

FORNYBAR DIESEL FRA NORSK SKOG

Dec 5, 2019



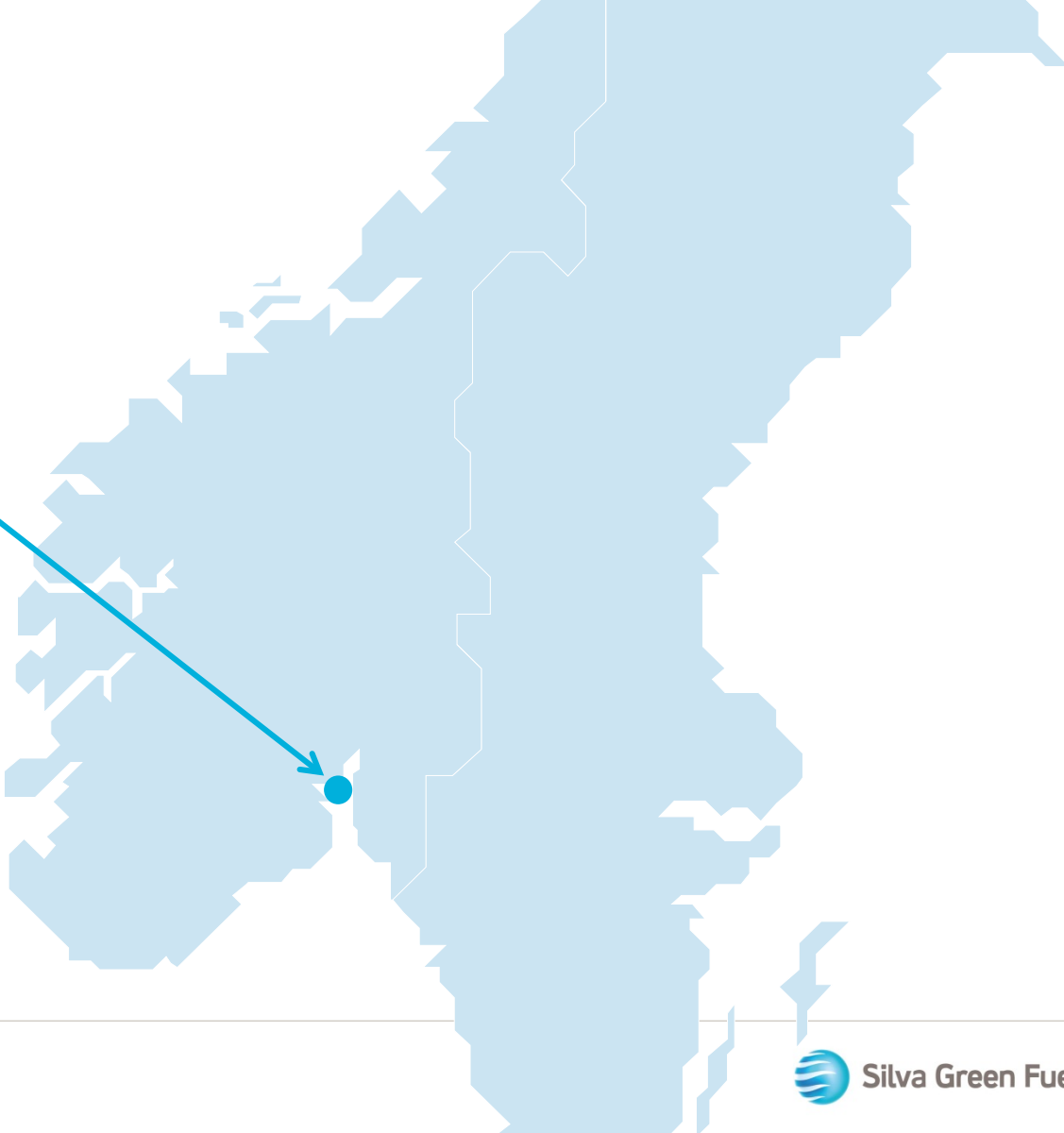
**Demoplant for advanced 2G
(2. generation) biofuel**



