

1 MW_{th} Pilot Plant Visit

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2nd Public
Workshop



1 Introduction

2 1 MW_{th} Pilot Plant

3 Visit of Pilot Plant

Conversion of Solid Fuels

- Fluidized bed gasification & combustion
- (Bio-)Fuel production
- Pulverized fuel combustion
- Characterization of solid fuels



Biomassekraftwerk in Güssing



Raw Methanol from pilot plant

www.kraftwerk-mehrum.de



Power Plant Technology

- Efficiency & flexibility of power plants
- Polygeneration
- High temperature corrosion

CO₂ Capture Technologies

- Oxyfuel combustion
- Chemical looping
- Carbonate looping

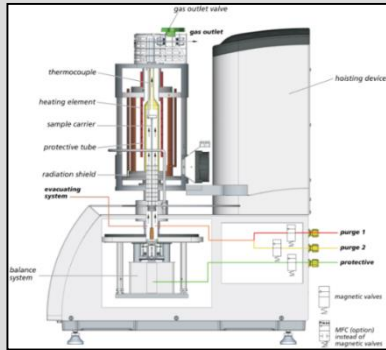

 1 MW_{th} pilot plant

1

Technological Development



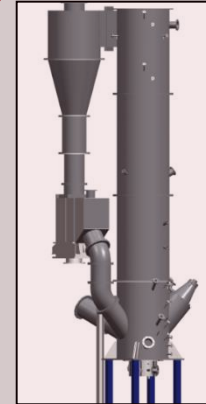
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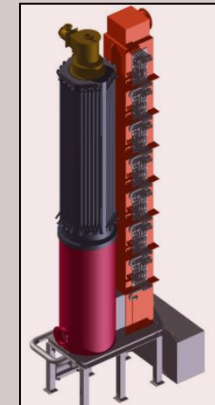
TGA



Entrained-flow
reactor



1 MW_{th} fluidized bed
reactors



1 MW_{th} combustion
chamber

**Bench scale
experiments**

**Lab Scale
Investigation**

**Pilot scale
Validation**

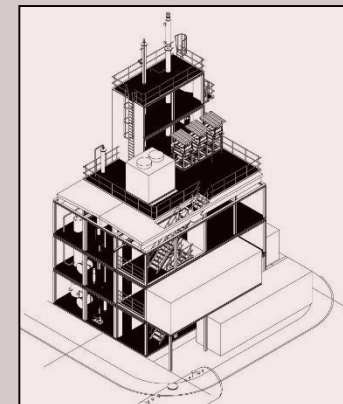
**Full
scale**



Air jet sieve



Lab-scale fluidized
bed reactor



Pilot scale gas
treatment plant

Pilot-scale (1 MW_{th}) Test Facilities

- Circulating fluidized bed ($d_i = 600$ mm)
- Circulating fluidized bed ($d_i = 400$ mm)
- Combustion chamber
- Gas Treatment Plant
- Peripherals



Lab-scale Test Facilities

- 300 kW_{th} CaL plant
- Fluidized bed reactor
- Entrained flow reactor
- Cold flow models
- ...

Measuring Equipment

- In-bed capacitance probe
- Online corrosion probe
- Analyzers for gases and solids





