



CAPTIMISE

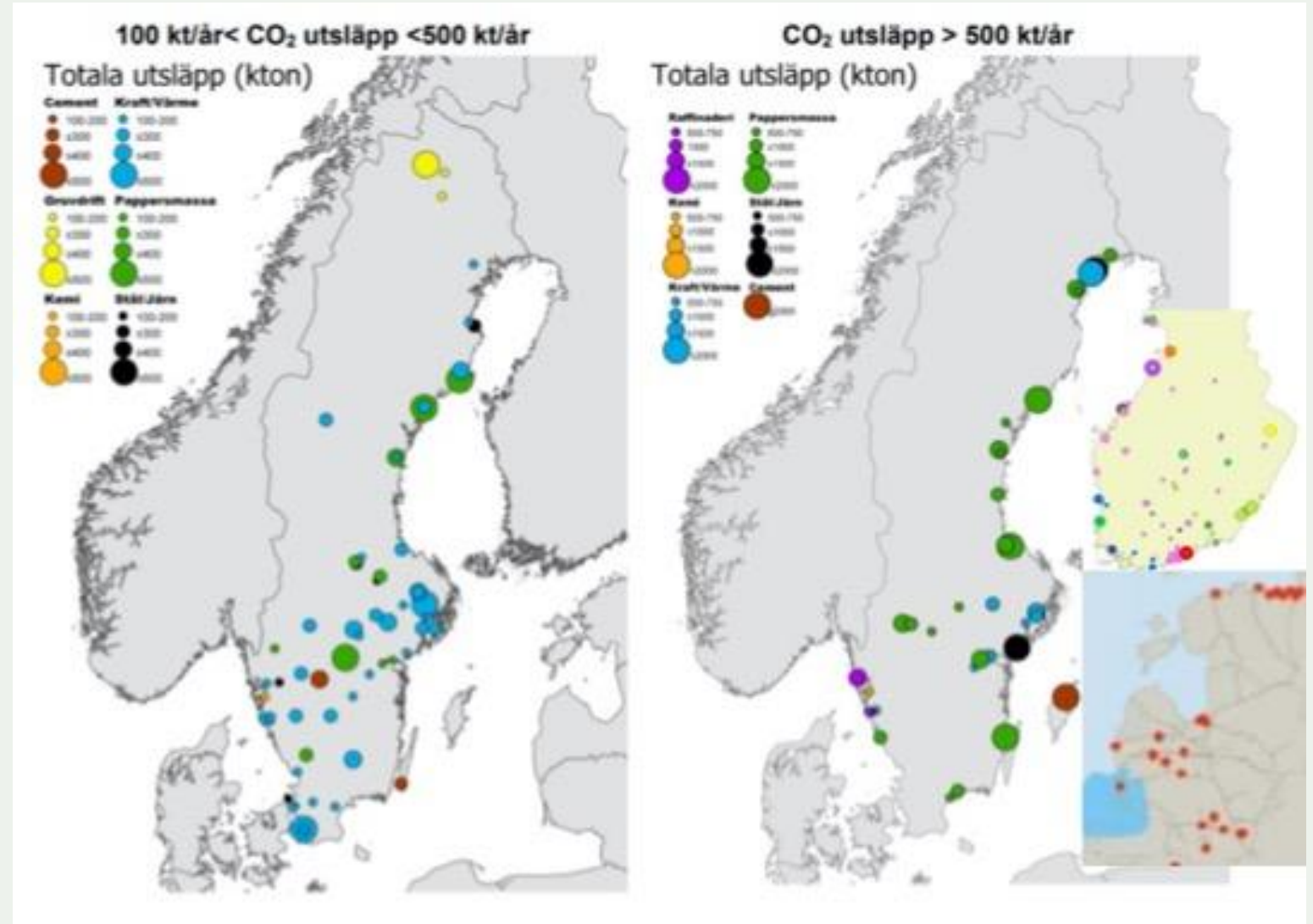
Optimizing and reducing
the cost for CCS



21 plants are planning for CCS, - only in Sweden!

