



Fortum Oslo Varme AS

CCS from waste incineration









part of tomorrow's climate solution



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Energy sources:

-  WASTE HEAT
-  ELECTRICITY
-  HEATPUMP/ SEWER
-  DATACENTER
-  WOOD PELLET
-  BIOFUEL
-  FOSSIL OIL
-  LNG



3289 Domestic housing

952 apartment building

1141 commercial building

District heating possible to ships

District heating

ENERGY RECOVERY FROM 400.000 TONNES WASTE/ YEAR

600 km district heating network

30 mill liters hot water distributed throughout Oslo

District cooling

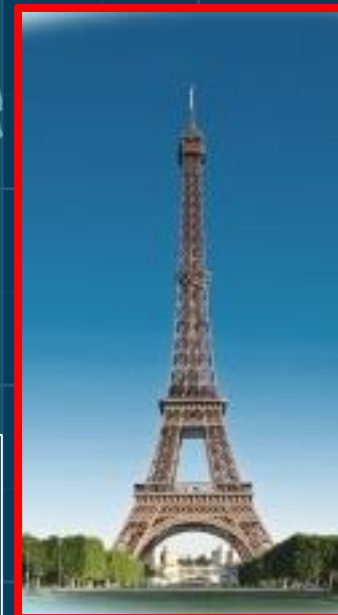
Production approx 150 GWh electricity (est. 2017)



The Norwegian CCS project



Infrastructure for Europe



Paris agreement

- Below 2° C
- CCS key technology

Carbon Capture in Oslo

- Goal to capture about **400 000 tons CO₂** per year starting in 2024
- CCS at Waste-to-Energy plants will capture both fossil and biological CO₂ (appr. **50 % BIO-CCS**)
- CO₂ transport to port via **emission free cars**
- Pilot testing on **real flue gas**
- **90% cleaning** of CO₂, technology supplier with full scale experience (Shell), EPC contractor TechnipFMC



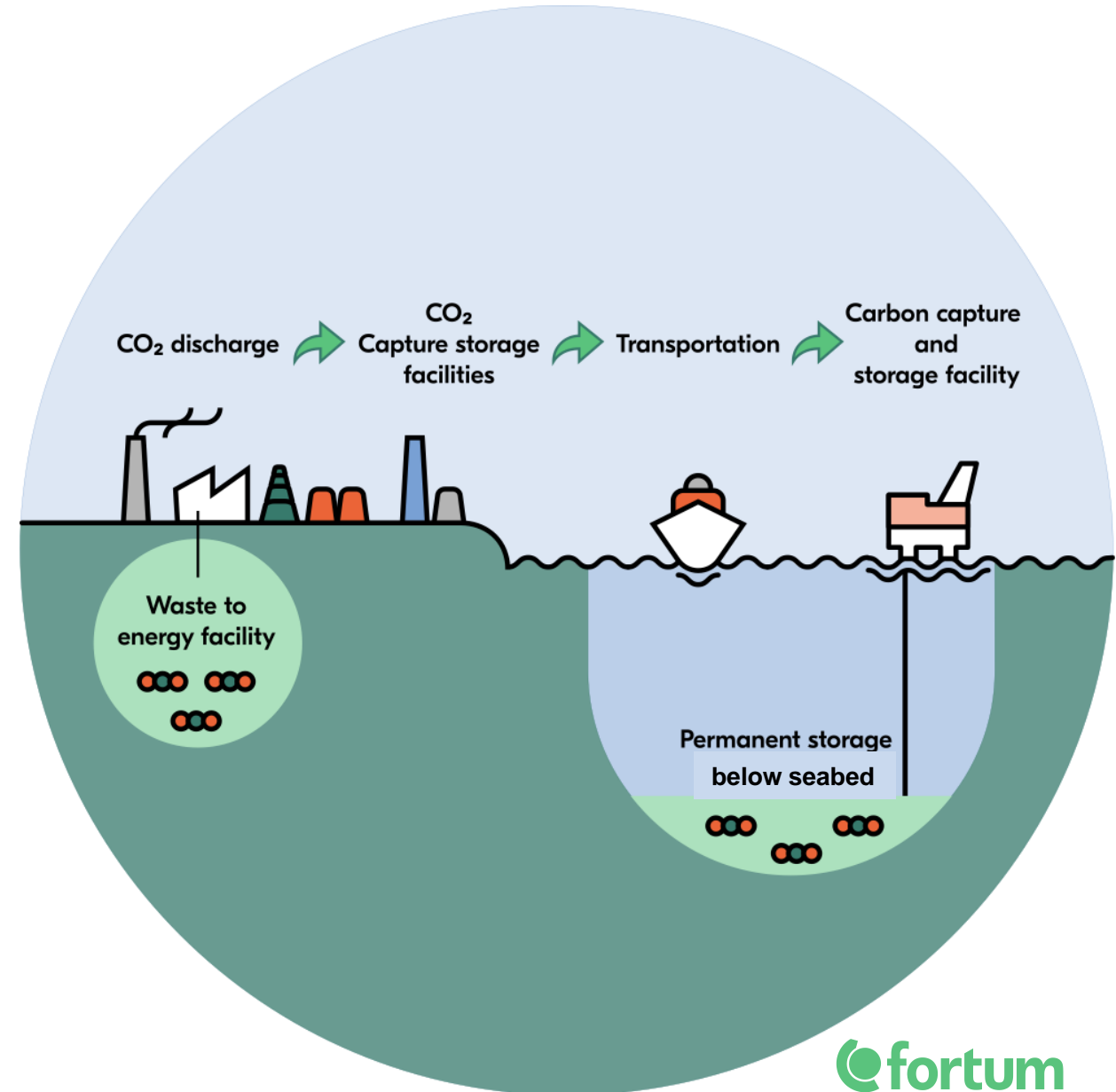
Waste is one of the world's biggest climate challenges



- 2.2 billion tons of waste produced yearly, and 5% of global emissions is from household waste alone
 - Landfilling has to reduce and waste-to-energy is the best solution for waste that cannot be recycled (including unrecyclable plastics)
 - Significant BIO-CCS potential; waste-to-energy with CCS can contribute to achieve negative emissions
 - EU's targets for recycling and reduced landfills; 40 mill. tons missing capacity of waste-to-energy
- 1 ton waste is equivalent to 1 ton CO₂

CCS is part of the climate solution

- New technologies emerging
- Significant change in EU on CCS and BIOCCS, and funding from Innovation Fund for new projects
- BIOCCS on Waste-to-Energy will give negative CO₂-emissions, and can neutralize other emissions that are difficult to reduce/remove
- The Fortum project shows how cities can cut emissions from waste handling as part of sustainable city solutions





Join the change!

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