



Fortum Oslo Varme AS

# Fortum's CCUS initiatives in the Baltic Sea Region

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# Fortum's geographical footprint



## Nordic countries

- #3** Power generation  
**43.5 TWh**
- #4** Heat sales  
**5.9 TWh**
- #1** Electricity customers  
**2.4 million**



## Russia PAO Fortum

- #10** Power generation  
**29.5 TWh**
- #8** Heat sales  
**20.7 TWh**

## Key figures 2018

Sales	EUR 5.2 bn
Comparable EBITDA	EUR 1.5 bn
Total assets	EUR 22 bn
Personnel	8,300



## Poland

Power generation  
**0.6 TWh**

Heat sales  
**3.5 TWh**

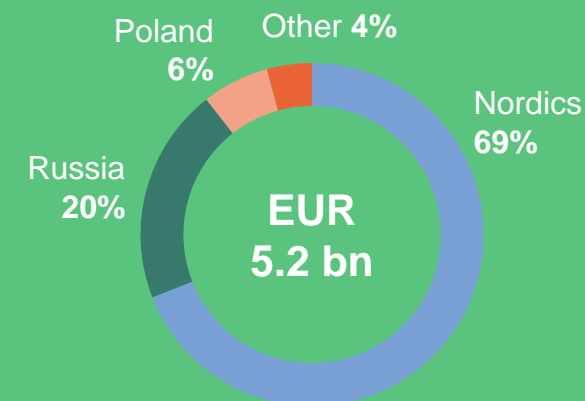


## Baltic countries

Power generation  
**0.7 TWh**

Heat sales  
**1.4 TWh**

## Sales by market area 2018



x

= Fortum market share ranking

Note: Ranking based on year 2017 pro forma figures  
Source: Fortum, company data, shares of the largest actors



