



a.m.b.a.

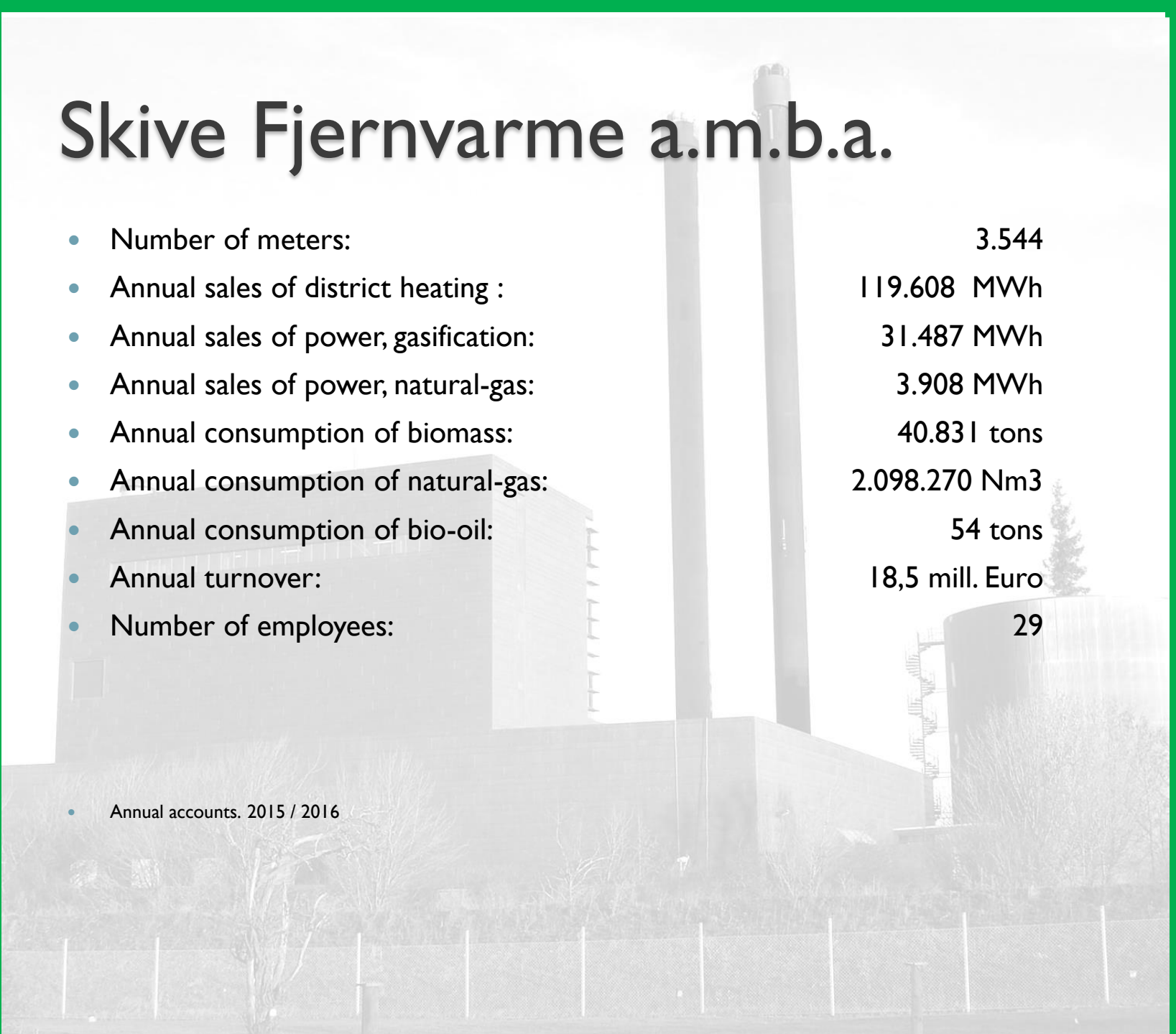
# SKIVE FJERNVARME



CEO Tage Meltofte, International seminar on gasification

20 October 2016

# Skive Fjernvarme a.m.b.a.



• Number of meters:	3.544
• Annual sales of district heating :	119.608 MWh
• Annual sales of power, gasification:	31.487 MWh
• Annual sales of power, natural-gas:	3.908 MWh
• Annual consumption of biomass:	40.831 tons
• Annual consumption of natural-gas:	2.098.270 Nm3
• Annual consumption of bio-oil:	54 tons
• Annual turnover:	18,5 mill. Euro
• Number of employees:	29