Boden, Skellefteå, Sundsvall, Gävle, Korsnäs, Uppsala, Billerud, Stockholm, Västerås, Södertälje, Gotland, Skövde, Jönköping, Växjö, Lysekil, Göteborg, Halmstad, Helsingborg, Malmö

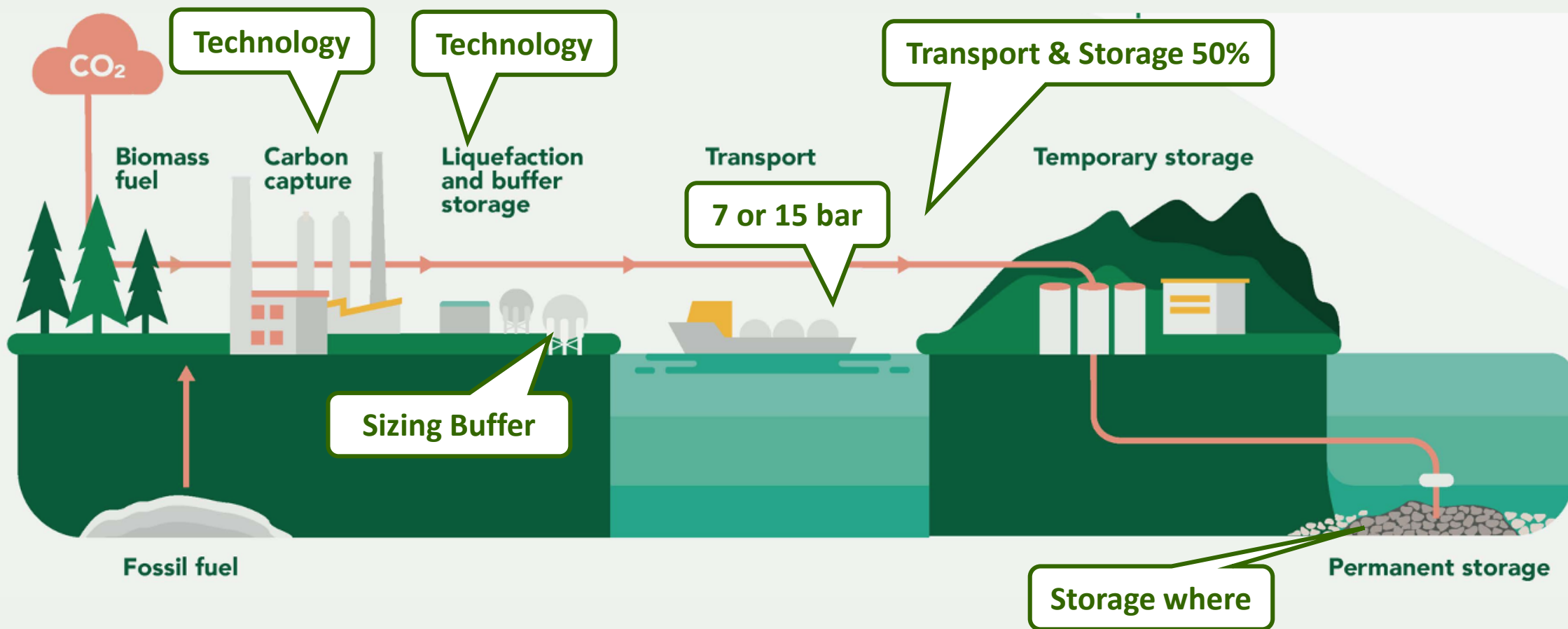
Go live between 2025 – 2030



F. Jonsson & J. Kjärstad, Avskiljning, transport och lagring av koldioxid i Sverige, 2019, Lauri Kujanpää VTT, GIS database



Complex chain of events





15+ Years of CCS experience



Mattias Jones
CEO and Co-founder

13+ years of CCS Engineering



Martin Rödén
CMO and Co-founder

13+ years of CCS Sales and Logistics



Ola Augustsson
Process Specialist

15+ years CCS Engineering



Jasmine Nordenström
Process Engineer

1+ year CCS Engineering & Logistics



Tejas L.K
Process Engineer

1+ years CCS Engineering



Henrik Nordlund
Software Dev.

