A group of people is walking away from the camera on a wooden pier that extends over a large, calm body of water. The sky is overcast with soft, grey clouds. The water reflects the light from the sky. In the foreground, the back of a woman with long dark hair wearing a light-colored jacket is visible. Further ahead, a man and a woman are walking together. The pier has a rope railing on the left side.

A green step ahead - together

Waste –and biomass fired combustion plant

**Bo Johansen
Sales Director
Verdo Energy Systems A/S, Denmark**

Verdo Group



Vision

A **green** step ahead
– together

Employees



Business areas

Power, water and heating
Electricity trade
Energy plants
Solid fuels
Technical infrastructure

Turnover

390
Mill. EUR



Verdo and the Sustainable Development Goals

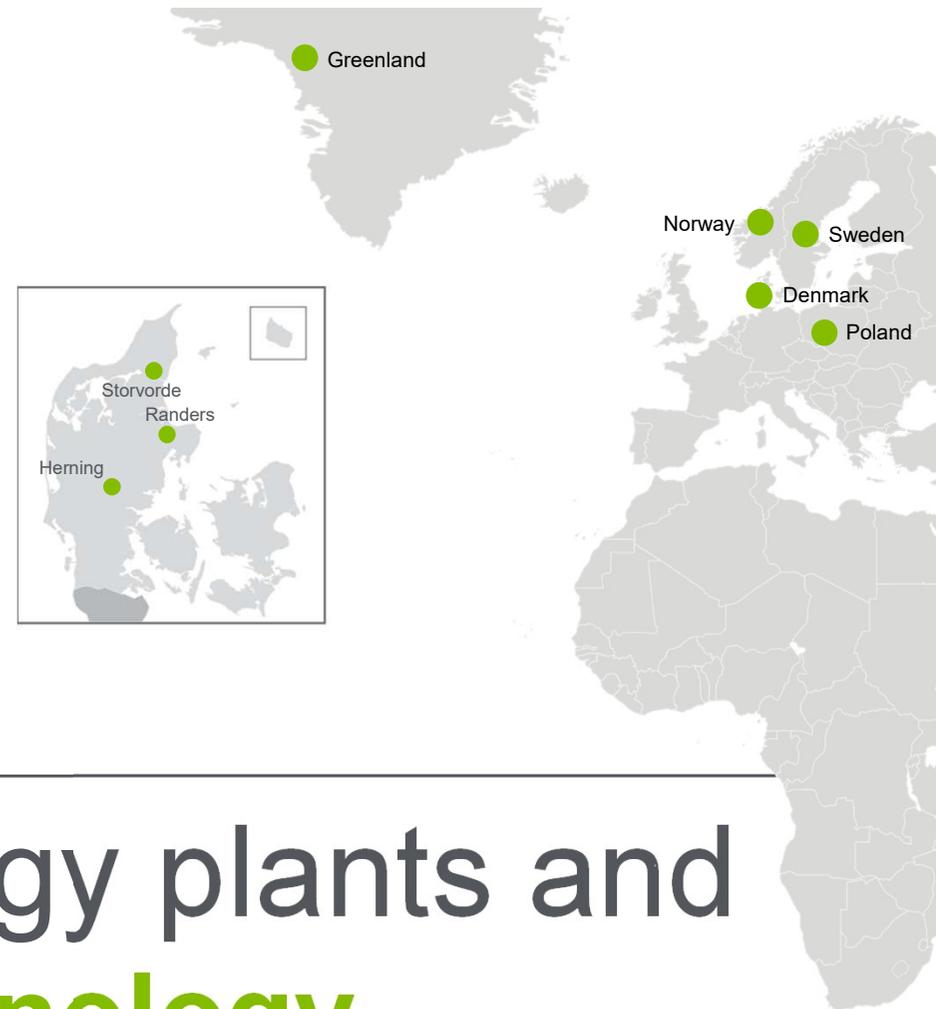


Step by step, we can solve the global climate challenges together.
At Verdo, we focus in particular on three of the 17 UN Sustainable Development Goals

