

The heat plant – Future biorefinery

Panndagarna 2015

Västerås, 14-15 April

Valmet Technologies Comprehensive Offering for Energy Customers



- Biomass to Energy, Waste to Energy and Multifuel solutions
 - Fuel handling systems
 - Boiler islands, modularized power plants and heating plants
 - Air pollution control systems
- Products and Technologies
 - Circulating fluidized bed boilers (CYMIC) and Bubbling fluidized bed boilers (HYBEX)
 - Biomass and waste gasification
 - Oil and gas boilers, waste heat recovery boilers
- Rebuilds and conversions
 - BFB conversions, capacity increases and lower emission levels
- Services

Facts

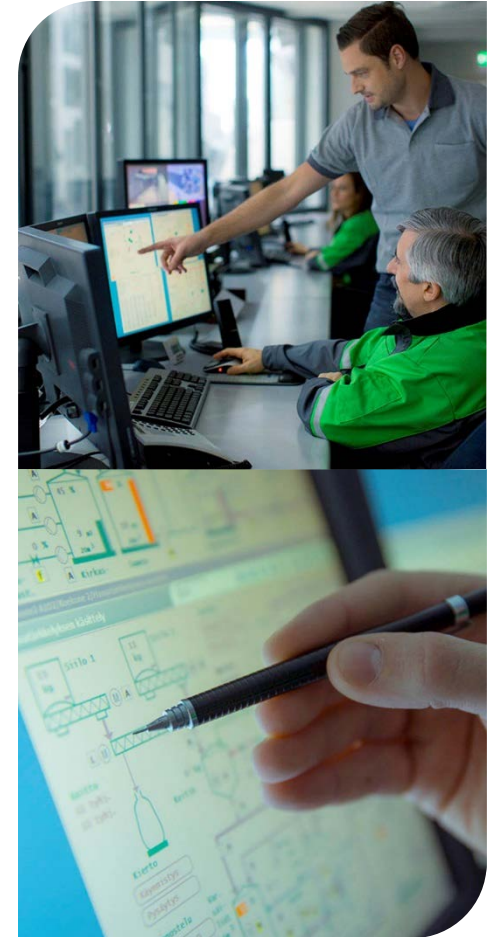
- Solutions for demanding fuels: biomass, waste and multifuel
- Multifuel capabilities
- Wide capacity range
- From-Fuel-to-Stack solutions
- Large installed base

Results

- High fuel flexibility gives economic advantage and security
- Replacement of fossil fuels
- Reducing CO₂ emissions economically
- Minimum emissions

Valmet acquires Process Automation Systems business from Metso

- Valmet and Metso have signed an agreement on the sale of Metso's Process Automation Systems business to Valmet on January 15, 2015
 - The enterprise value of the acquisition is EUR 340 million
 - The acquisition is estimated to be completed by April 1, 2015
- Acquisition has an excellent strategic fit
 - Combination of Valmet and Process Automation Systems creates unique customer offering
 - Paper, pulp and power plant technology offering, services, process know-how and automation in one customer value-adding entity
 - The acquisition makes Valmet more stable and more profitable



New Biomass Conversion Technologies

Secured performance through step-wise development



- CFB gasification technologies for biomass and waste gasification
- Pyrolysis solutions for bio-oil production
- LignoBoost system for extracting lignin from kraft black liquor
- Complete production lines for steam treated pellets and revamps of existing white pellet plants
- Solutions for prehydrolysis of biomass to sugars and lignin for further refining to fuels or chemicals



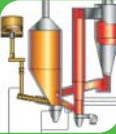


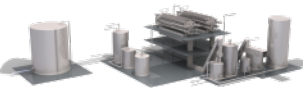
Facts

- Commercial scale gasification of biomass and waste since 2011
- Bio-oil pilot production since 2009, first demonstration scale plant in operation in 2013
- World's first commercial lignin separation installation in operation since 2013
- Several prehydrolysis pilot scale deliveries. First demonstration scale plant in operation in 2012. Commercial scale being offered.