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History of Pilot Plant



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Erection Pilot Plant



2009

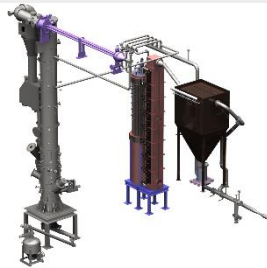
ACCLAIM

2013/14

LISA

2012/13

Commissioning
HTW™ Gasifier



2015

FlexFlores

2019/20

Erection Gas Cleaning Unit



06/2020

Lara

04/2022

LIG LIQ

08/2021

2010



Commissioning
Pilot Plant

2014



Erection
HTW™ Gasifier

2015/16

SUCCESS

2016/17

LISA II
SCARLET

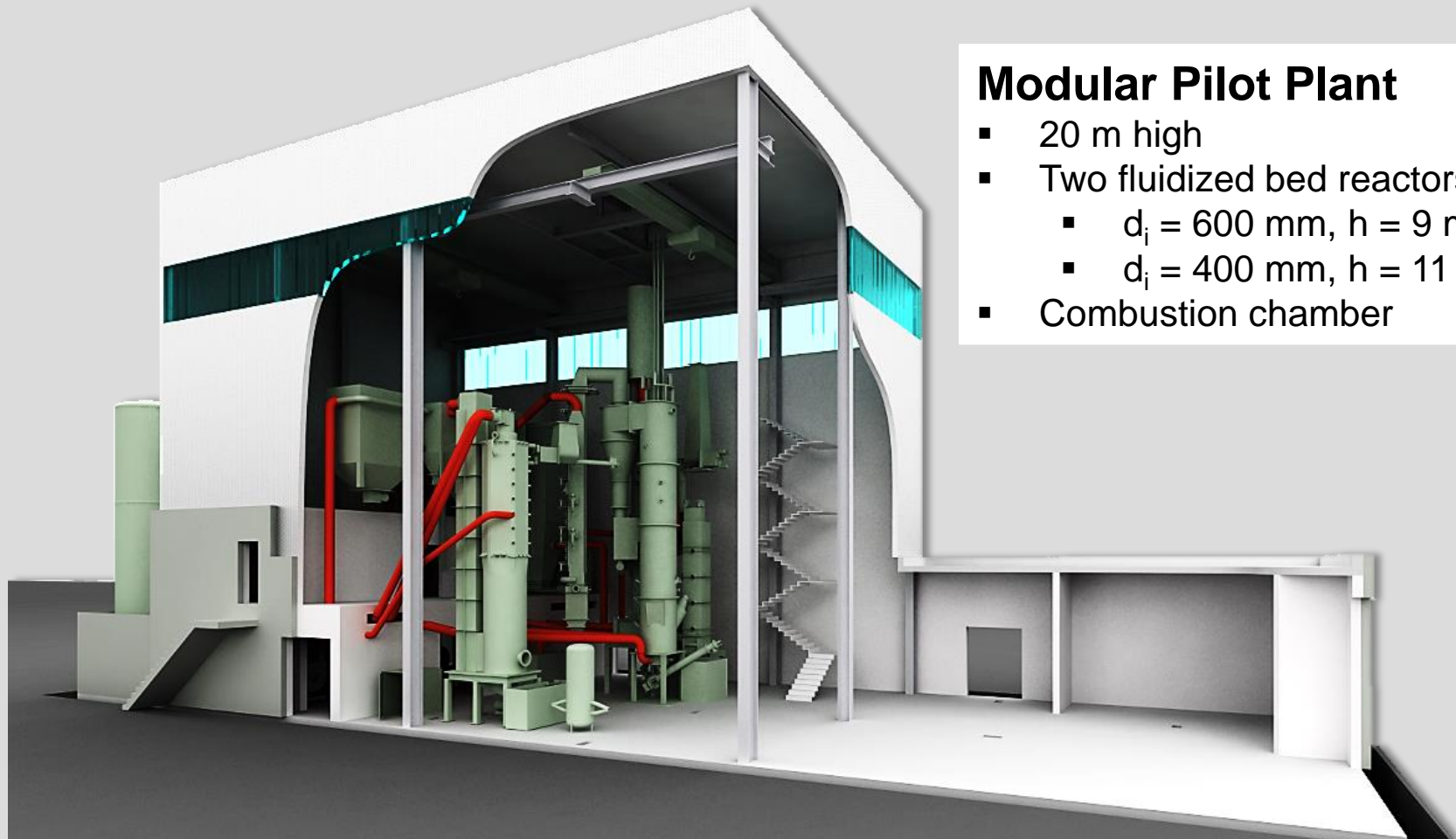
01/2021



Full Chain Commissioning

2023-25

VERENA
CARBIOW
LOUISE
REBECCA

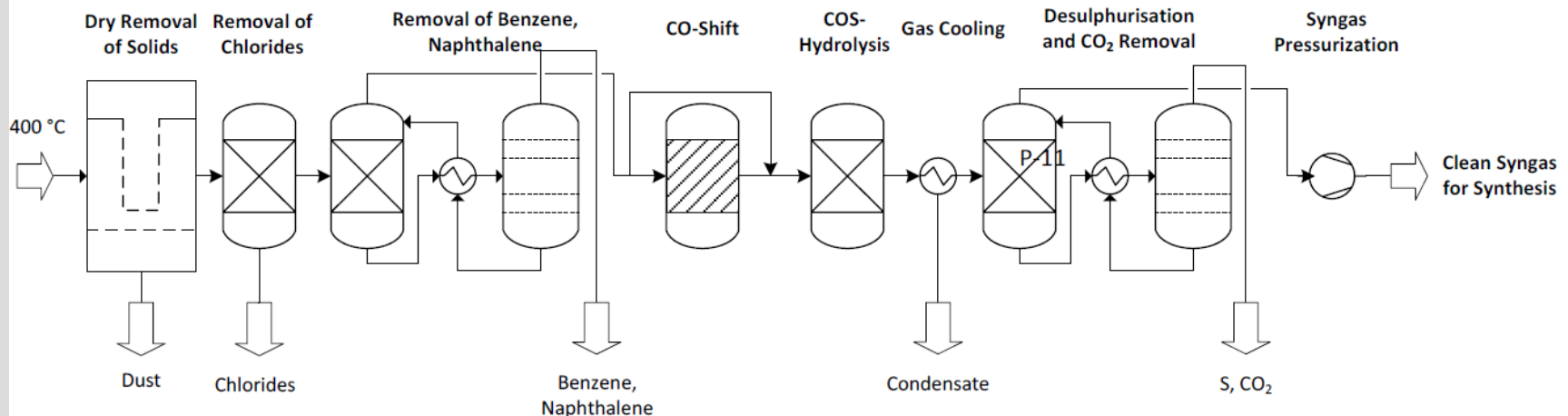