Energy plants and technology



Verdo Energy Systems A/S



Competences

- System integration
- Heat pumps
- Electrical boilers
- Biomass fired plants
- Waste-to-energy plants
- Biofuels
- Service
- Automation

Turnover

34
million EUR

Energy plants and -technology

Our contribution to green district heating and energy for all

Input



Verdo

Project development and design

Installation and operation of energy plants

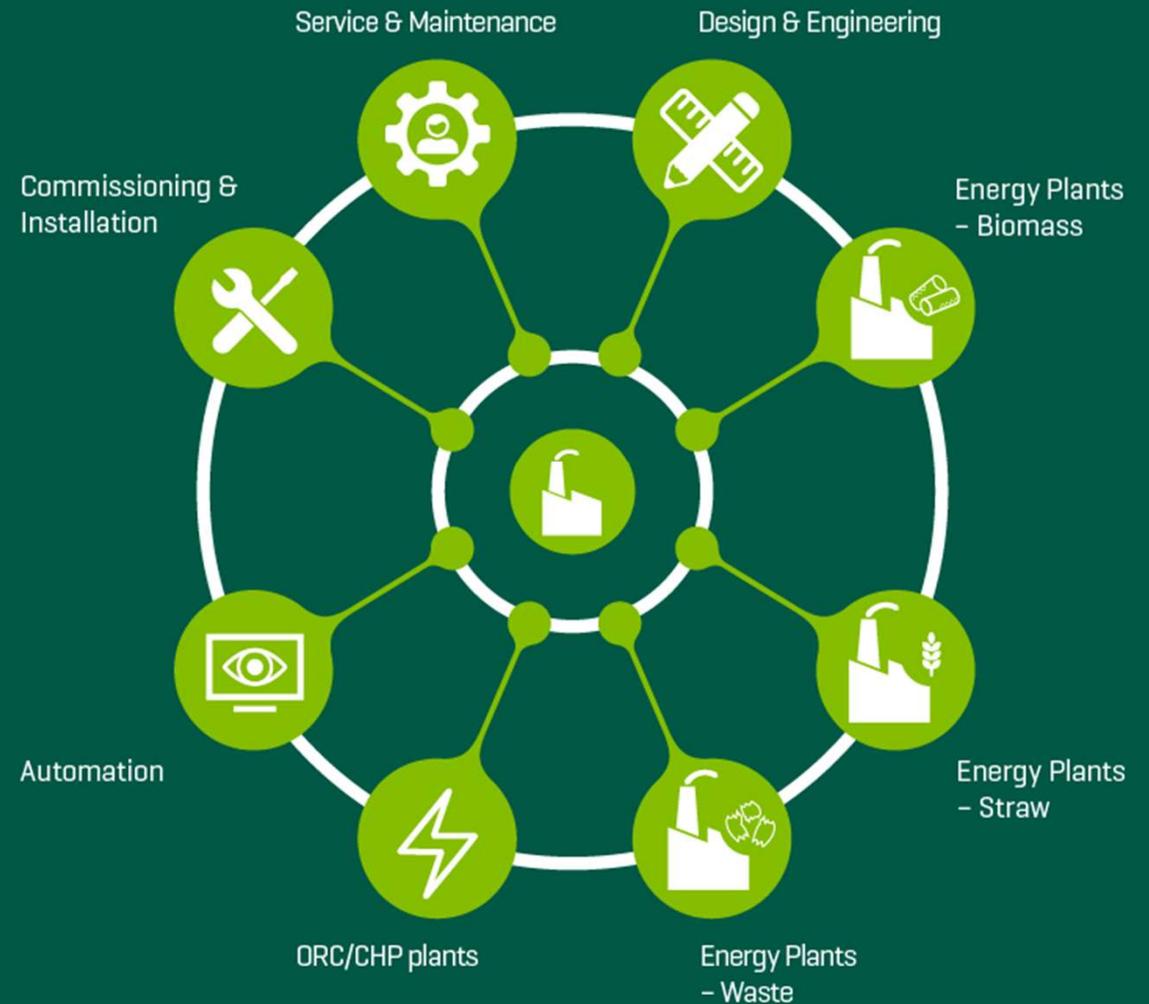
Service and fuel supply

Output



Your system integrator

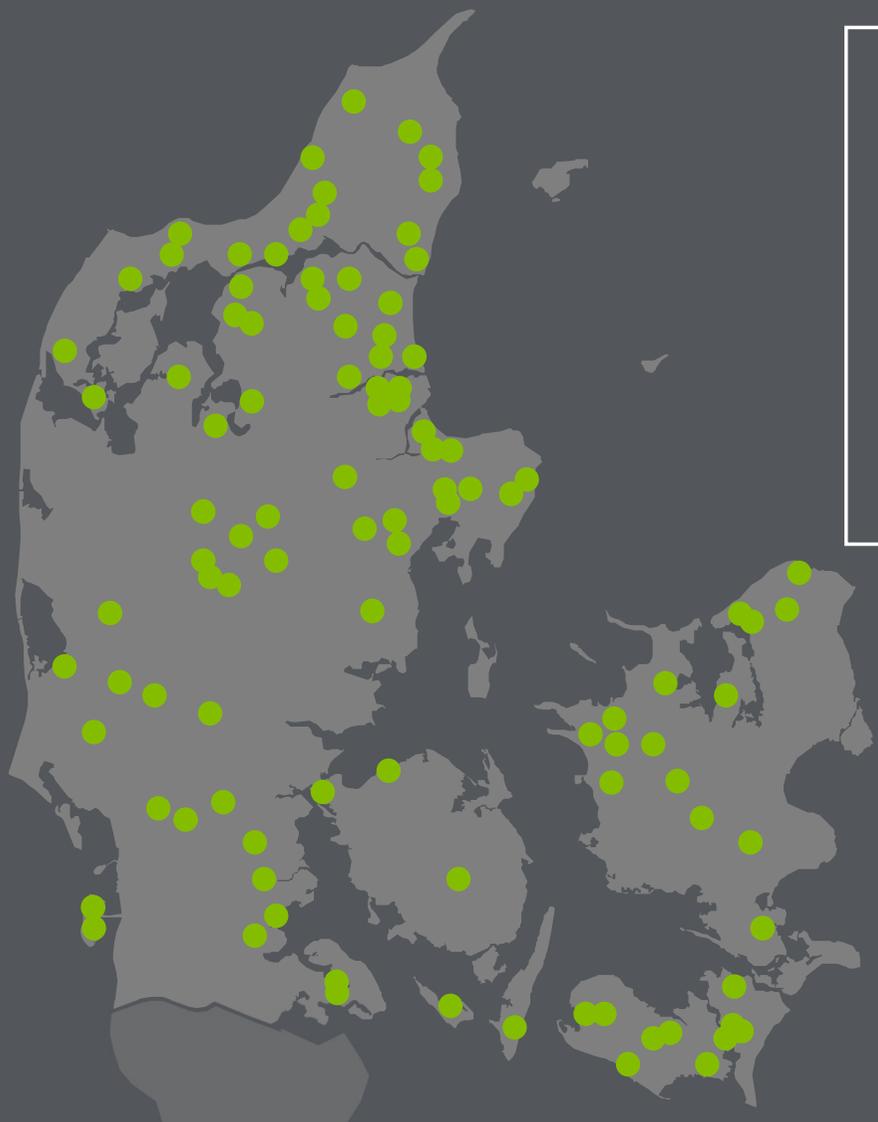
- We integrate and combine technologies



Track record - Biomass fired plants

94

Biomass fired plants
established
from 1986 to 2021

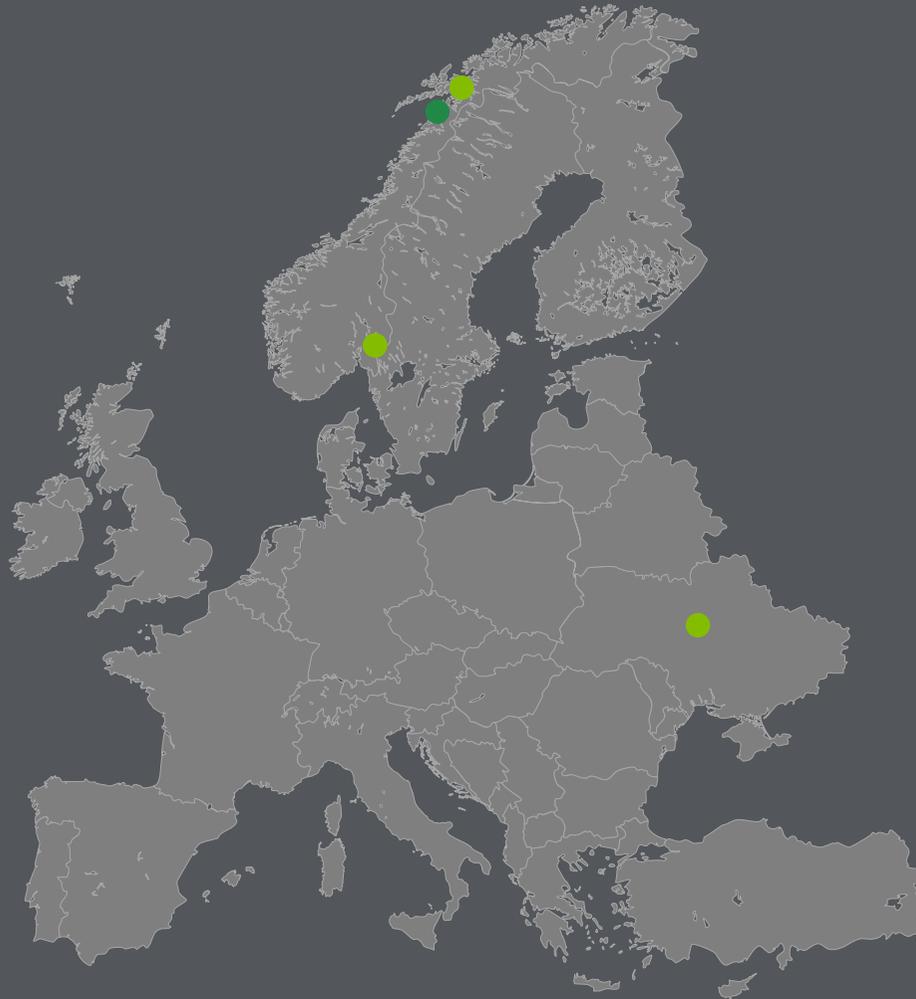


Track record - Waste-to-energy plants

4

Kvitebjørn Varme AS in Norway
Eidsiva Bioenergi in Norway
Comfort Mebeli in Ukraine

Senja in Norway *in process*



Case story - biomass boiler plants



Kjellerup

District Heating

- 10 MW wood chips boiler output
- 3 MW flue gas condensation system
- 0.8 MW absorption heat pump
- COP value of 1.7
- Flue gas temperature at chimney: $<20^{\circ}\text{C}$
- Calculated efficiency at 118.9%
- Wood chips or alternative fuel of 35-55% water content