Results

- New revenue streams for pulp mills and biomass power plants
- Reduction of emissions
- From fossil fuels to utilization of sorted waste and biomass
- Alternative renewable fuels

Six full-scale new biotechnology projects

Biomass gasification	Vaskiluodon Voima, Vaasa, Finland	140 MW gas to replace coal in PC boiler	
Waste gasification	Lahti Energia, Lahti, Finland	2*80 MW Waste	
Biomass indirect gasification	GoBiGas Göteborg Energi, Sweden	20 MW SNG	
Integrated pyrolysis	Fortum Joensuu, Finland	30 MW bio-oil	
Lignin extraction	Domtar Plymouth, NC, USA	25 000 ton/a lignin	
Lignin extraction	Stora Enso Sunila mill, Finland	50 000 ton/a lignin	

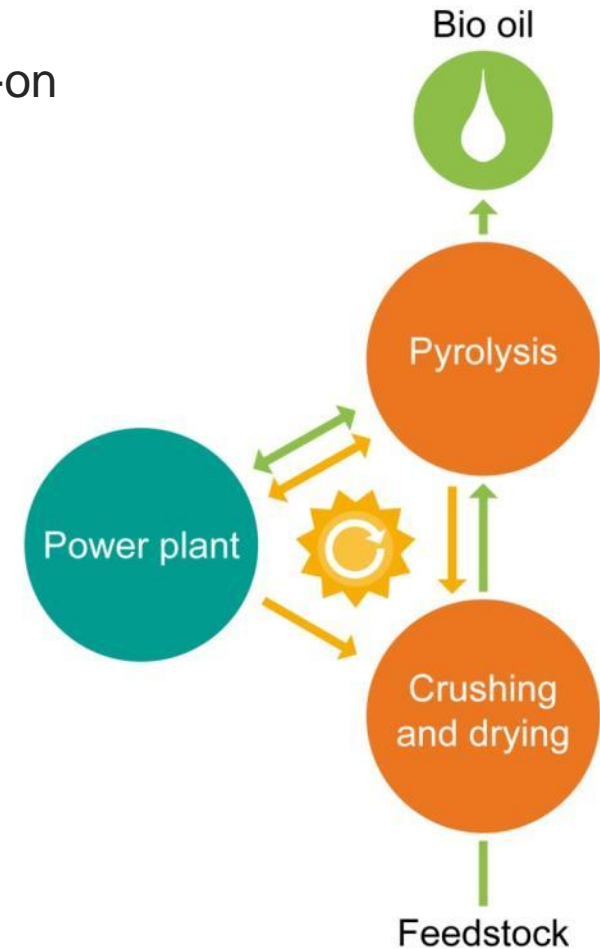
New biorefinery solutions for energy producers