# Carbon Capture initiatives in Fortum

## Oslo



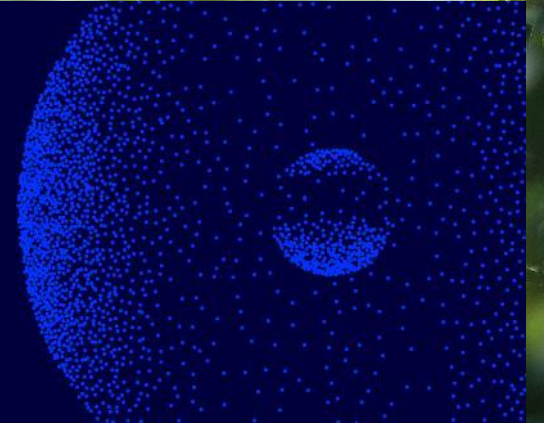
## Stockholm



## Lithuania and Poland



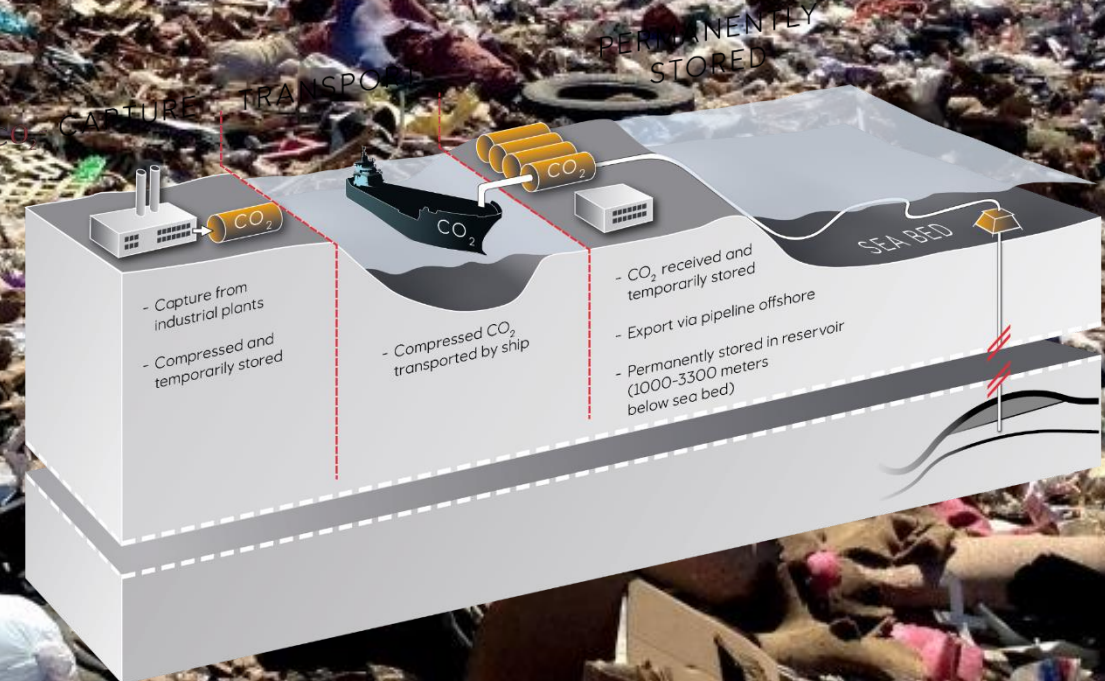
puro





# Carbon Capture in Oslo

- Goal to capture about 400 000 tons CO<sub>2</sub> per year
- CCS at Waste-to-Energy plants will capture both fossil and biological CO<sub>2</sub> (appr. 50 % BIO-CCS)
- CO<sub>2</sub> transport to port via emission free cars
- Pilot testing on real flue gas ongoing
- 95% cleaning of CO<sub>2</sub>, technology supplier with full scale experience (Shell), EPC contractor TechnipFMC





# Stockholm Exergi, Sweden

Värtavarket, KVV8

- Potential CCUS plant location in Stockholm
- 100% Biomass
- Annual volume of CO<sub>2</sub> produced:  
~1 000 000 t/year
- With capture rate 80%: 800 000 t of CO<sub>2</sub> to capture annually (~3000 t daily)
- Waste heat from CCS-process can be re-used
- Close proximity to ocean
- Thorough screening study performed to evaluate technology and provider of process packages
- CO<sub>2</sub> to be picked up by Northern Lights

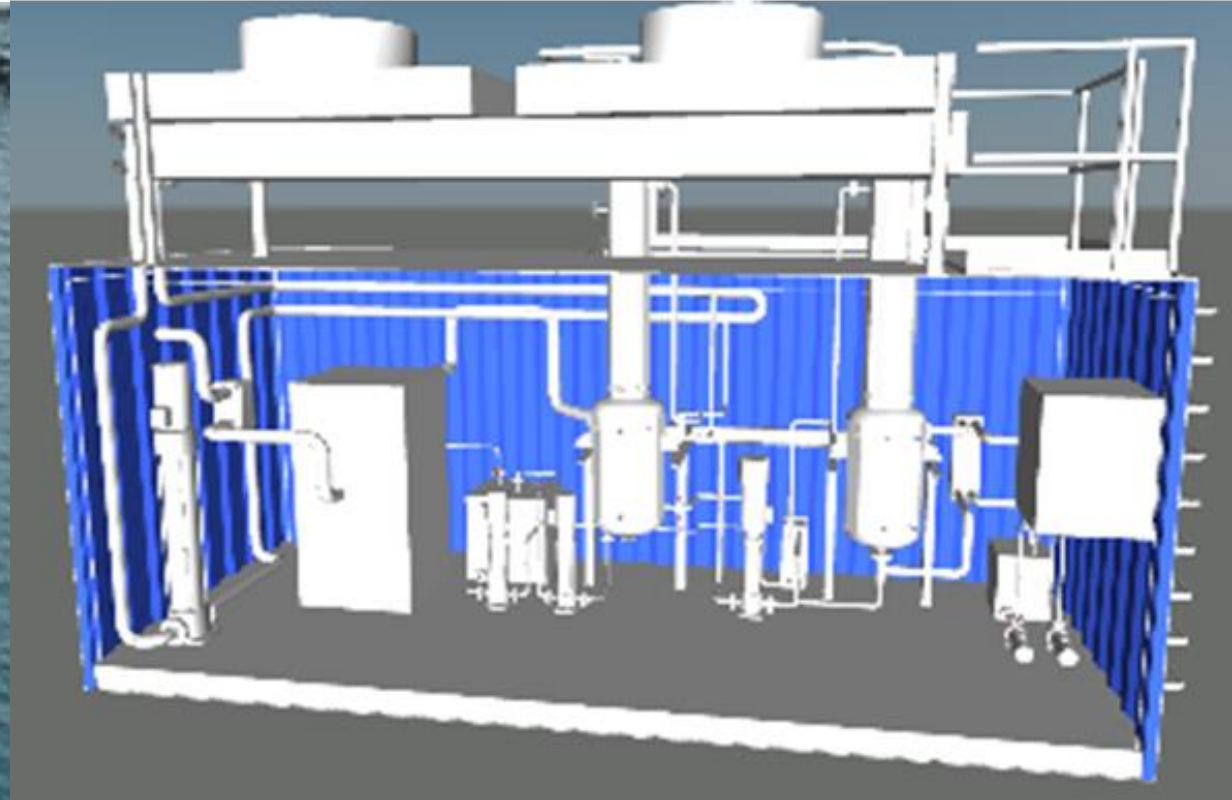




# Stockholm Exergi, Sweden

## Värtavarket, KVV8

- Pilot plant for hot potassium carbonate (HPC) testing
  - Start operation November 2019
  - Operation planned until end of May 2020
  - Testing at various different pressures and mixtures of solvent
- 700kg CO<sub>2</sub>/day capture
- In container for easy transport