- Annual accounts. 2015 / 2016

# Production sites



## Thorsvej

Gasification plant  
2 Biomass boilers  
4.000 m<sup>3</sup> heat storage tank



## Marius Jensens Vej

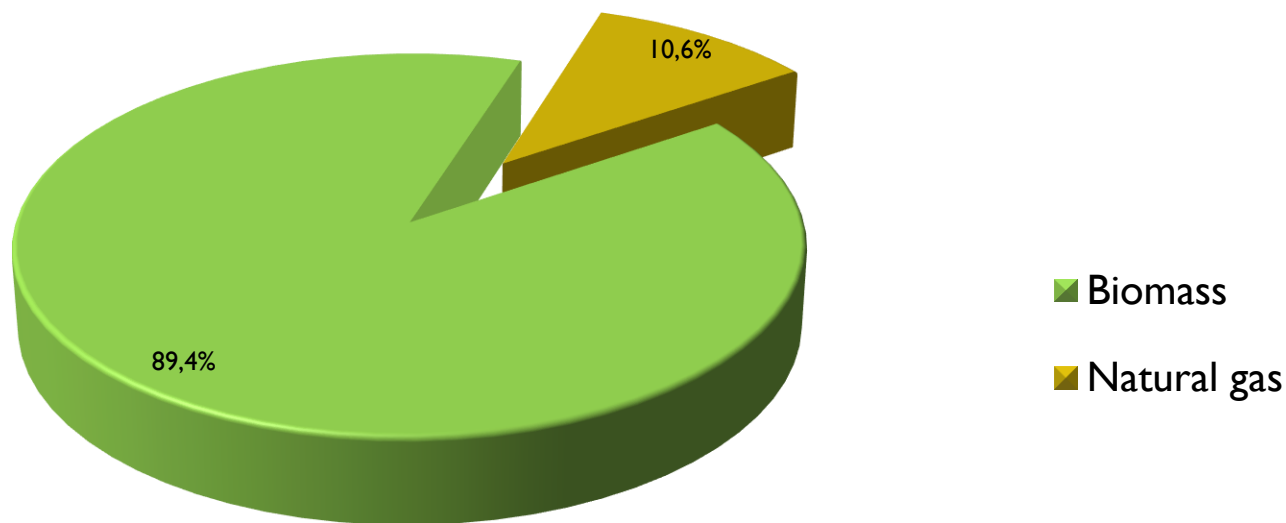
4 Natural gas engines  
3 Bio-oil boilers  
8.000 m<sup>3</sup> heat storage tank