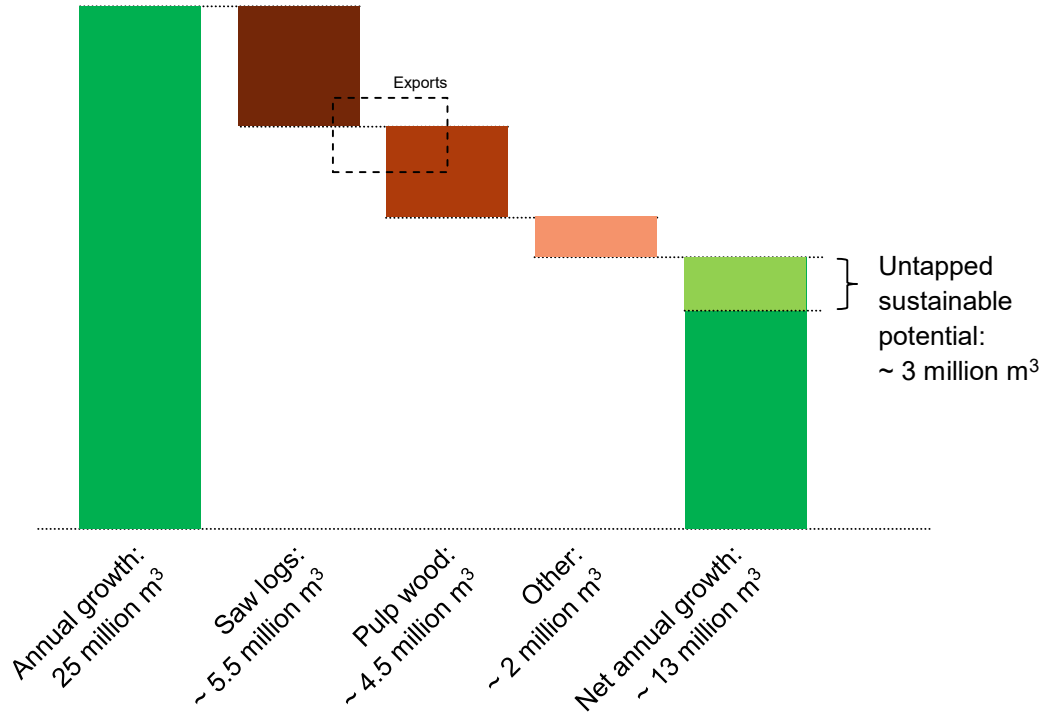
Owners:



Technology:



Sufficient fibre supply available



- ▶ Present export is 3-4 million m³
- ▶ Untapped potential (due to present demand) is estimated to 3 million m³ (NIBIO analysis)
- ▶ Significant resource potential from GROT not calculated

Advanced biofuels can contribute significantly to national CO₂ cuts



Transport:
16.4 million
tonnes

Other:
37 million
tonnes

Cut target:
21 million
tonnes

Biofuels cut
potential:
1.5 million
tonnes

- ▶ Transport sector represents around 30% of total domestic CO₂ emissions
- ▶ Biofuel can cut CO₂ emissions from transport sector by around 10% and contribute to cuts of 7% the national target

Total CO₂ emissions
from Norway in 2016:
53.4 million tonnes

Reduction target 2030

Cut in CO₂ emissions
from biofuels

Biofuel Business Outlook

Transportation sector Decarbonization

- ▶ Emission reduction from the transportation sector required
- ▶ Advanced biofuels are a solution

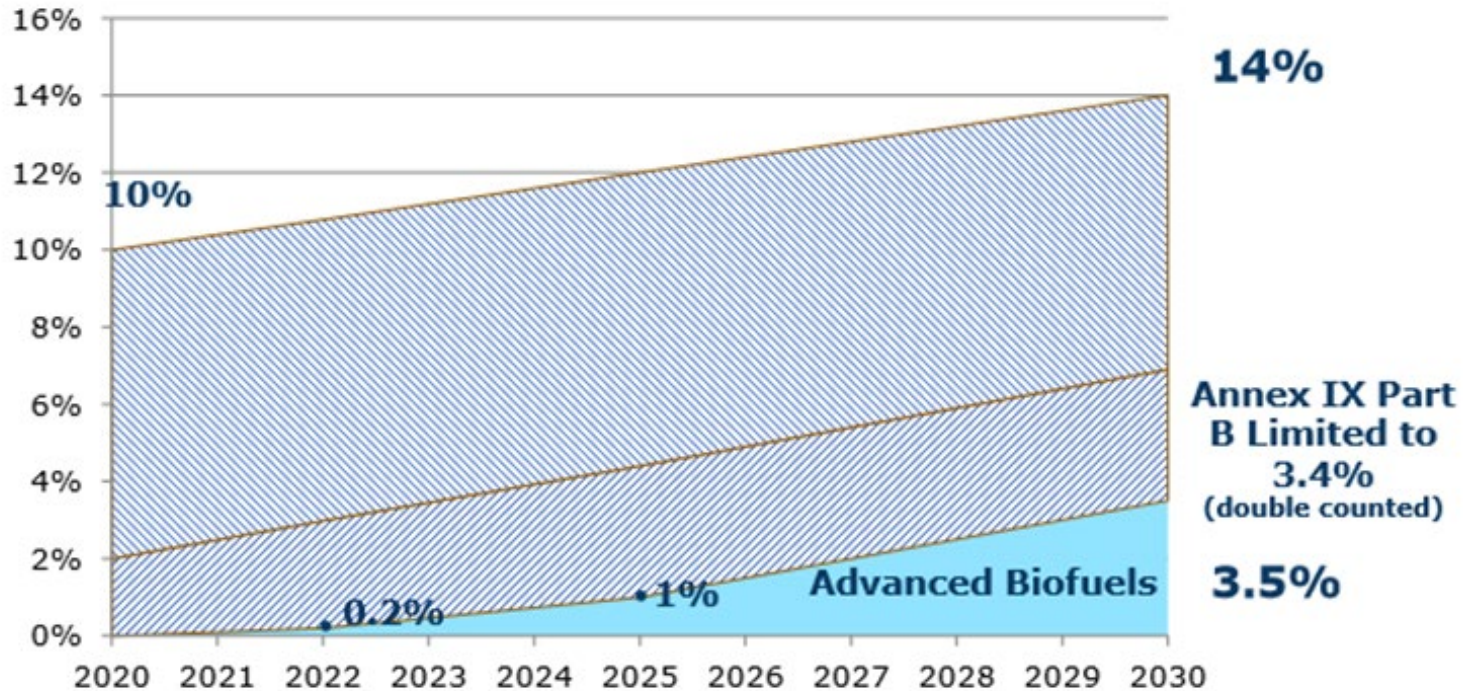
Ambitious international and national targets