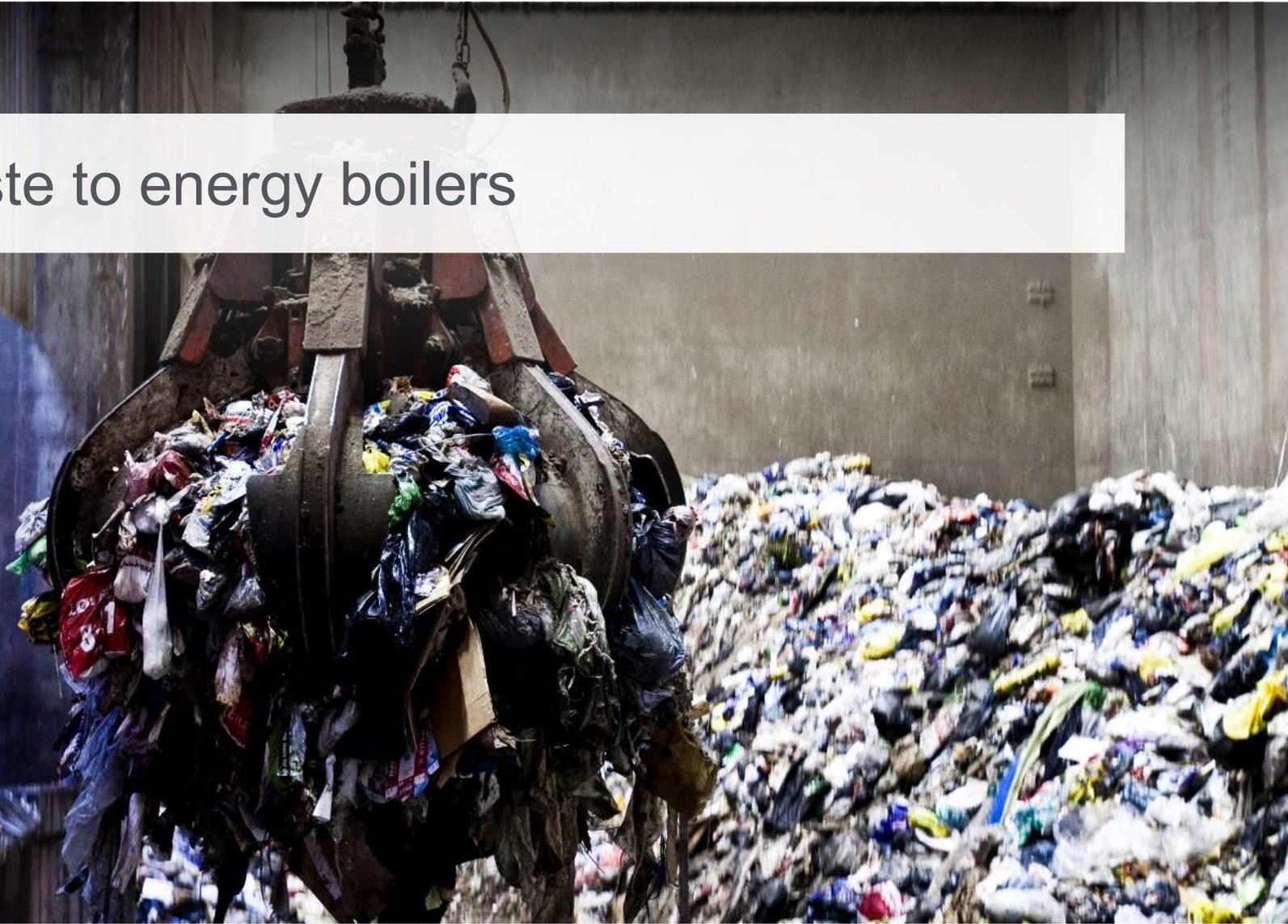
Auning

District Heating Plant

- 12 MW straw boiler output
- Operation temperature – flow 110 °C and return 40 °C
- Straw from Danish cereal crops
- Automated straw bale handling from storage to boiler infeed



Case story - waste to energy boilers



Eidsiva Bioenergi Kongsvinger, Norway

- 8 MW waste boiler output
- Waste wood from demolition and industry – water content 10-50%
- DeNO_x system based on ammonia water
- Bag filter with dosing of lime and activated carbon
- Continuous measuring of flue gas emissions in line with local regulations
- 87.5% efficiency