## Højlundsvej

2 Natural gas boilers

# Share of CO<sub>2</sub> neutral production

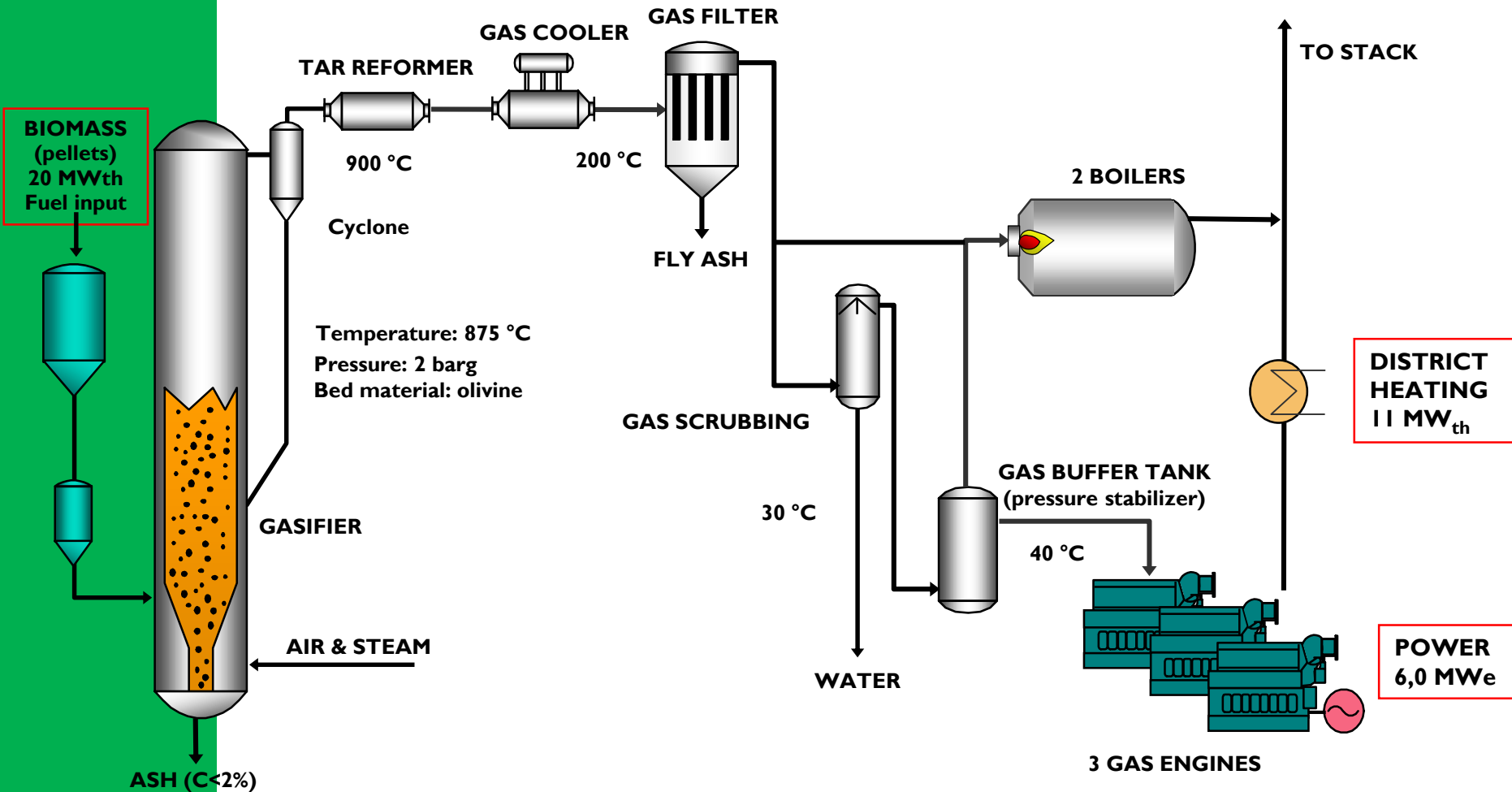






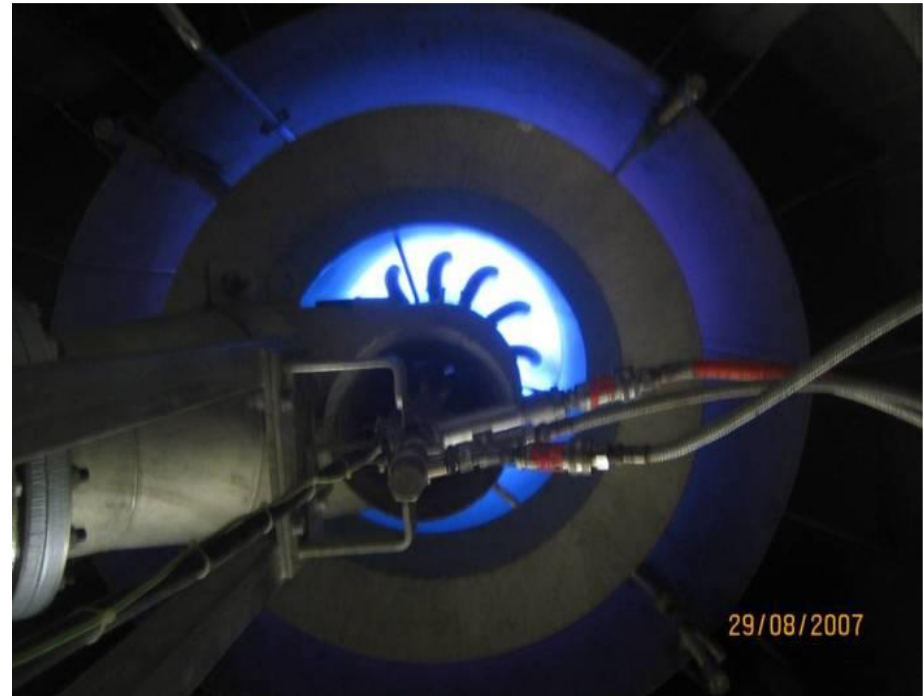


# Biomass Gasification Gas Engine



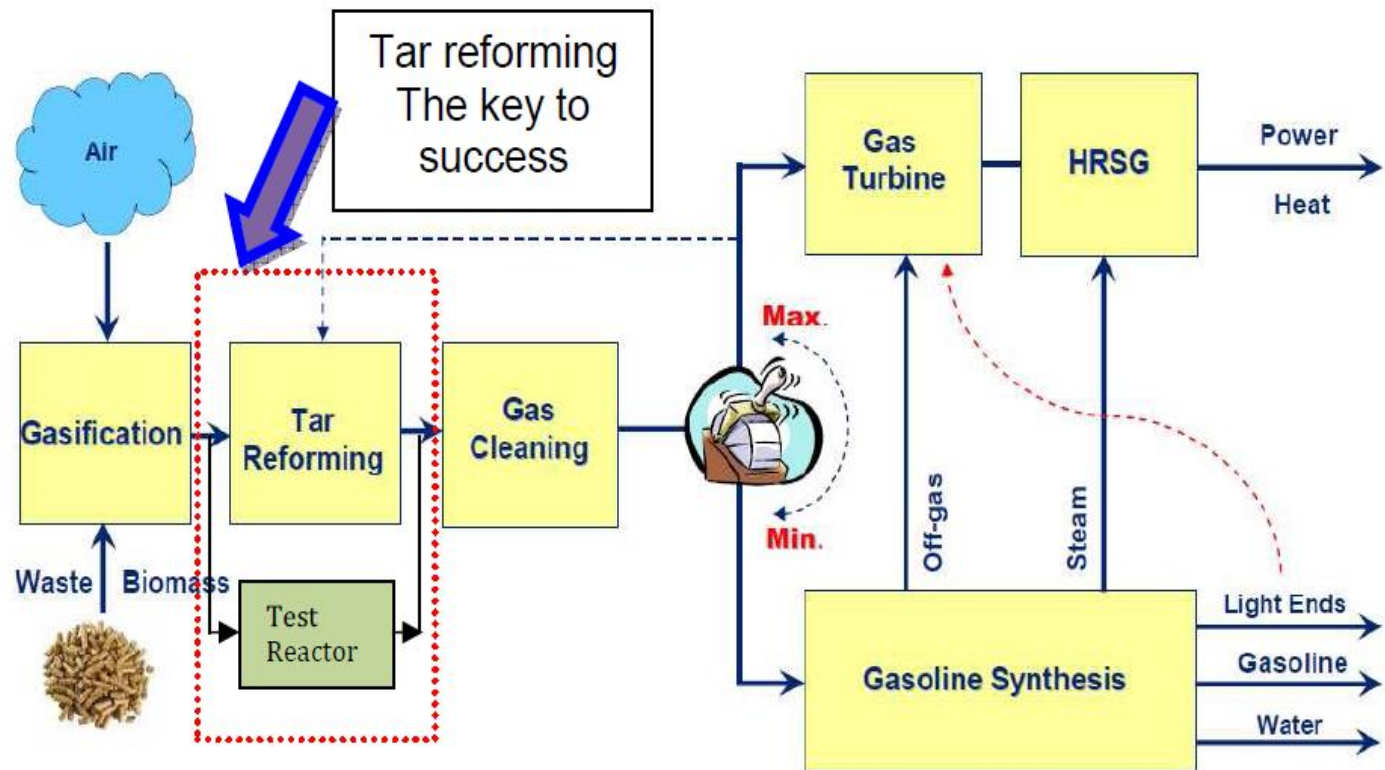
## Gas composition after reformer.

- CO      %-vol 20