Modular Pilot Plant

- 20 m high
- Two fluidized bed reactors:
 - $d_i = 600 \text{ mm}$, $h = 9 \text{ m}$
 - $d_i = 400 \text{ mm}$, $h = 11 \text{ m}$
- Combustion chamber

Gas Cleaning Concept

- Raw syngas contains side products (e.g. dust, CO₂) & contaminants (e.g. HCl, H₂S)
- Removal before catalysis in hot gas filter, scrubbers & catalytic conversion
- Catalyst requirements (e.g. pressure, H₂:CO-ratio) need to be met
- Treatment of gas in CO-shift
- Pressurization prior to synthesis



Syngas Purification

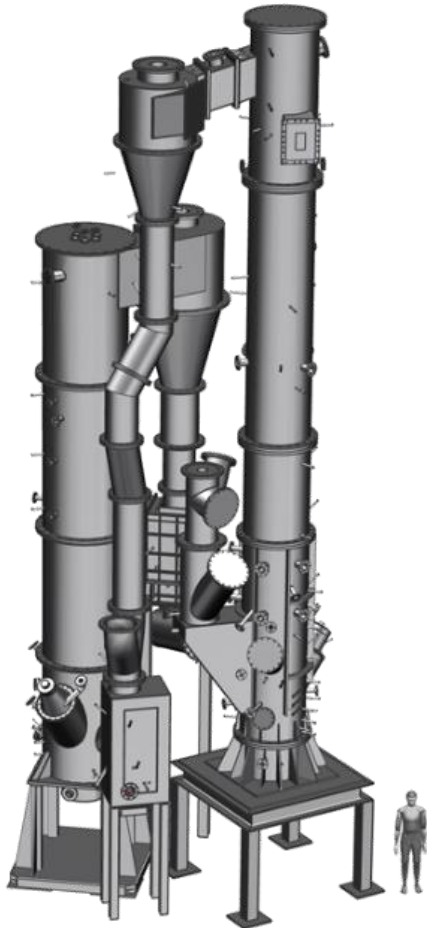
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CLG Pilot Plant