- ▶ EU goals for advanced biofuels result in mandatory market of 15 billion litres a year in 2030

Customer Push

- ▶ Logistics companies, airlines, fuel retailers, and truck manufacturers confirm attractiveness of the product and demand

RED II puts Minimum Limits on Advanced Biofuels



Where from, where to?

Done

Screening/Technology testing

- Evaluated 30+ technologies
- Worked with short-list of 4 technology vendors
- Completed several Basic Design studies
- Produced oil and fuel samples which were analysed and evaluated by independent labs
- Chose preferred technology vendor
- Basic Engineering for Demo Plant completed

Next phase

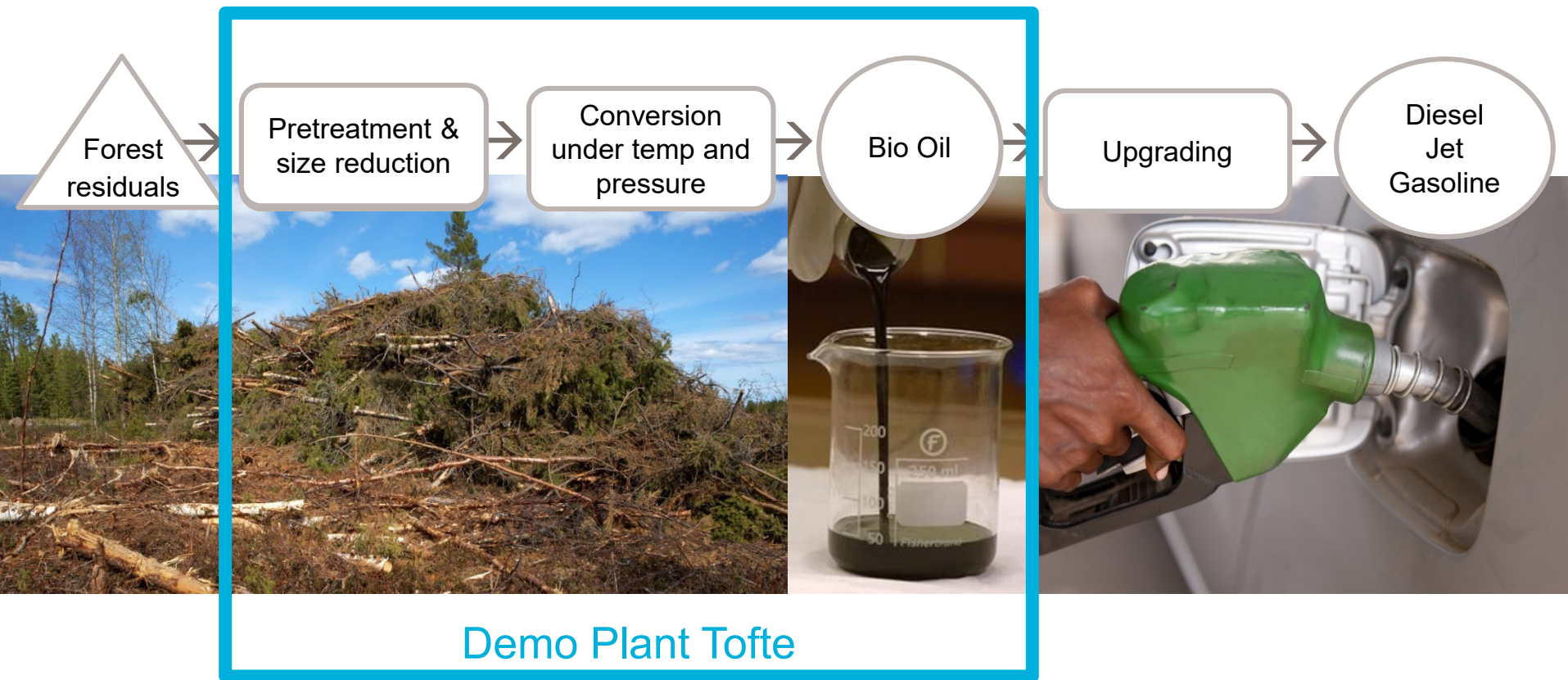
Technology demonstration and commercialization