- CO<sub>2</sub>    %-vol 12
- H<sub>2</sub>      %-vol 16
- CH<sub>4</sub>    %-vol 4
- N<sub>2</sub>      balance
- LHV      MJ/m<sup>3</sup>n



4.8 – 5.2

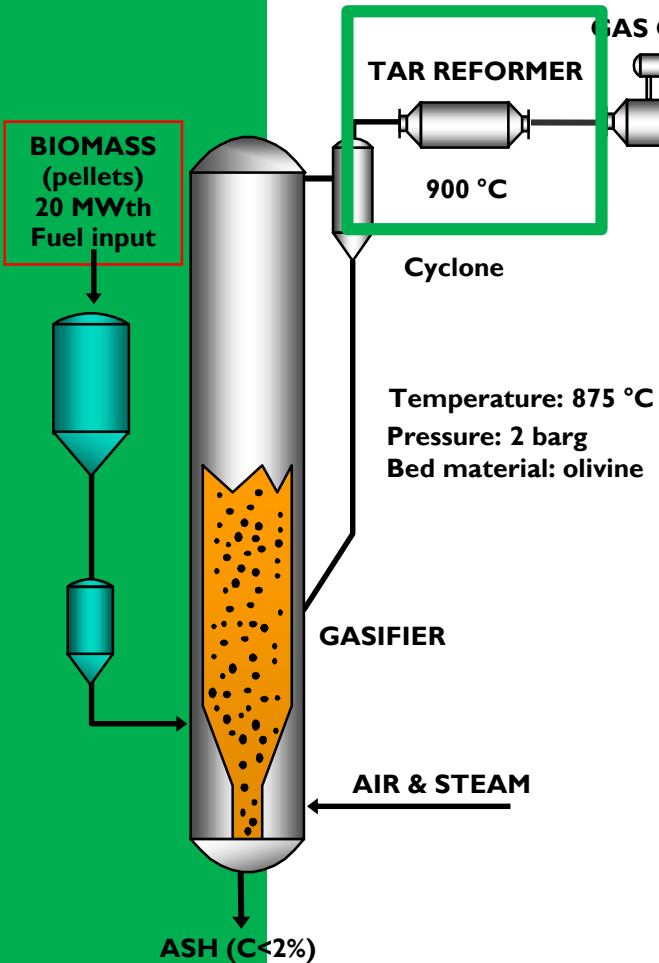
# Utilization of syngas to production of liquid fuel funded by EUDP