Kvitebjørn

Norway

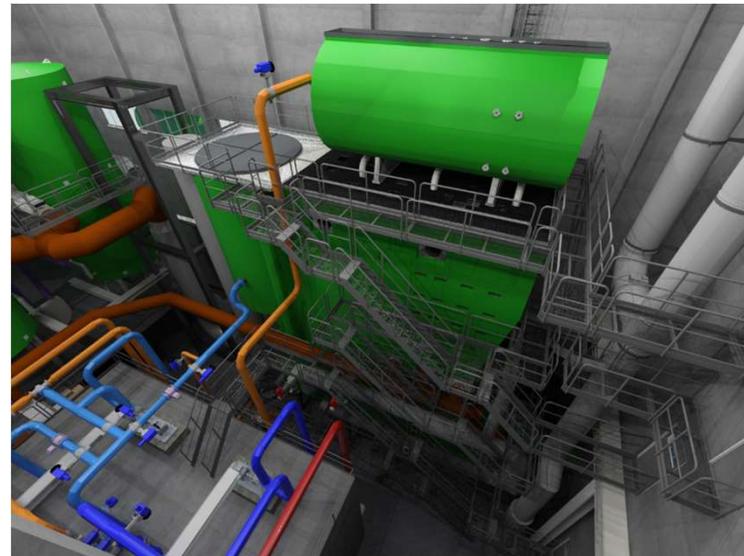
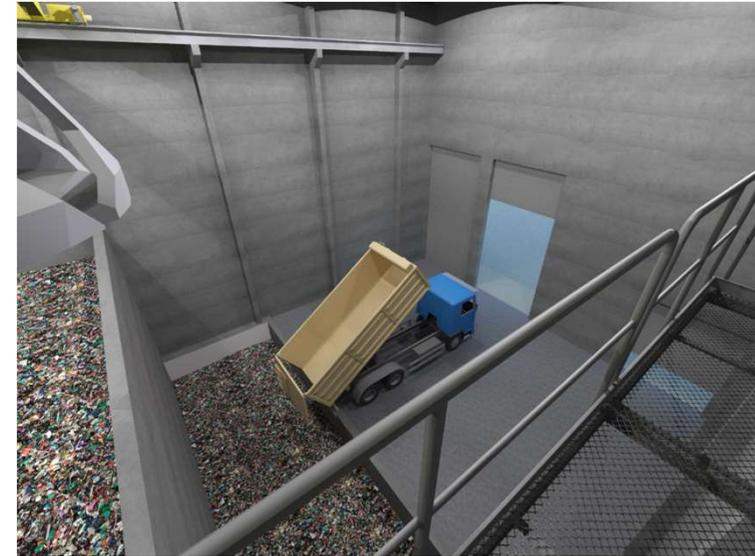
- Existing boilers: 2 x 10 MW ht water boiler installation
- New installation: 17MW hot water boiler installation
- Burning RDF, house hold waste and waste wood
- Water content in fuel: 15-40%
- Flue gas treatment plant according to EU norms



Senja Avfall

Norway

- 9,6 MW, waste fired hot water boiler
- Fuel – household and industrial waste – water content 15-30% (nominal)
- DeNOx system – based on ammonia water
- Flue gas cleaning system with dosing of bi-carbonate and activated carbon
- ORC Electric Turbine, 1MWe
- Continuous measuring of flue gas emissions in line with local regulations
- 88% efficiency