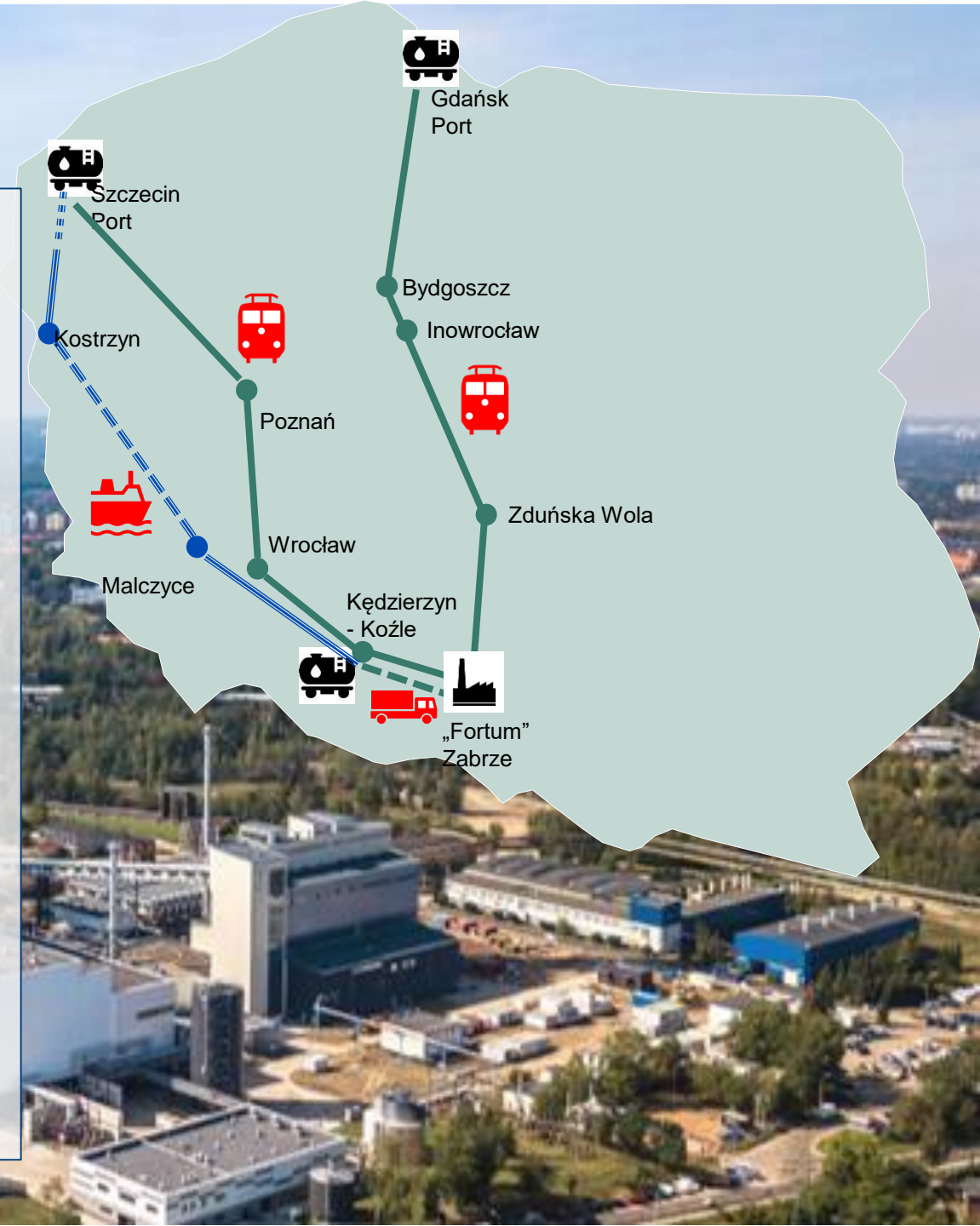
# Klaipeda, Lithuania

- Potential CCUS plant location in Klaipeda CHP premises
- Annual volume of CO<sub>2</sub> produced: ~275 000 t/year
- With capture rate 95%: 260 000 t of CO<sub>2</sub> to capture annually (870 t daily)
- ~50% Biogenic CO<sub>2</sub>
- Two capture technologies evaluated based on Stockholm Exergi and FOV experience
  - Amine and hot potassium carbonate
- Pilot plant testing planned in 2020
- Talks initiated with Northern Lights regarding CO<sub>2</sub> transport and storage



