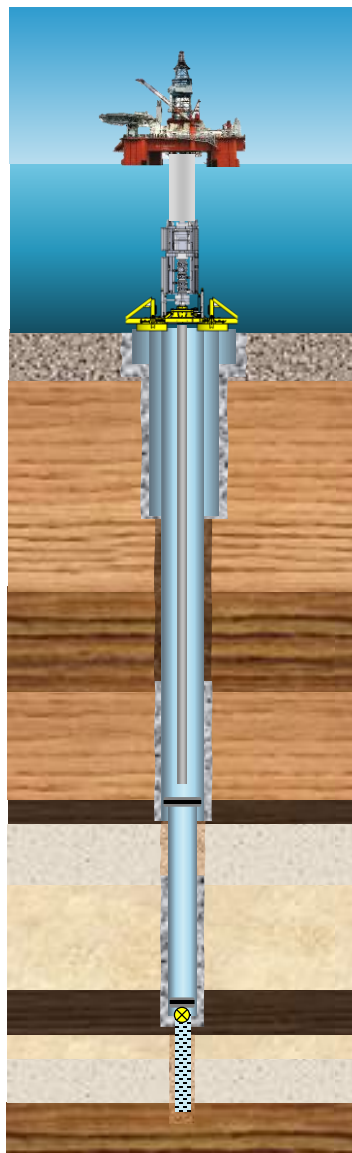
Subsea facilities status update

- Satellite structure fabricated August 2019
- Satellite installed at Eos at 300m water depth with ROV October 2019
- Routing for umbilical and DC/FO confirmed and surveyed.
- Post-FEED DC/FO study
- Preparations for ITTs. CA from 09 to 12.2020
- Installation works resume in 2022