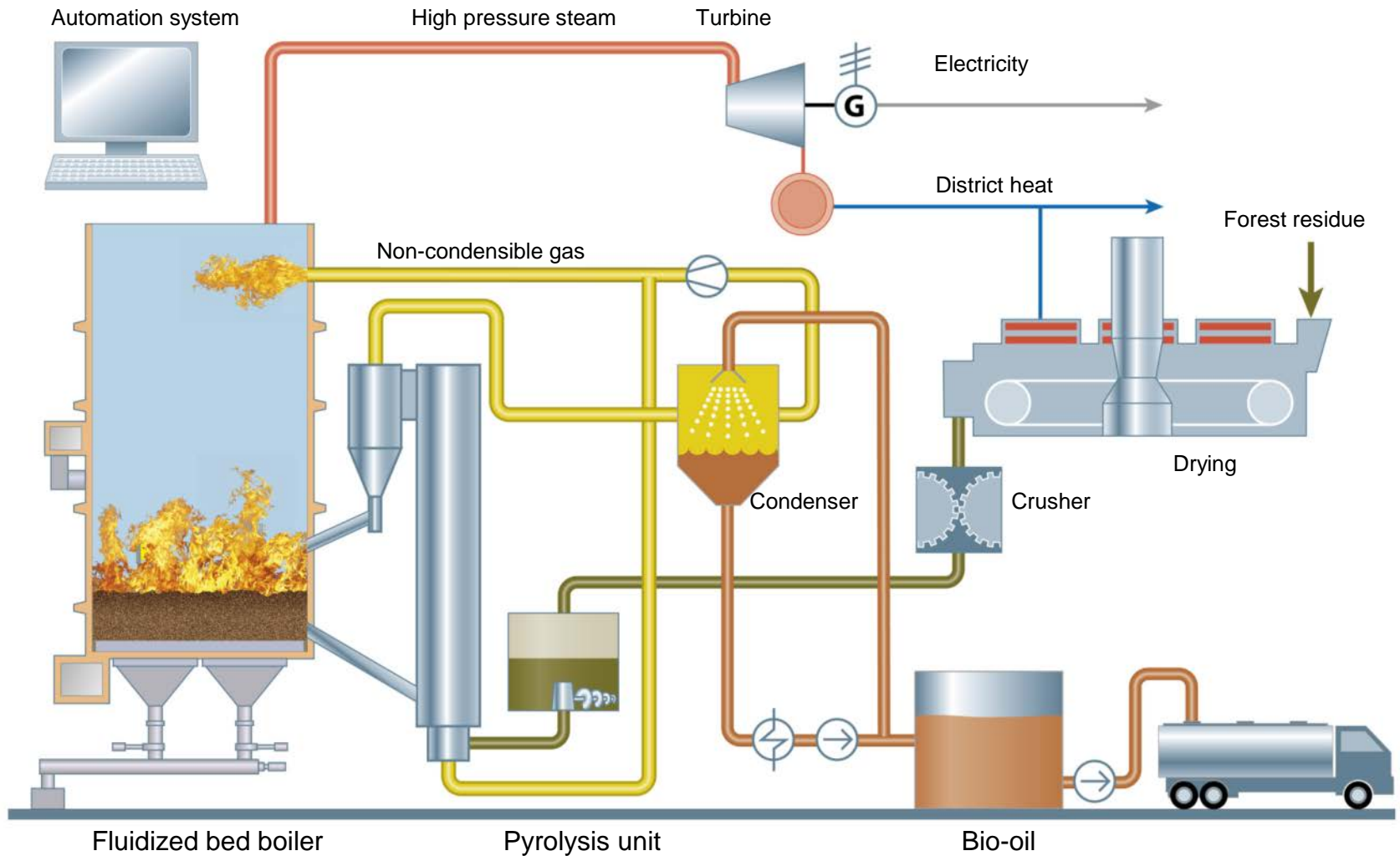
Bio-oil

Integrated pyrolysis

- Production of renewable liquid fuel with an add-on process to a fluidized bed boiler
- Utilizing waste heat for feedstock drying
 - Increase in plant efficiency
- Applications:
 - Replacing fossil fuels in burner applications
 - Heat/steam generation
 - Lime kiln and industrial ovens
- 30 MW_{oil} demonstration project with Fortum ongoing
- Commercial offering:
 - Pyrolysis piloting trials
 - Studies for customer sites
 - Pre-engineering
 - Burner systems