1+ years of CCS Engineering & Logistics

Hands on CCS experience

1. **PFBC Power plant pilot** 1982-1987, 1 MW, ABB Carbon, Malmö
2. **Chemical test plants**, several pilot plants, 1991-2007, Perstorp
3. **Biomass gasification pilot**, 10 W, Värnamo, 2005-2007
4. **Hot Potassium Carbonate (HPC) Pilot** at Fortum PFBC, Stockholm, 2007-2008
5. **Chilled Ammonia (CAP)** testing at Stanford Research Institute USA 2007-2008
6. **CAP** 10 000 TPA at EON, Karlshamn, Sweden, 2008-2010
7. **HPC** Pilot at PFBC pilot in Pittsburg, Ohio, USA, 2010
8. **Amines**, 3 000 TPA at Dow, Charleston, WV, USA, 2009-2011
9. **Amines**, 10 000 TPA at EdF, Le Havre, 2014
10. **CAP**, 50 000 TPA at AEP, Mountaineer WV, USA 2010-2012
11. **Amines, CAP, Oxyfuel** Research 370 TPA at Växjö , Sweden, 2013-2018
12. **Oxyfuel** at Windsor CT, USA, 2013-2014
13. **Calcium looping**, joint development with University of Stuttgart Germany, 2014
14. **HPC** Demonstration Unit 370 TPA at Stockholm Exergi, Sweden, 2019-2021
15. **Combined Demo Unit 1 TPD for Amine, CAP and HPC**, Sweden, 2021



HPC



CAP



AMINE



Picture 4: EONCAP Karlshamn Pilot Facility

Picture 3: Mountaineer PVF

Picture 1: SRI Absorber Pilot

Picture 2: SRI Regenerator Pilot



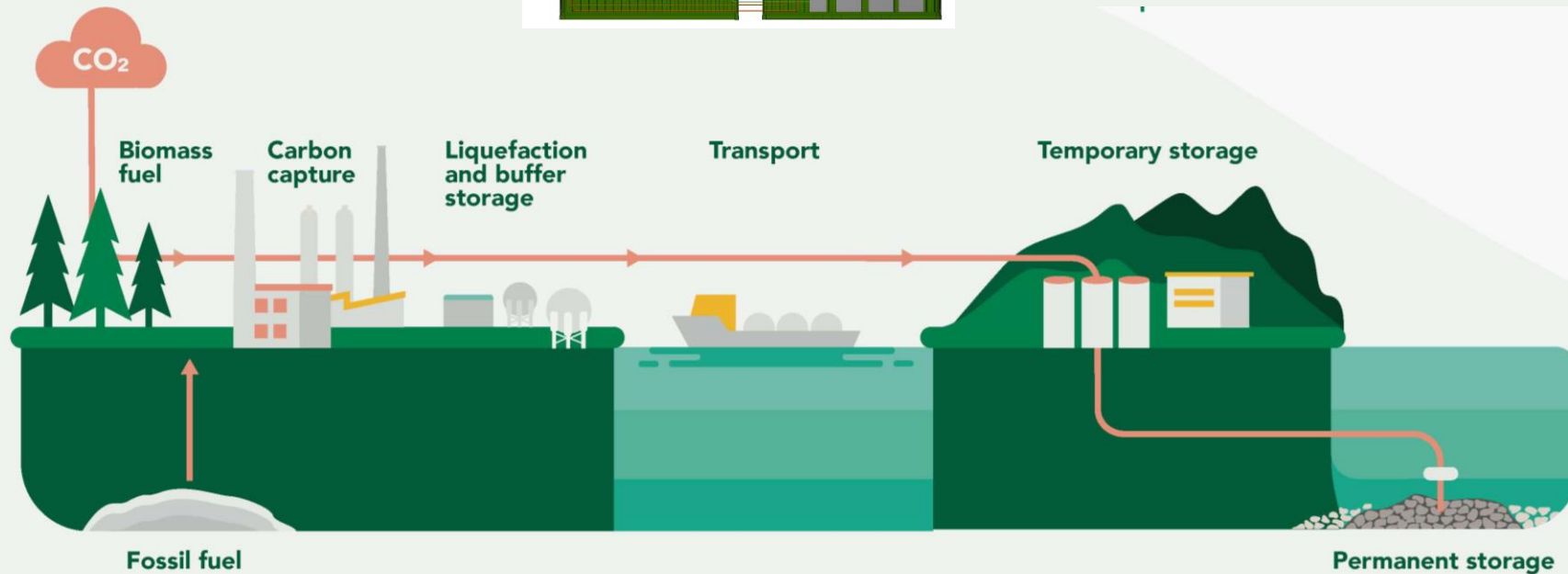
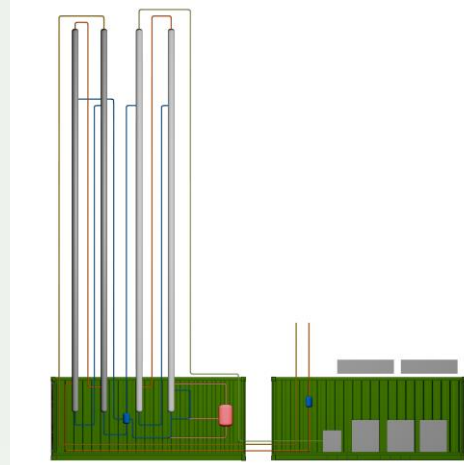