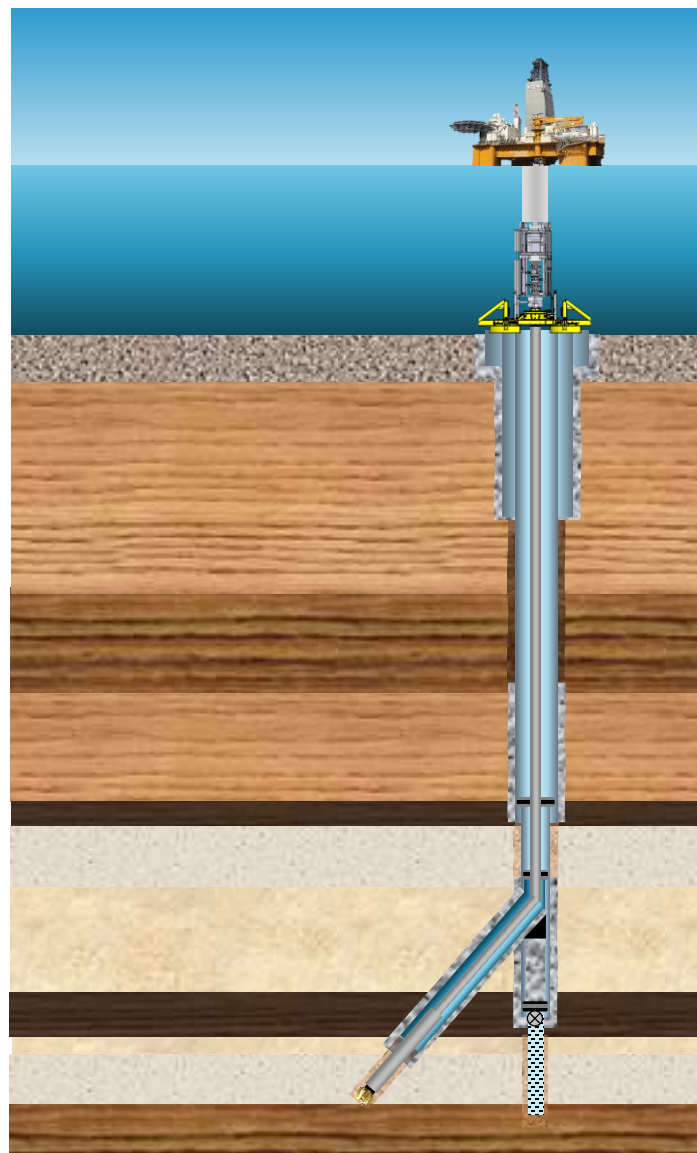


Eos 31/5-7 Confirmation well and CO₂ injector

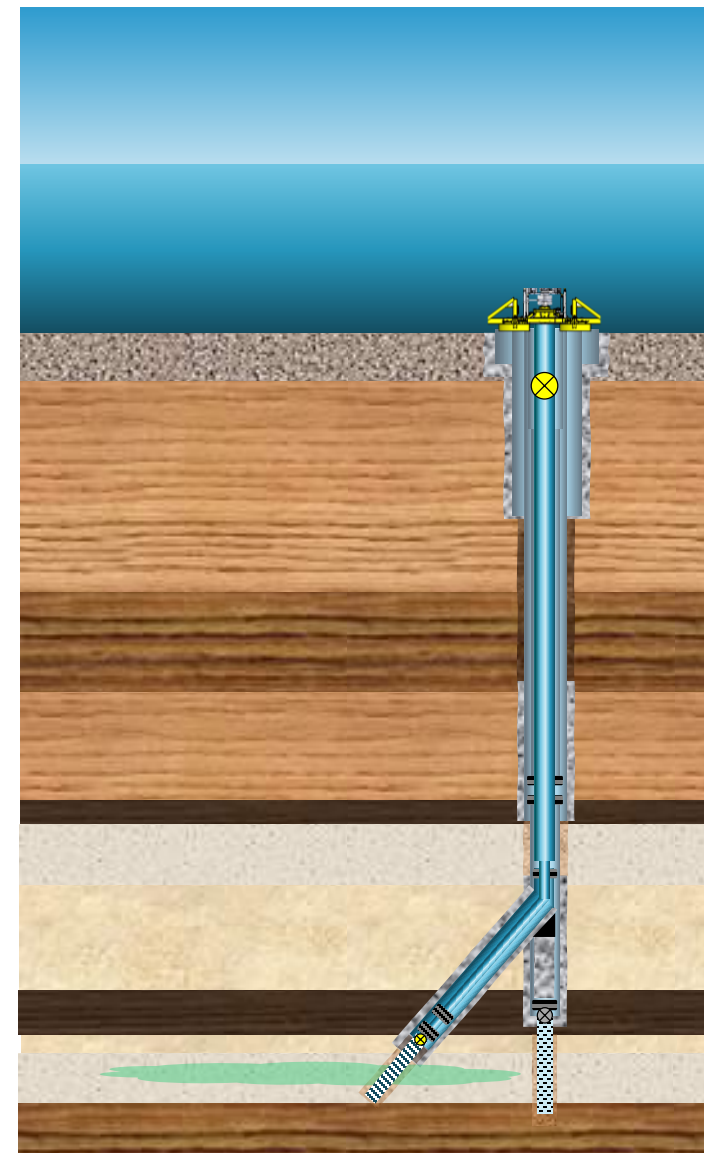
2020



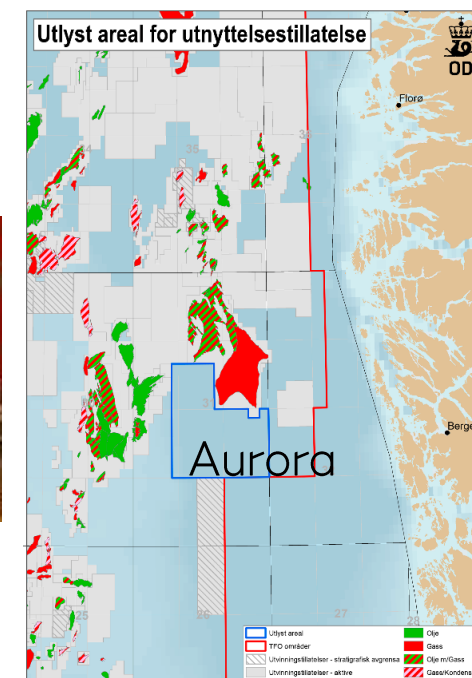