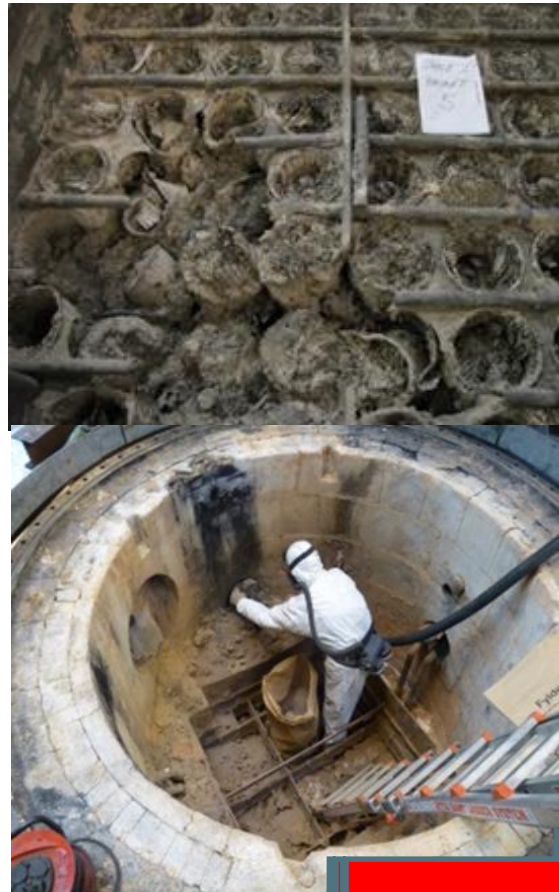
Companies involved in the project:  
Haldor Topsøe A/S  
Danish Technological Institute  
ChimneyLab Europe  
Skive Fjernvarme a.m.b.a



# Biomass Gasification Gas Engine



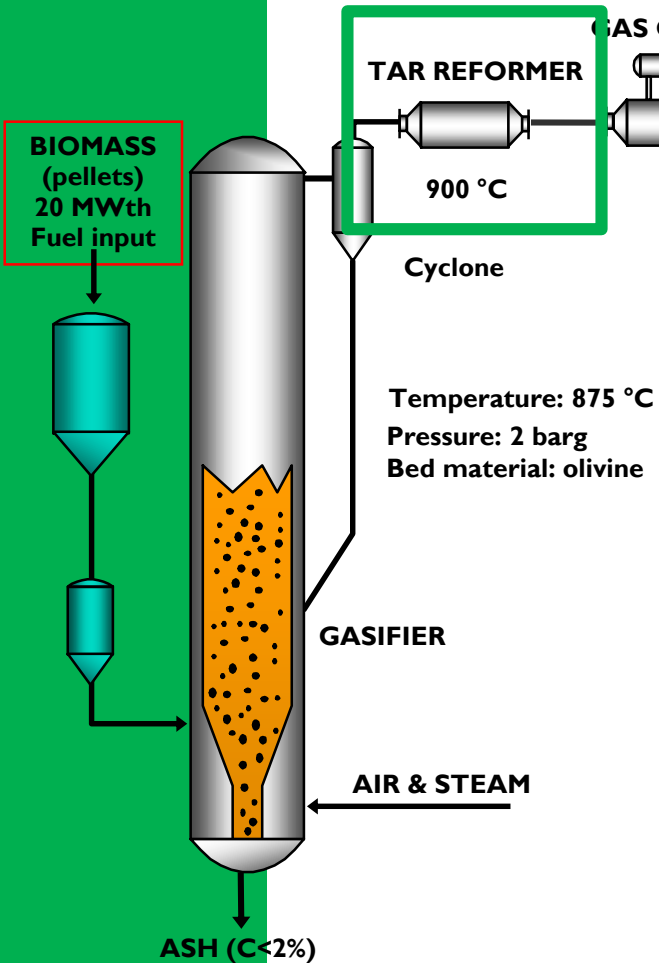
## Tar reforming reactor before revamp 2014:



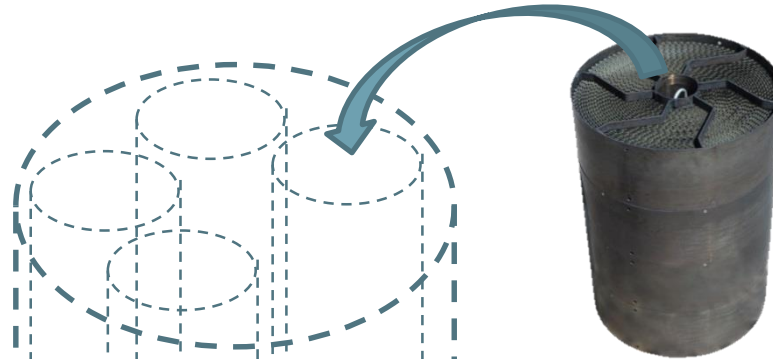
- Poor control → Unstable operation
- Damaged internals
- Troublesome catalyst replacement
- Poor working environment.

**Lower productivity**

# Biomass Gasification Gas Engine



## Tar reformer revamp:



- Pressure shell maintained
- New reactor internals
- New catalyst design

TACK

**DISTRICT HEATING**  
11 MW<sub>th</sub>

**POWER**  
6,0 MWe

**HALDOR TOPSØE** 

# The rebuild tar reformer

has several advantages...