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Reactor System



Feedstocks



Industrial Wood



Pine Forest Residue



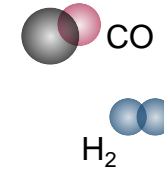
Wheat Straw

Bed Material



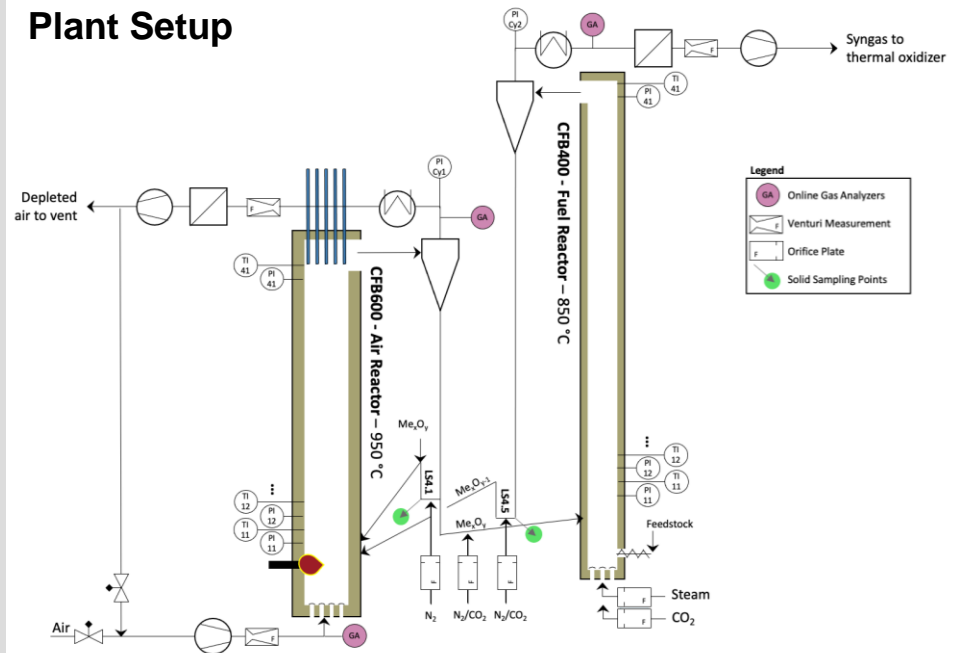
Ilmenite

Products



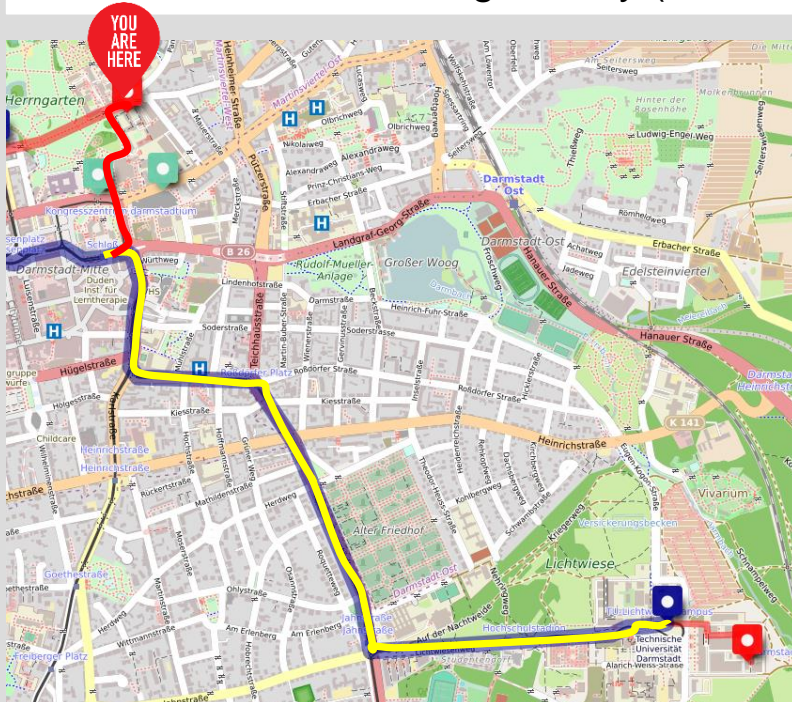
MeOH &
FT-Products

Plant Setup



Outline

- Guided tram ride to *TU Lichtwiese* (approx. 15 min)
- Short walk to pilot plant (3-4 min)
- Visit of 1 MW_{th} Pilot Plant (20 min)
- Visit of Gas Cleaning Facility (15 min)



Tram Schedule

<ul style="list-style-type: none"> ▼ Darmstadt Schloss Darmstadt TU-Lichtwiese/Campus 	15:06 ab 15:16 an
<ul style="list-style-type: none"> > Darmstadt Schloss Darmstadt TU-Lichtwiese/Campus 	15:16 ab 15:26 an

On-Site

- Splitting in 2 or 3 groups
- Pilot Plant visits
- Drop-off at Tram Station *TU Lichtwiese*

Thank you for your Attention!



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