Bio-oil production technology



Pyrolysis integrated to a CHP-boiler

Joensuu 30 MW_{oil}, 50 000 t/a bio-oil production plant

Pyrolyzer
in boiler
building

Feedstock
drying and
crushing

Bio-oil
recovery

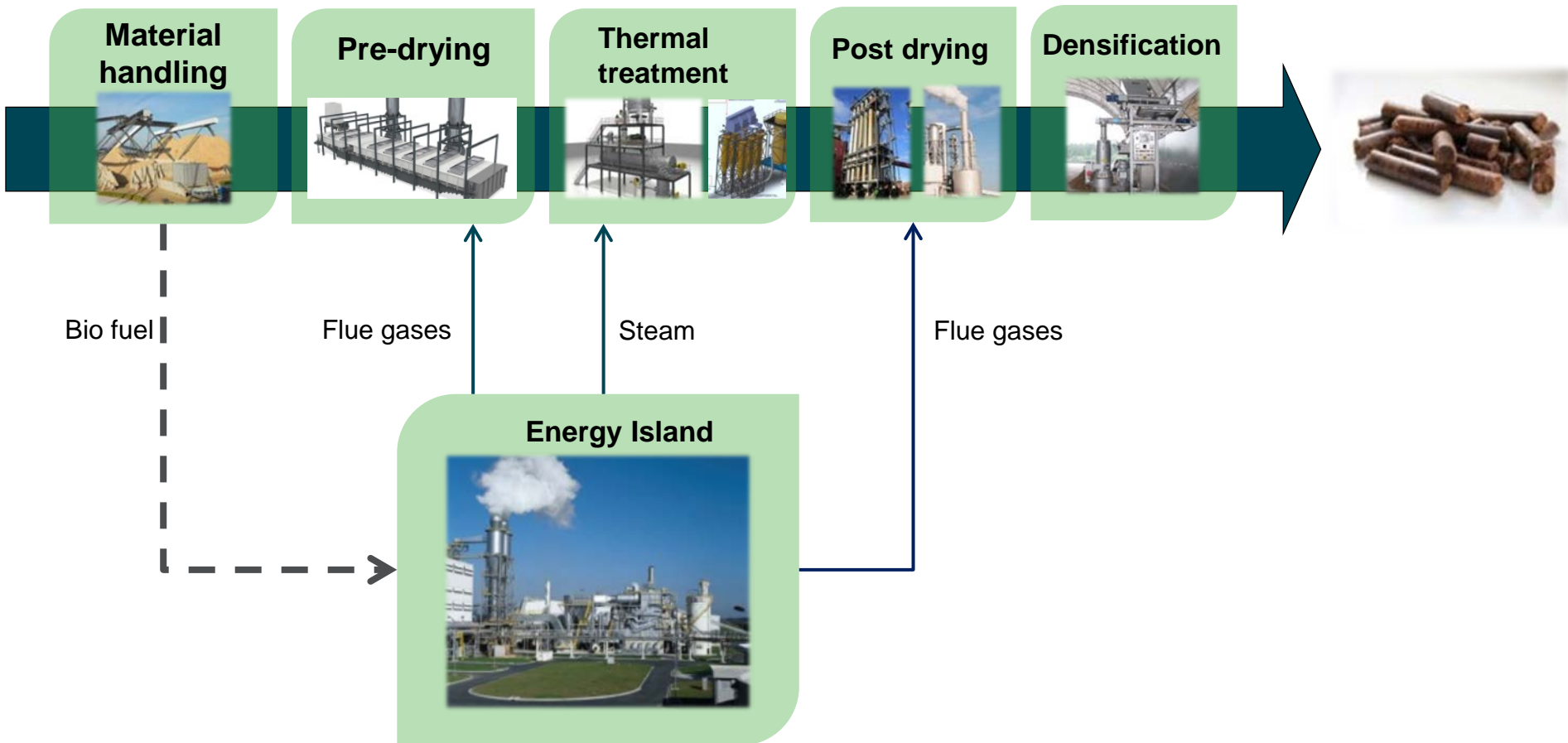
Bio-oil
storage
tanks





Biocoal

Production of black pellets



Black pellets replaces coal up to 100 %