## Improvements:

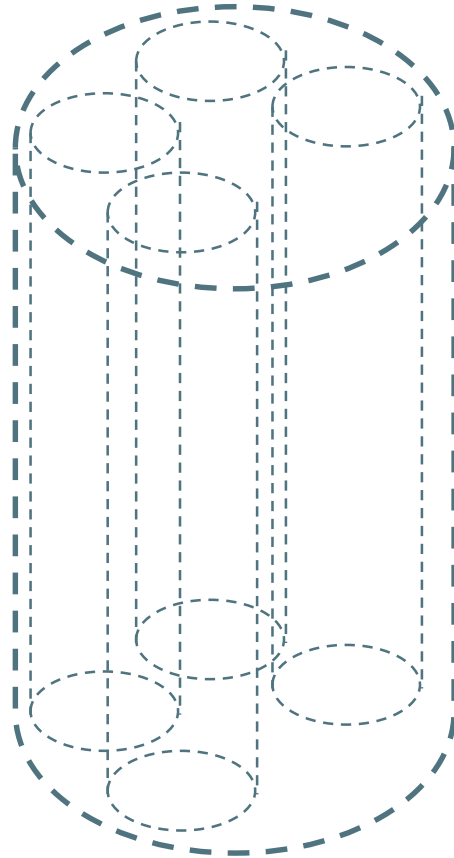
- Improved design of reactor internals
- Faster and easier catalyst replacement
- Much better working environment
- Efficient dust blowing
- Improved design of catalyst
- Better dust handling → increased utilization
- Improved process control
- Robust long-term activity → longer lifetime



Increased number of stable  
operation hours



# The robust tar reformer



The new design of the reformer has led to

- less dust deposition
- better dust blasting
- controlled regeneration of the monoliths

Increased operation hours and longer lifetime of the monoliths.

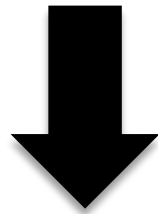
# Skive > 20.000 citizens

6.000 households

6.000 cars

30 km/d (180.000 km/day)