# Zabrze, Poland

- Potential CCUS plant location in Zabrze CHP premises in place of old heavy oil installations
- Annual volume of CO<sub>2</sub> produced: ~500 000 t/year
- With capture rate 95%: 475 000 t of CO<sub>2</sub> to capture annually (~1600 t daily)
- River/railway transport analyzed
- Road transport included in the analysis for short way transport to the closest river port only.
- Due to distance to Polish sea ports and river ports pipeline transportation excluded from the analysis
- Talks initiated with Northern Lights regarding CO<sub>2</sub> transport and storage from one of sea ports

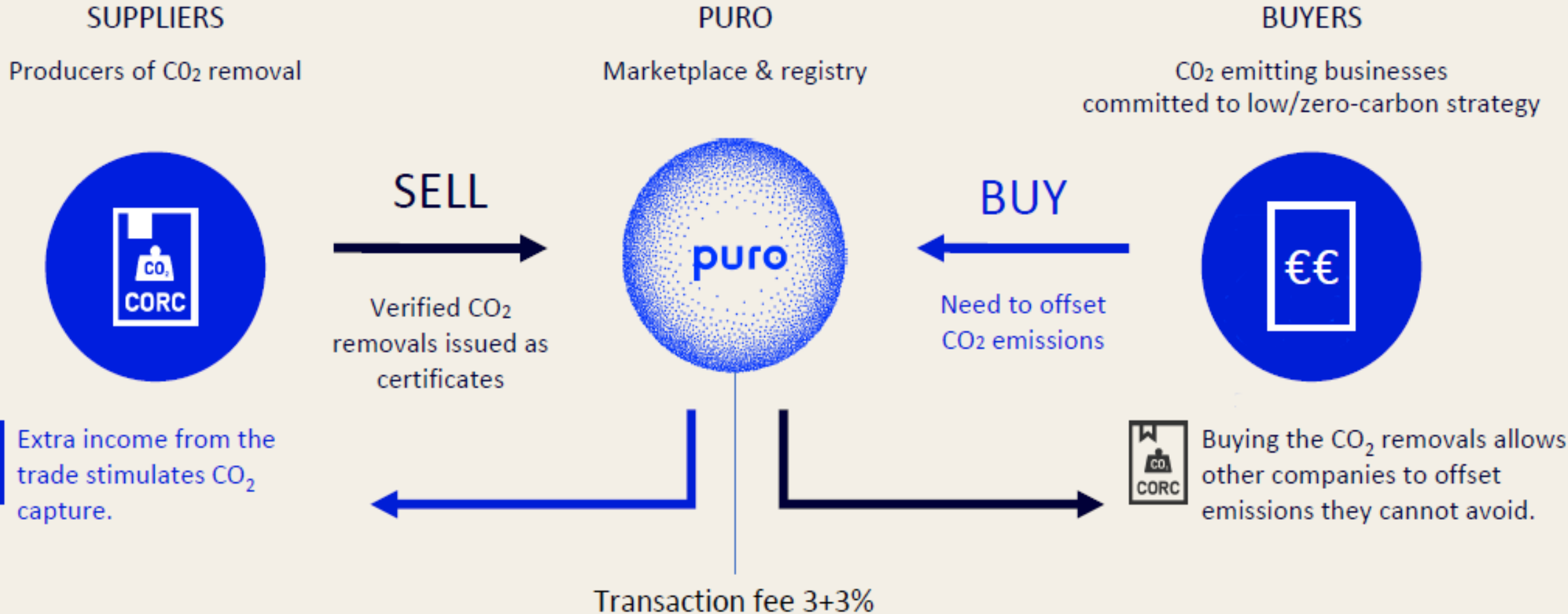




# Puro

## World first marketplace for CO<sub>2</sub> removal

Companies are facing growing pressure from consumers, clients, employees and investors to become carbon neutral





# Puro

## World first marketplace for CO<sub>2</sub> removal



IT-Digital



Logistics



Agri-Food



Consultants



Offset-retailers



Energy





Join the change!