- Mitigate scale-up risk by building Demo Plant
- Demo Plant designed as scaled down commercial plant
- Integrate process to prove continuous operations and further optimization
- Develop hands-on competence with technology
- Introduce product to market

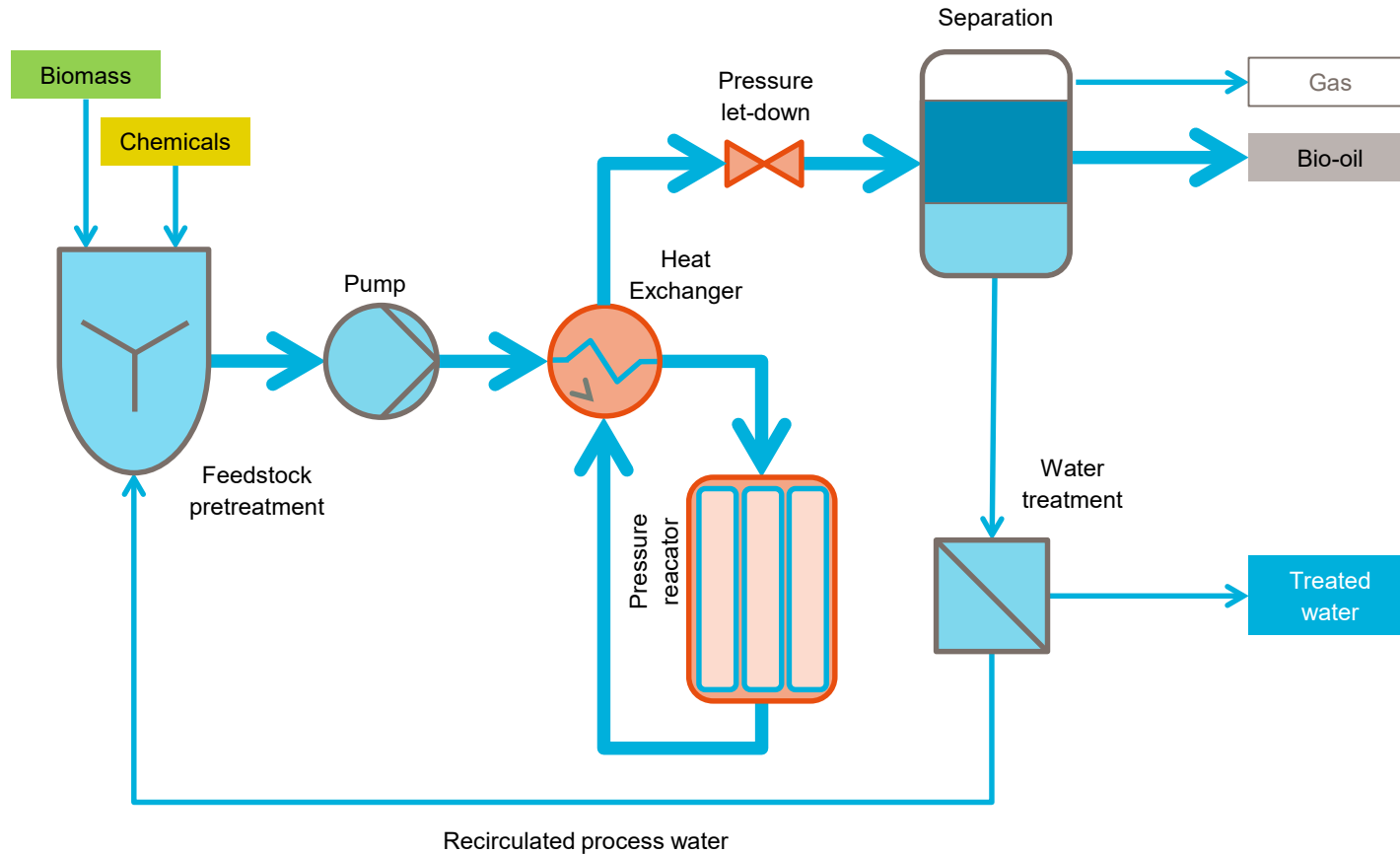
Benefits of HTL

- ▶ Wet process, no drying, no gas expansion volumes
- ▶ Relative simplicity
- ▶ Closest to pulping processes
- ▶ Feedstock flexibility
- ▶ Modular design
- ▶ Lowest capex
- ▶ Highest yield
- ▶ High diesel fraction