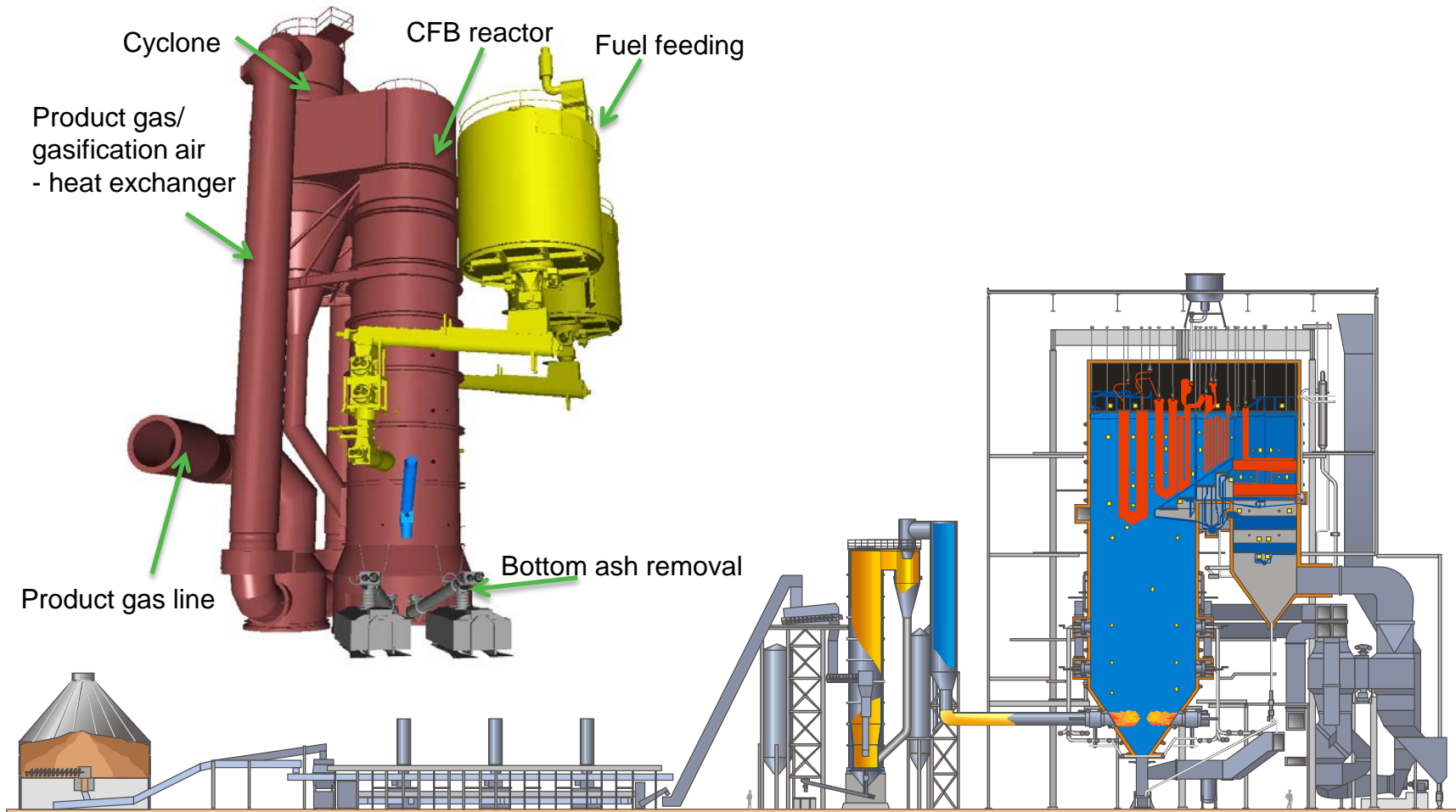
Successful full-scale testing by utility customers

- Several full-scale tests complete in European and Asian coal units (80-500 MW)
- Co-fired up to 70% in larger units, up to 100% in smaller units
- Success grinding in existing coal mills (ball and roller), some up to 100% Black pellets