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Independent

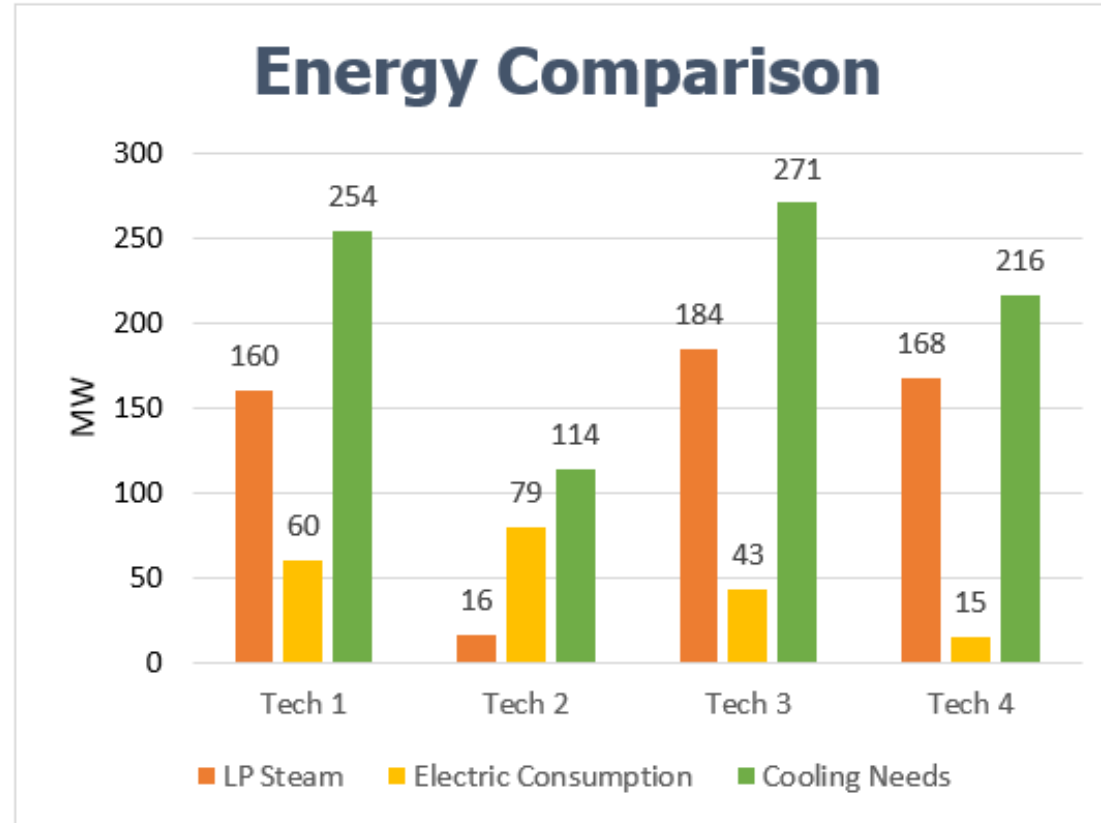
Feasibility
Studies

Demo Units



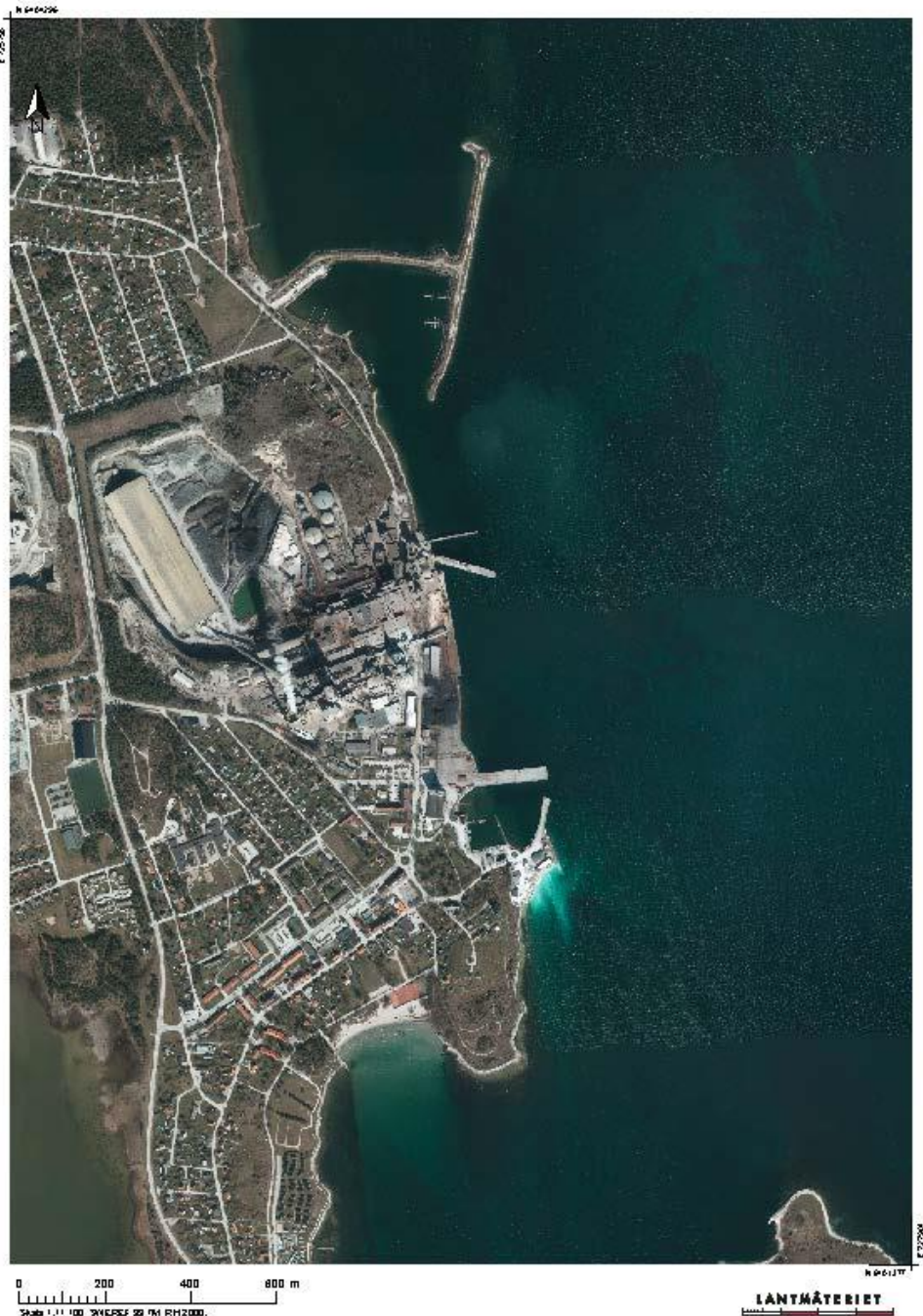