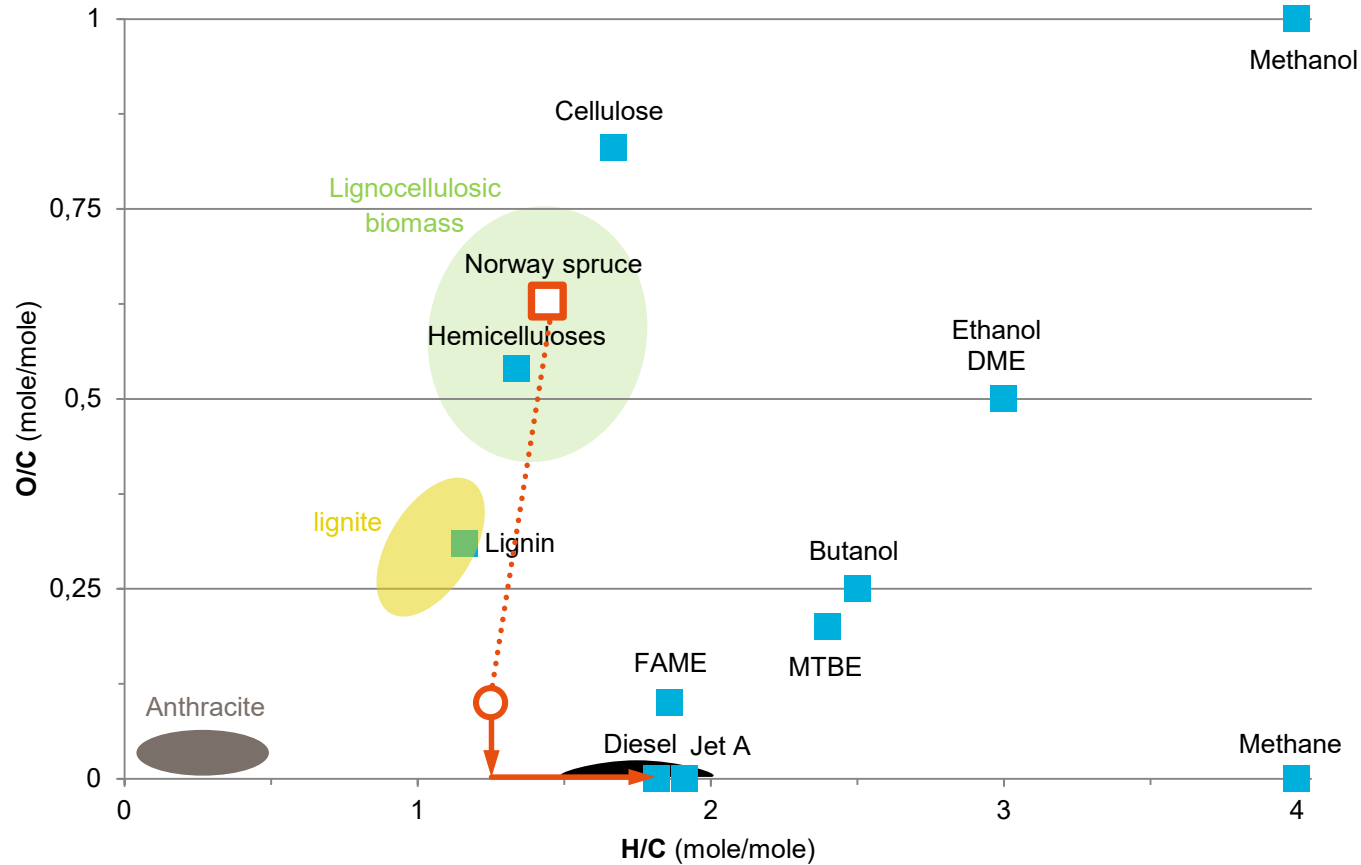
From Stump to Pump



Hydrothermal Liquefaction Process – How does it work?