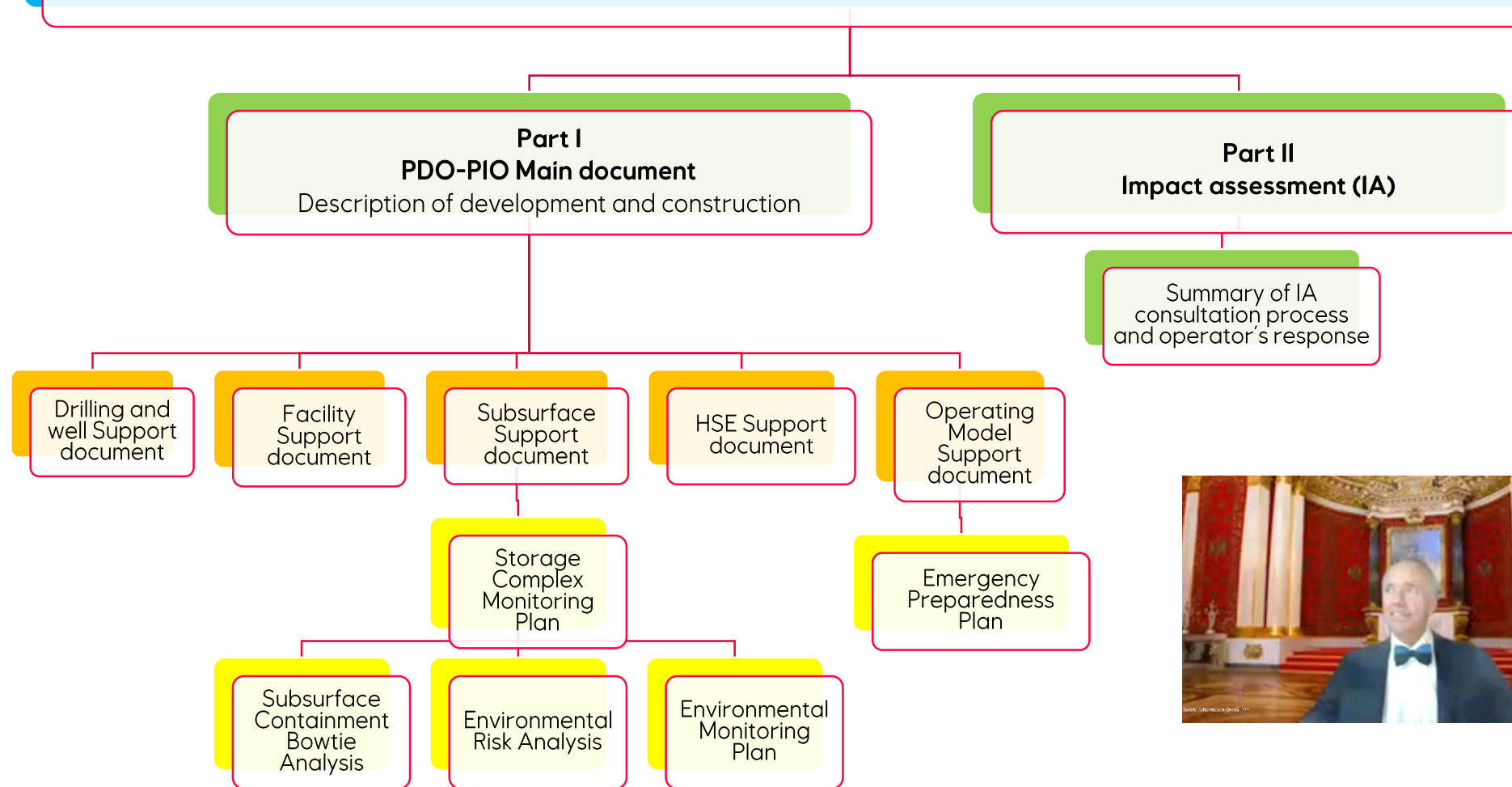
2022



2023 - 2048



Northern Lights Plan for Development & Operation, Plan for Installation & Operation





We'll be back soon...