Screening of technologies ← plant

- Electricity
- Steam
- Hot Water
- Cooling



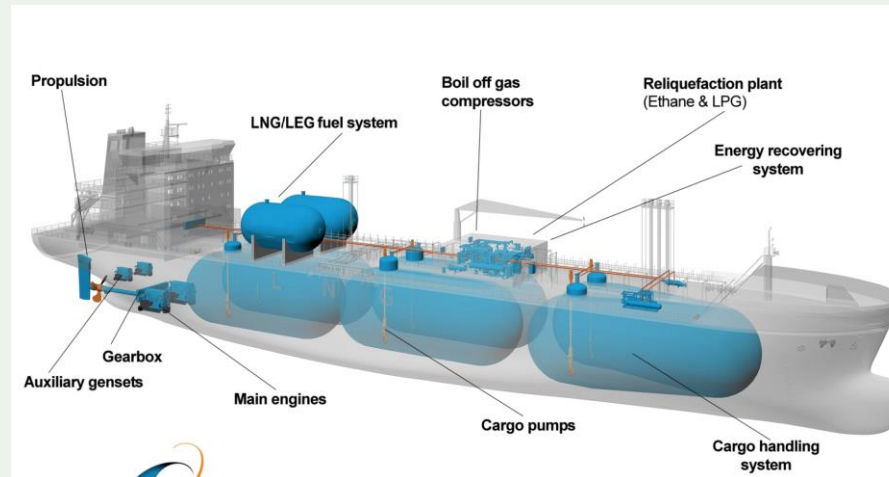
- Foot print
- HSE
- Timing
- Risk





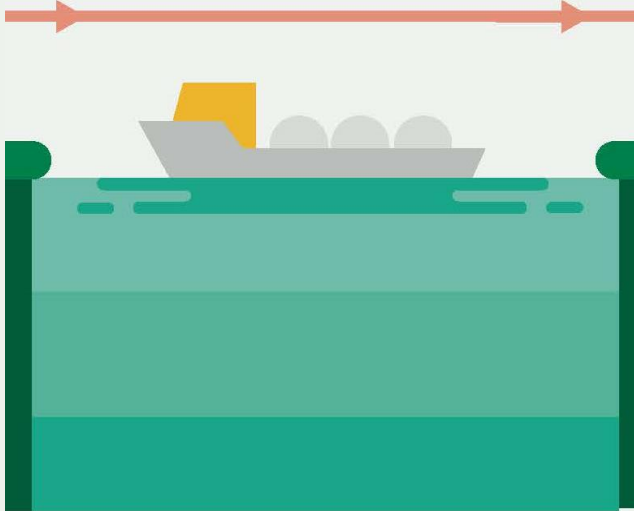
Harbour capacities

- Liquefaction unit
- Buffer Storage
- Out-shipment area
- Land-based transportation connections
- Capacity for inland regions too