Van Krevelen diagram

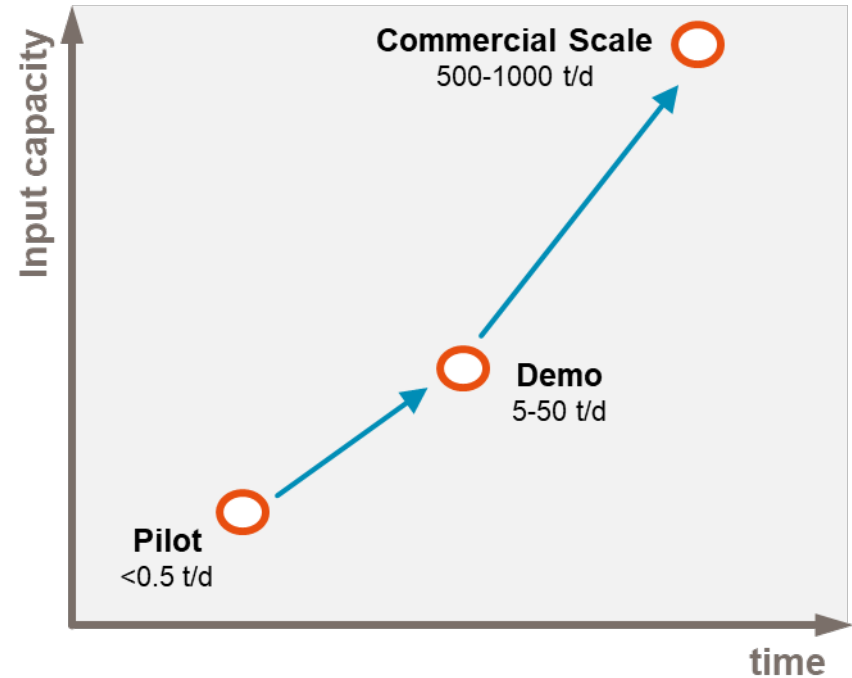


Why Demo Plant?

Mitigate risk by building Demo plant as a scaled-down Commercial plant and get acceptable scale-up

▶ Test Program Goals

- Verify design and capex level full-scale
- Continuous operation 1000 hours
- Reproduce yield and oil/fuel quality achieved in test campaigns
- Establish operational/HMS procedures
- Train operators