Waste-to-Energy

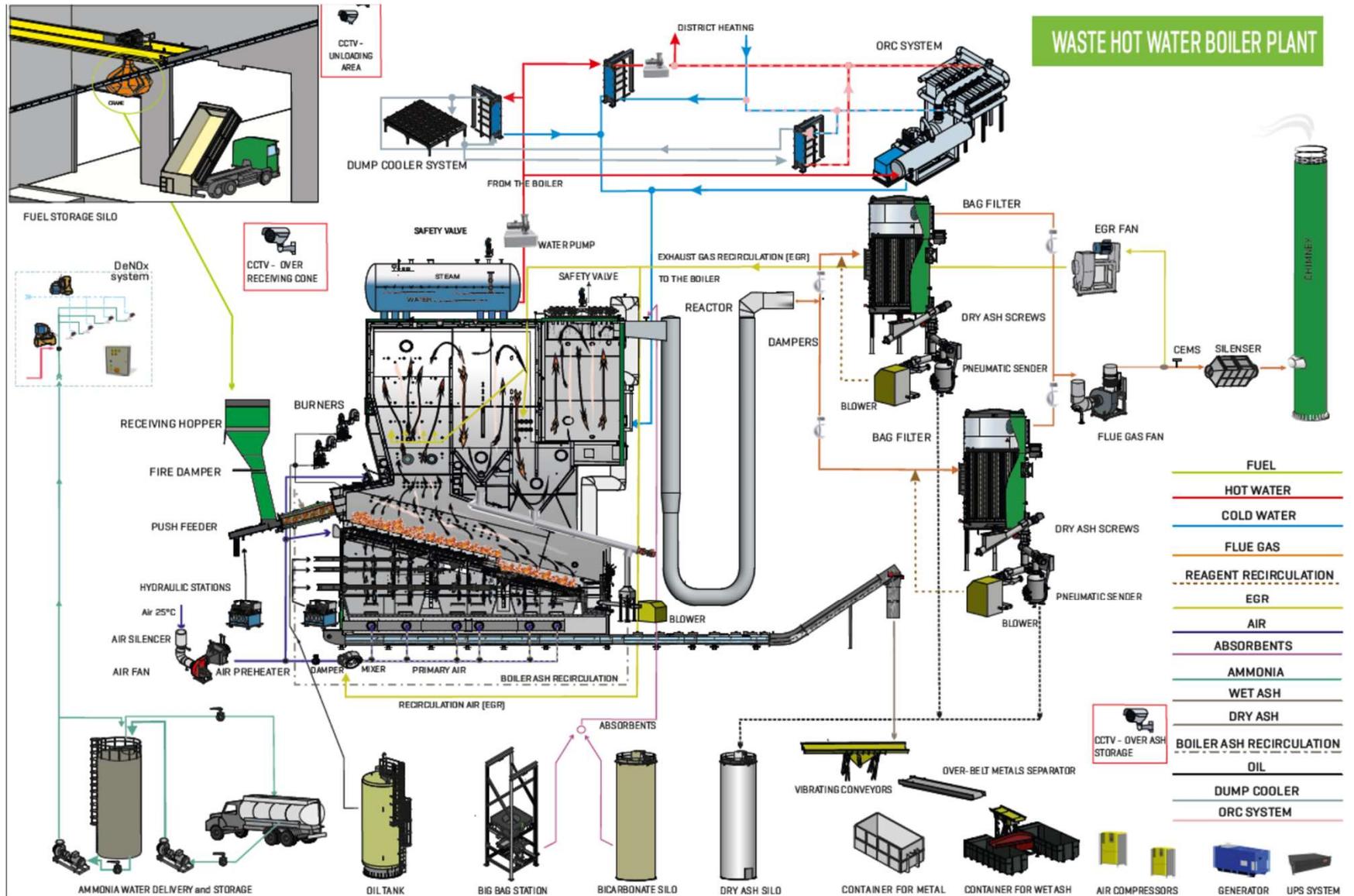
Hot water boiler connected to ORC

SNCR technology for NOx reduction

Principal functional diagram

Features:

- No wastewater from the plant
- Based on modular boiler plant



components

Energy from waste

Fuel type:

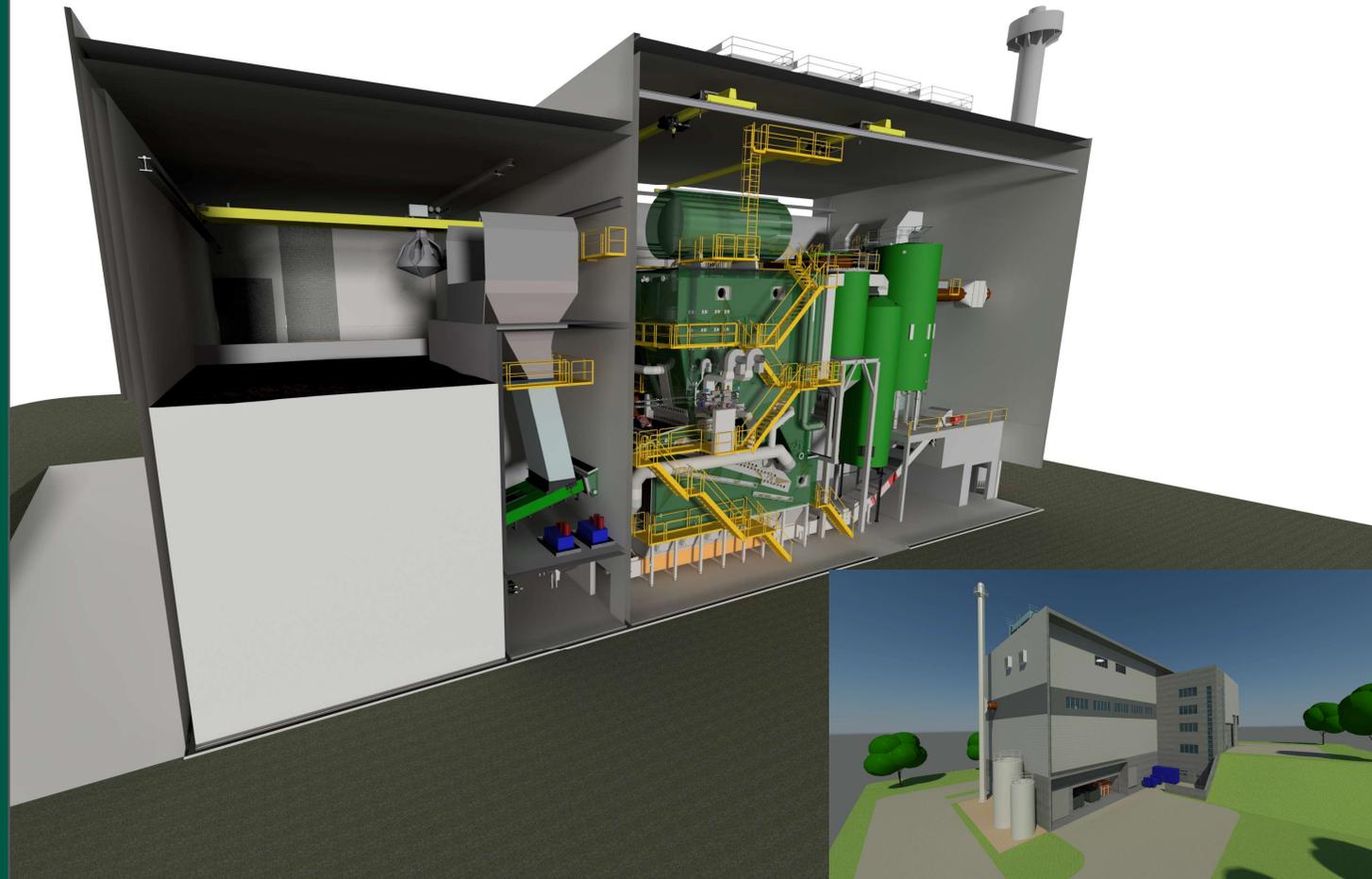
- RDF
- Industrial waste
- Household / Municipal waste

Standard size:

- (4 MWt)
- 8.9 MWt
- 10 MWt
- 15 MWt
- 17 MWt

Output:

- hot water
- saturated steam
- Power, ORC/CHP



VERDO

Thank you,

www.verdo.com
bojo@verdo.com