Transport



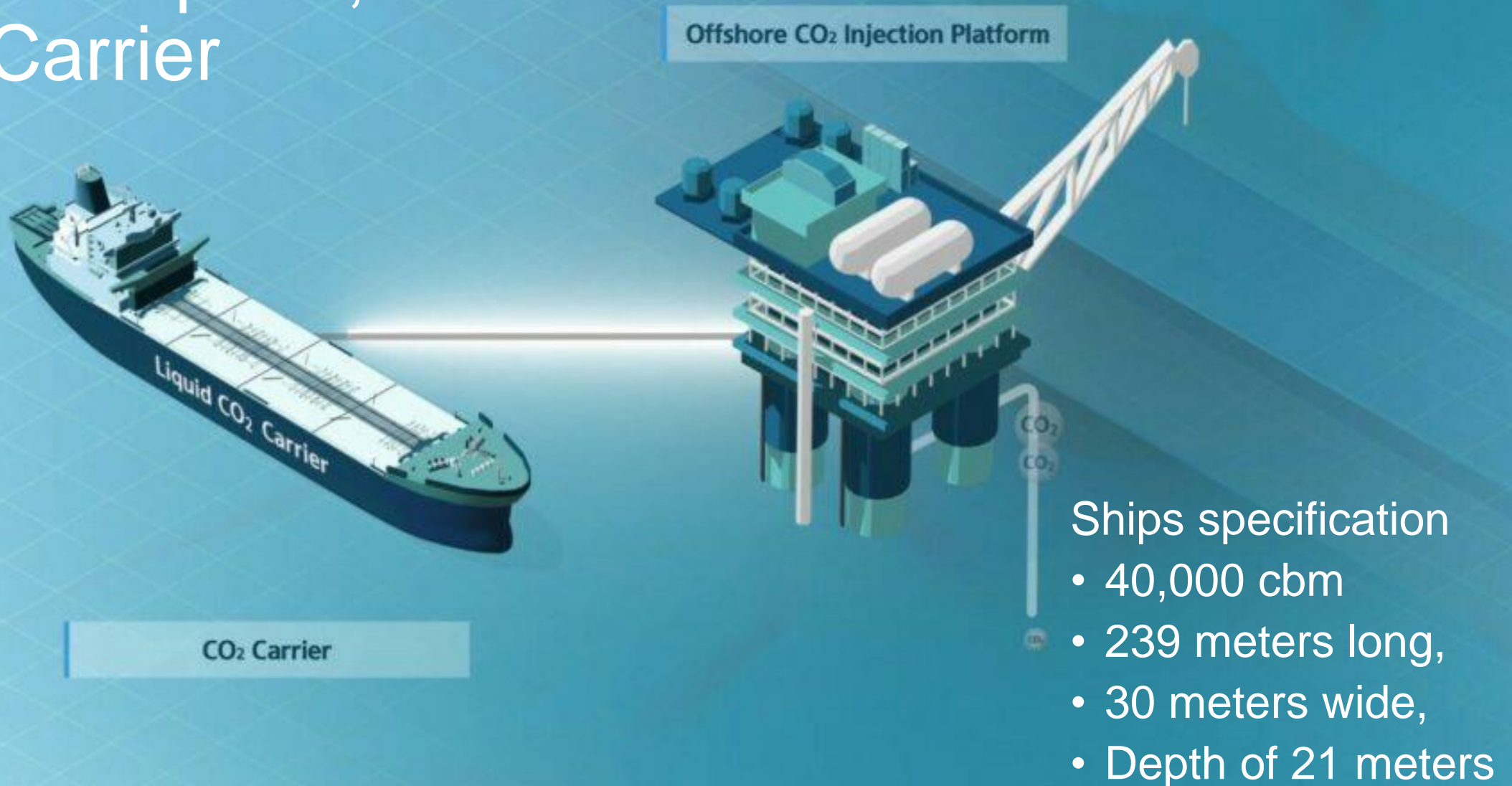
Logistics ships

- Loading capacity/ship based on volume & distance
- Number of ships
- CO₂ Hubs
- Pressure & Temp: 7 bar/-55°C vs 15 bar/-25°C
- Type of fuel
- Type of contract
- CHP → ships during summer?