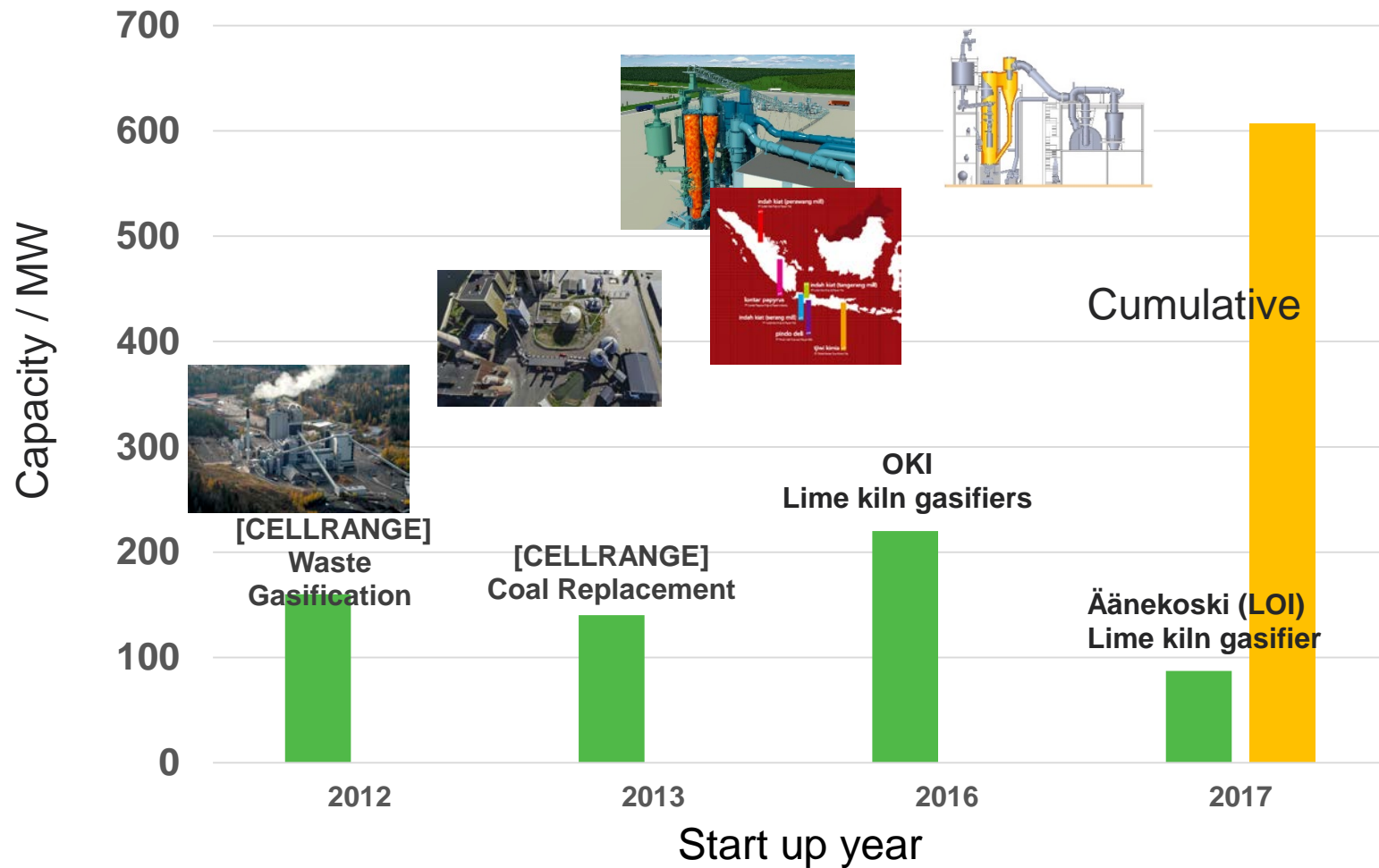


Biogas as replacement for fossil fuels

CFB gasification

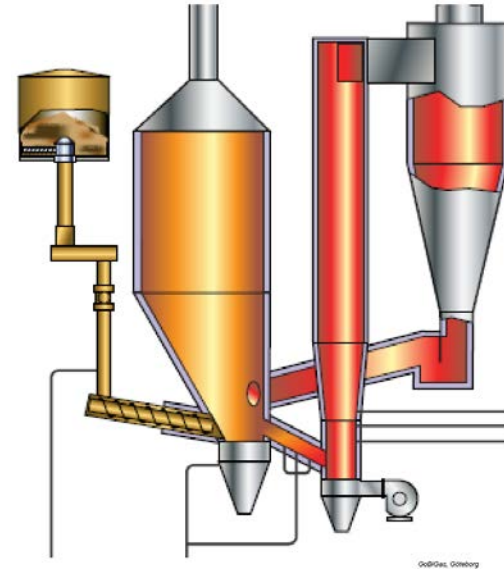
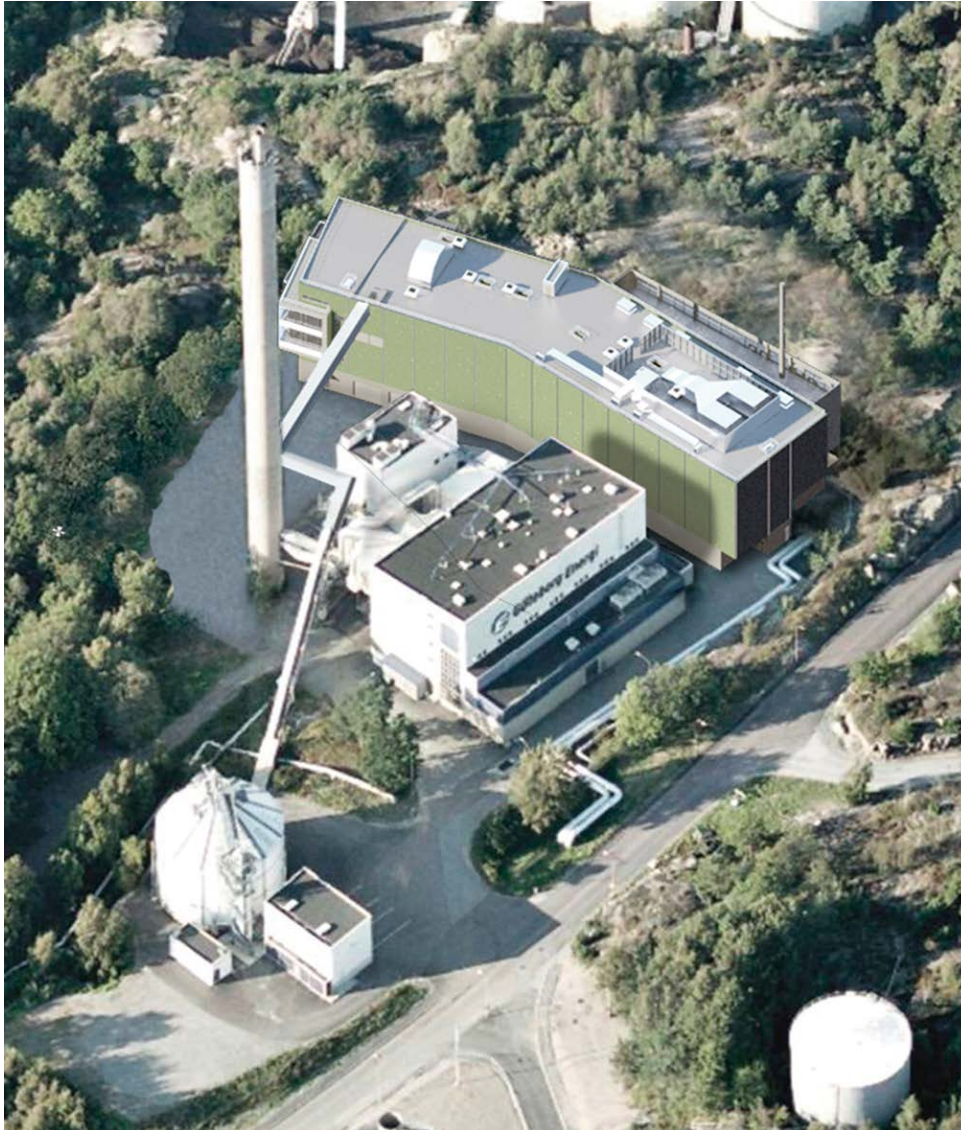


CFB gasification references



GoBiGas

Plant in operation



- Indirect gasification
- High quality gas for further refining
 - SNG (biomethane - GoBiGas)
 - Liquid fuels (Fischer-Tropsch)

New technologies to the market

- Business potential
- Predictability
- Synergy
- Partnering
- Public funding



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