Civil work has started

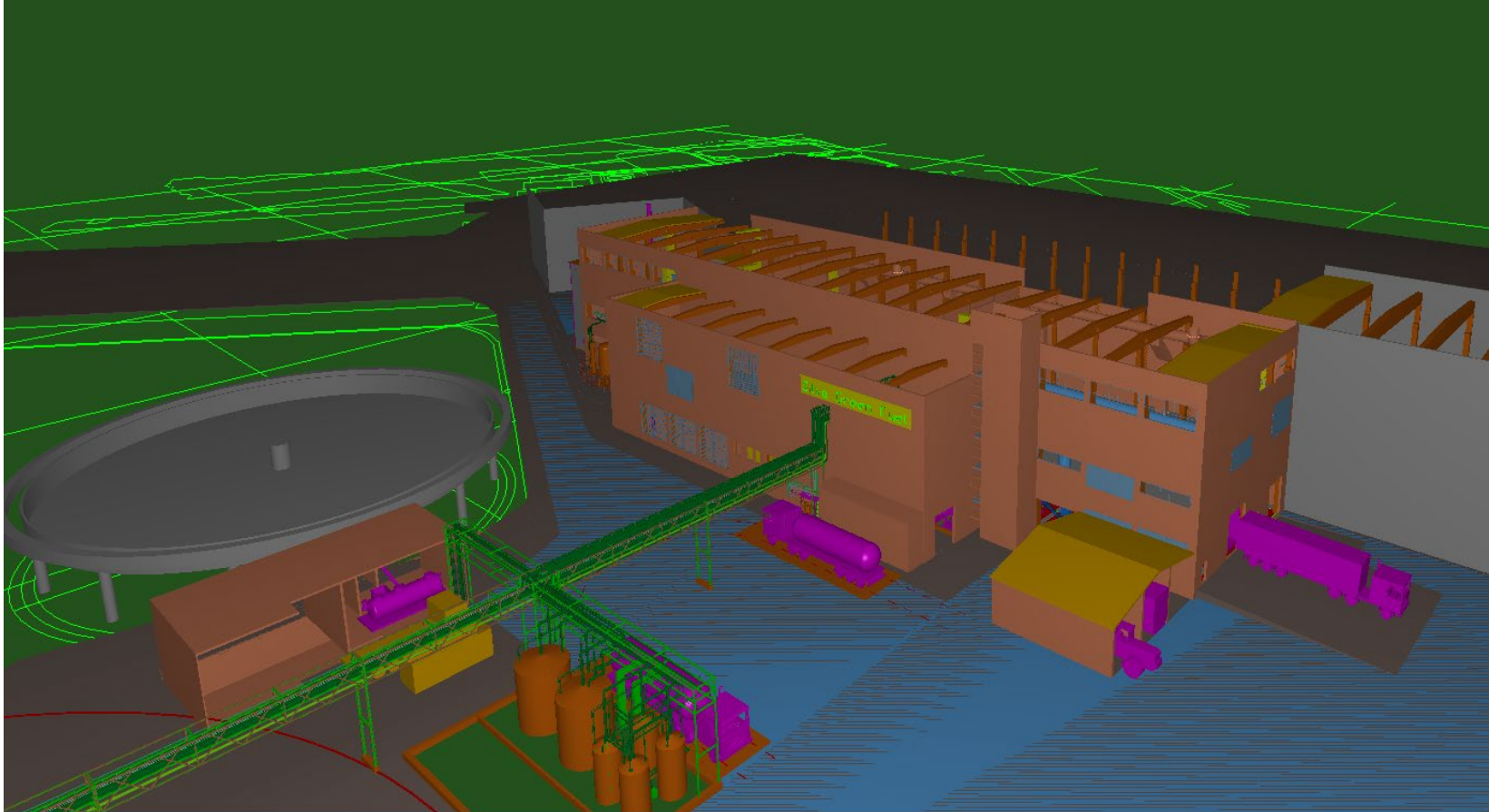


Demo Plant Location

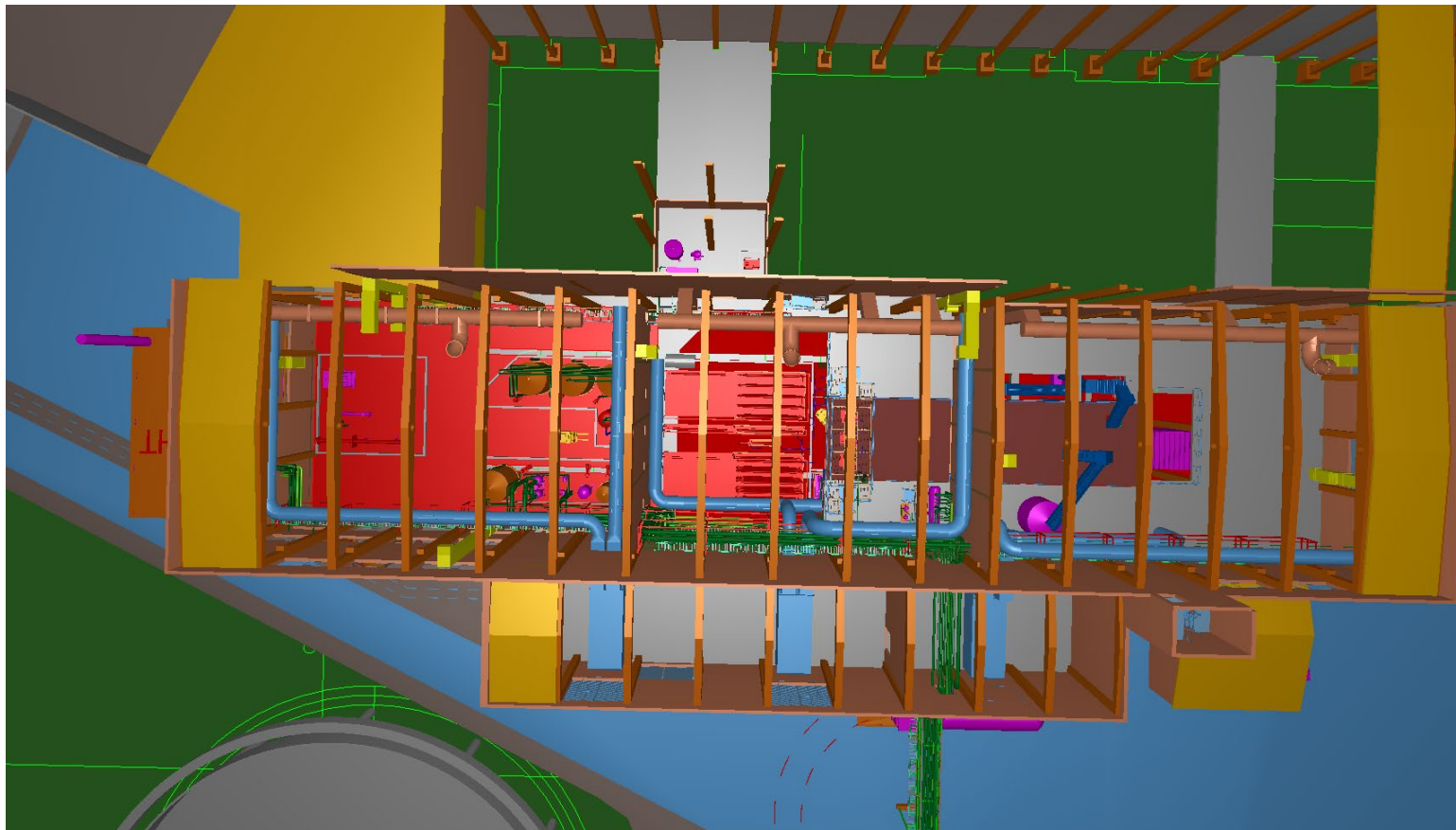


- 1. Silva industriområde
- 2. Indre næringspark