Other

- Pipeline length
- Train
- Truck

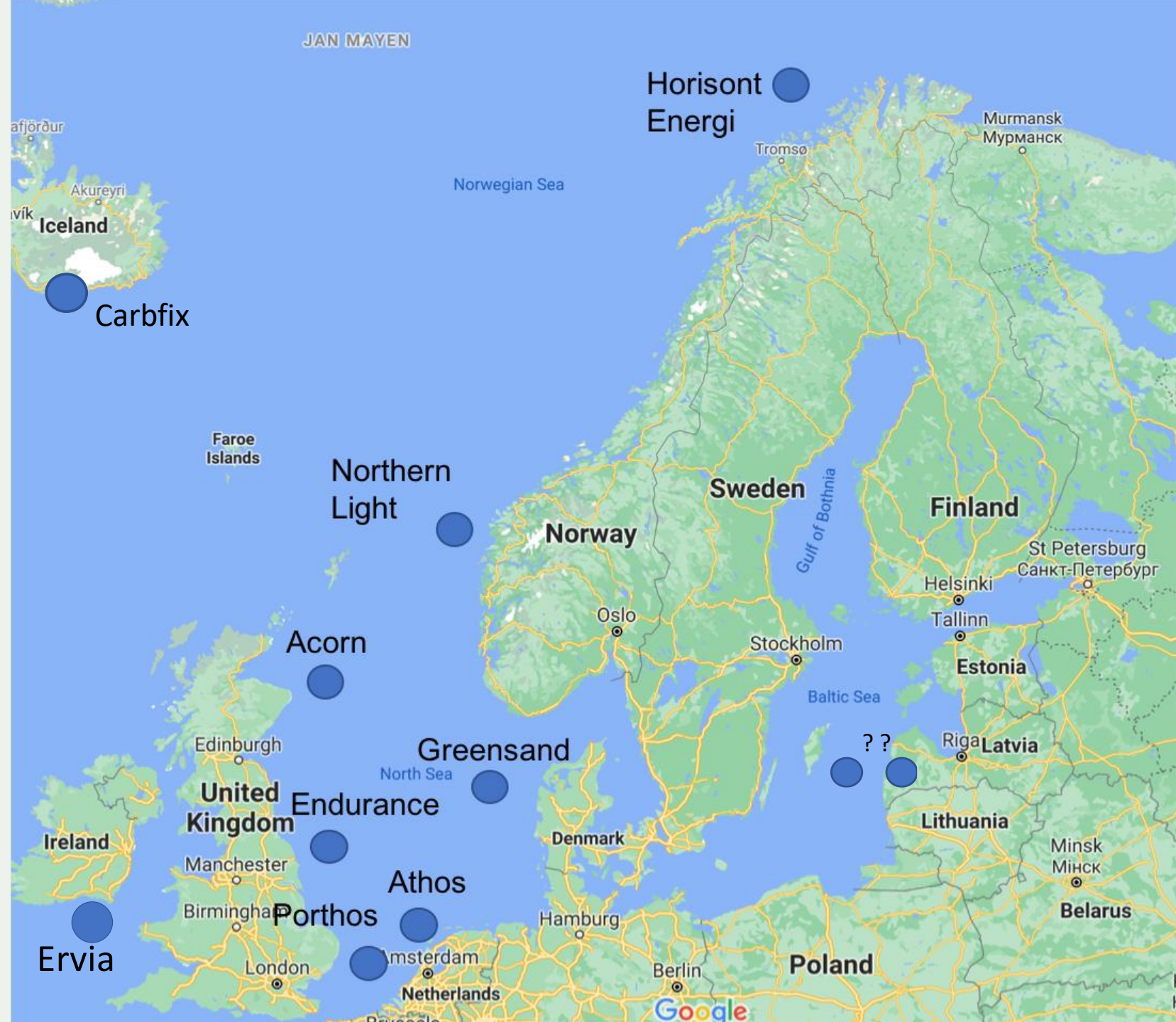
Hyundai Sept 24, 2021 LCO₂ Carrier





Permanent storage sites

Portos	2024
Northern Light	2024
Horisont Energi	2025
Acorn	2025
Greensand, SPM	2026
Carbfix	2026
Aramis/Athos	2026
Endurance	2027
Ervia	2027
Baltic Sea	????





What to think about

- As large ships as possible for longer distances
- Ships need to be suitable for the emitters volume of CO₂
- The ships may not fit the harbor or fairway
- Ensure harbor capacity for the whole region
- CO₂ Hubs – a sharing economy model
- Temperature and pressure has large impact
- National carbon dioxide infrastructure
- Larger collaborations networks
- Synchronized starting points for many CCS projects



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Thank You!
Questions?