11,3 km/l Gasoline

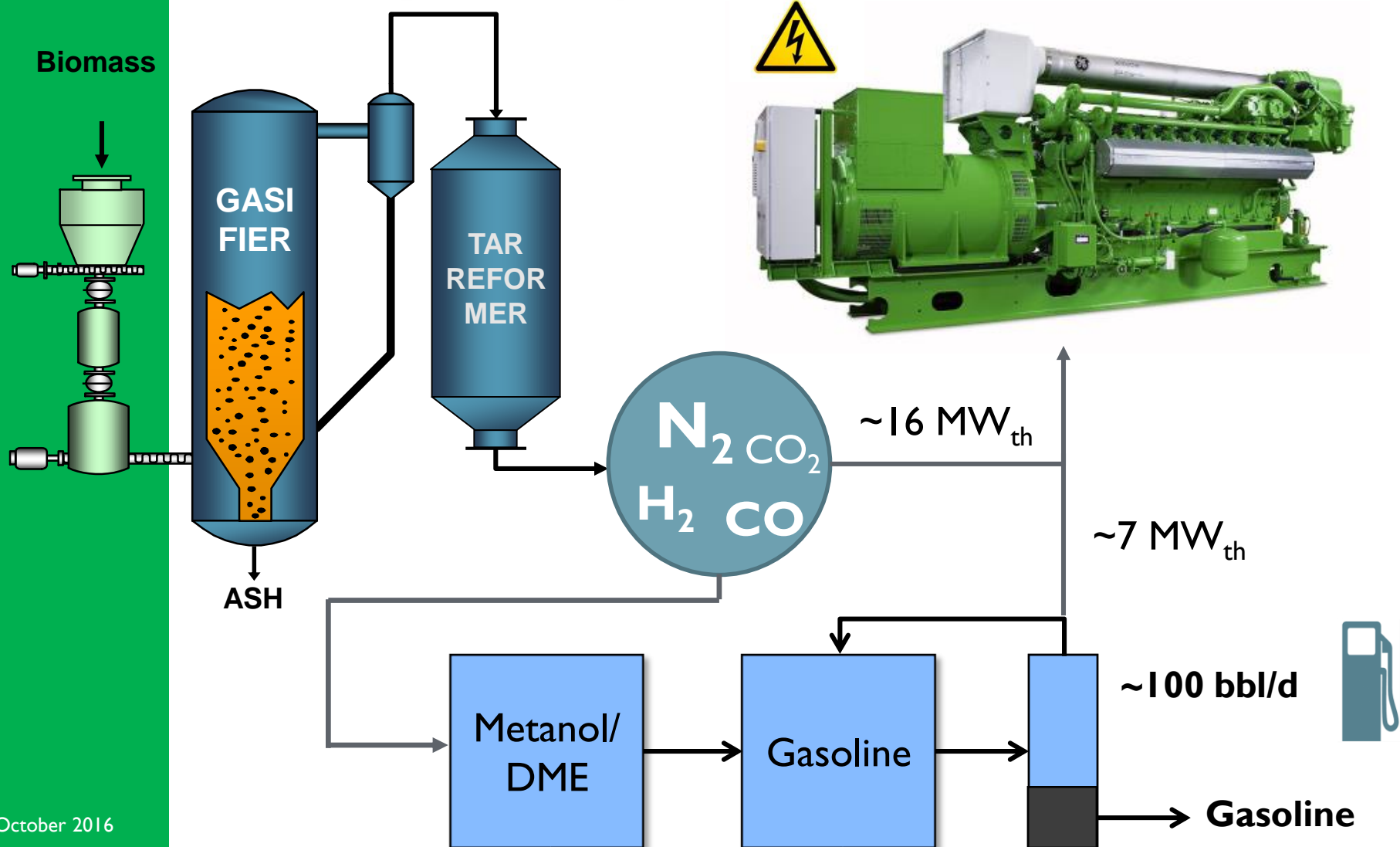


15.900 l Gasoline/day

100 bbl./day

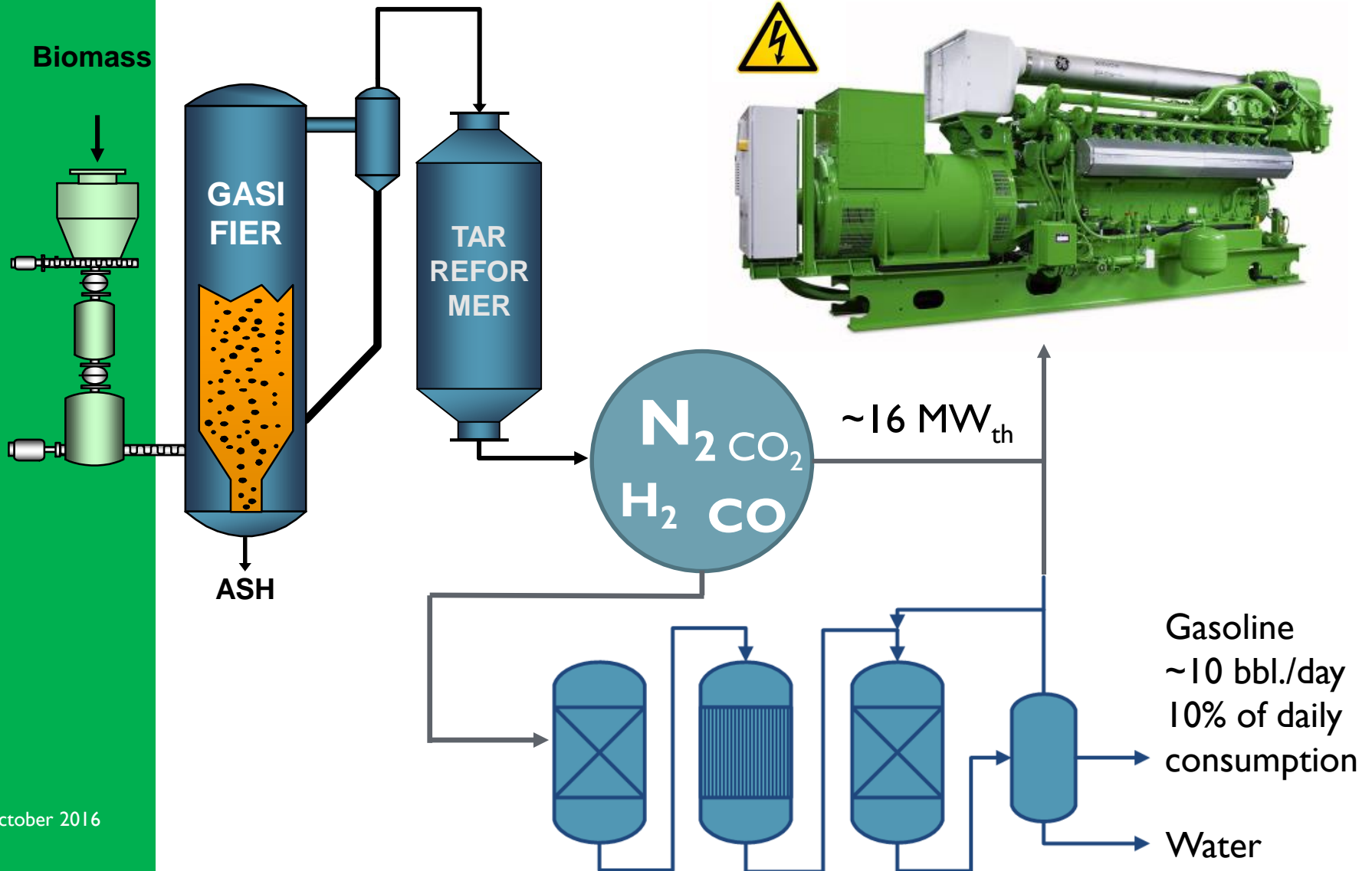


# Thought experiment





# Demo



# Increased electricity production 2010 - 2015

Production, MWh



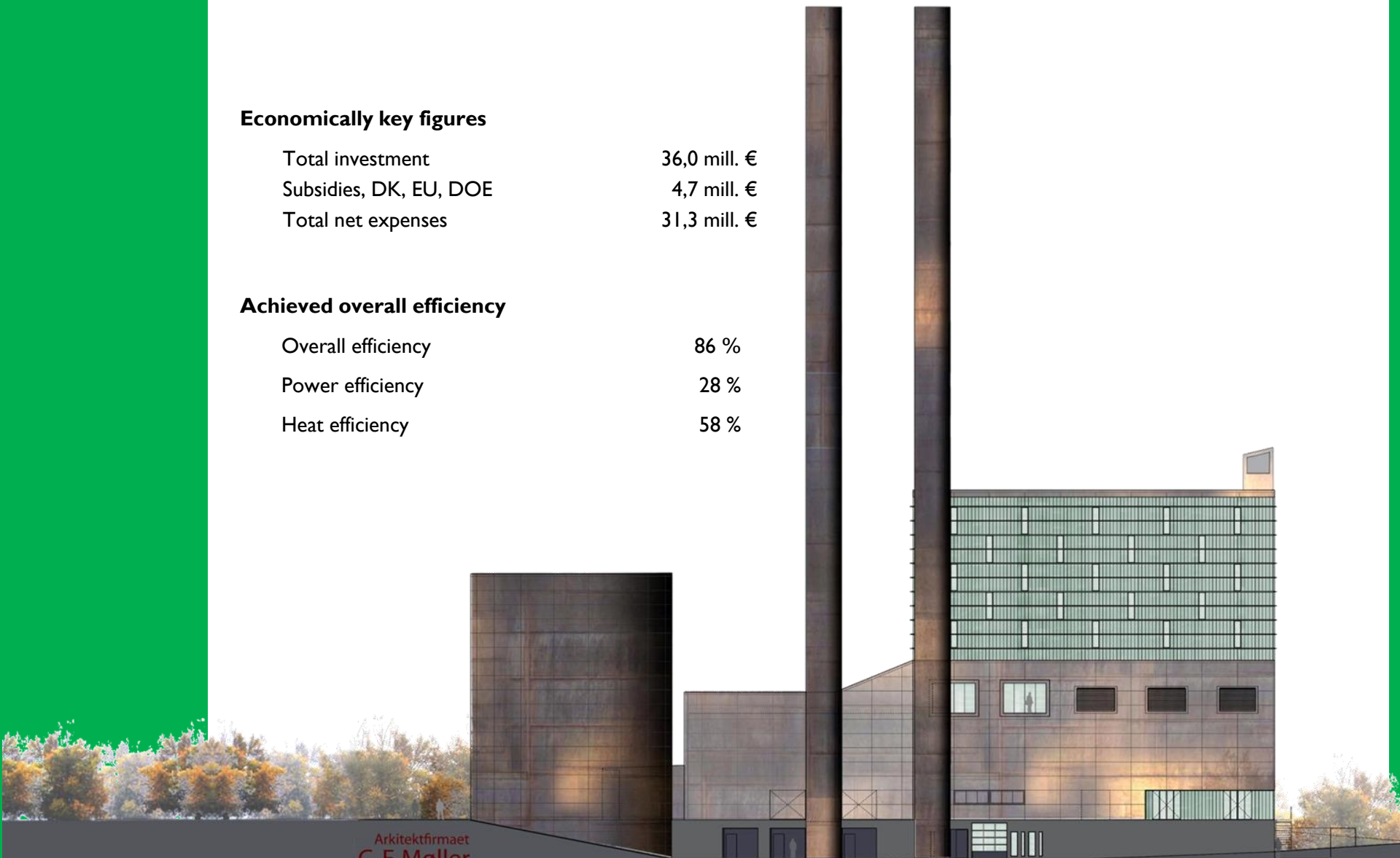
# Summary Skive biomass gasification

## Economically key figures

Total investment	36,0 mill. €
Subsidies, DK, EU, DOE	4,7 mill. €
Total net expenses	31,3 mill. €

## Achieved overall efficiency

Overall efficiency	86 %
Power efficiency	28 %
Heat efficiency	58 %





A low-angle photograph of an industrial building with a modern design. The building features large glass windows on the left and a rust-colored metal facade. Two tall, orange-brown chimneys rise from the roof against a clear blue sky. On the right, a large, curved, rust-colored structure is visible, with a spiral staircase winding around it. The text "Thank you for your attention!" is centered in the image.

Thank you for your attention!