- 3. Ytre næringspark

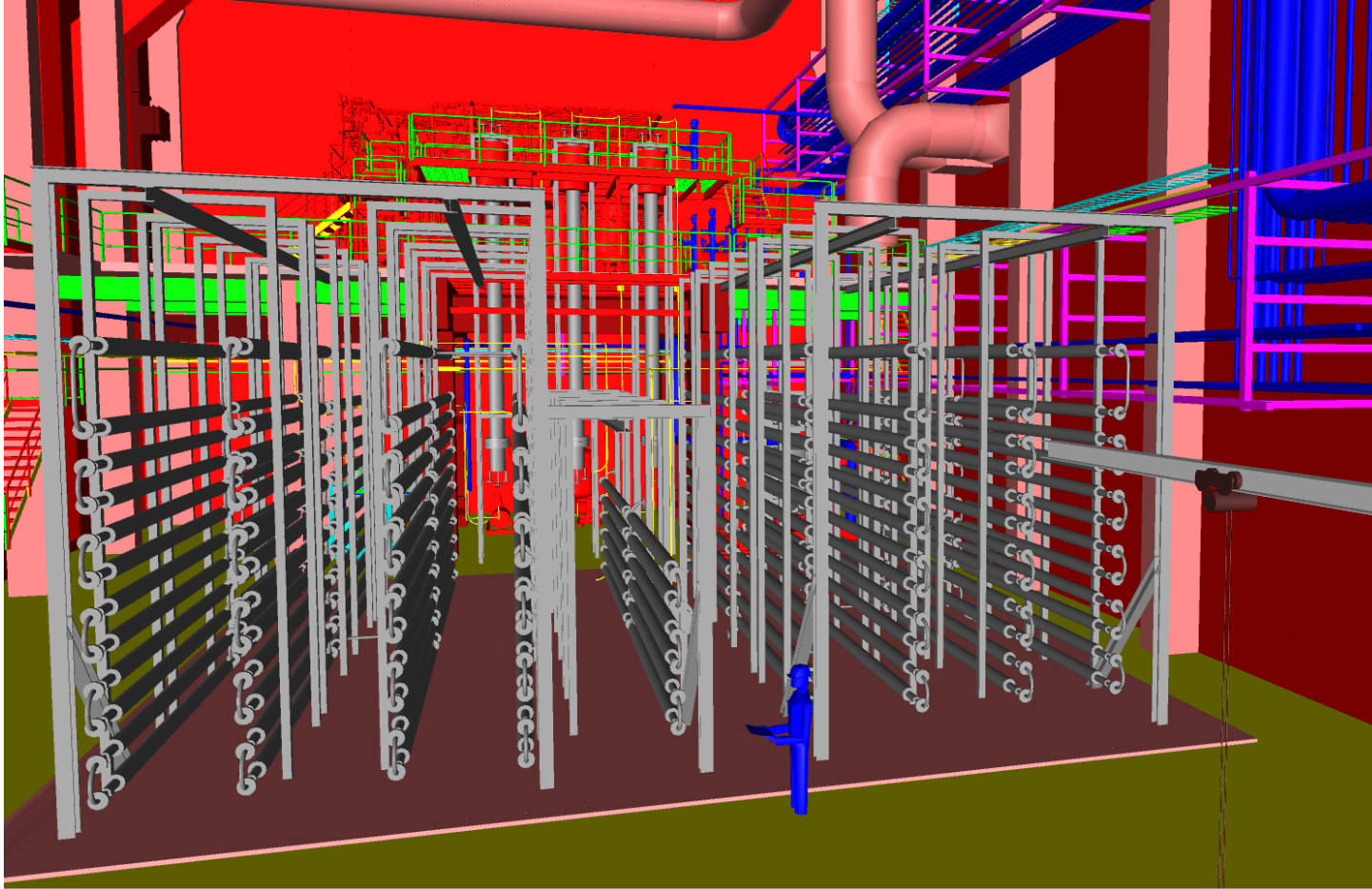
Outside view – north west



Areal view



HTHP Package





Demo Plant

Commercial
Plant



Thank you!