ECN

Energy research Centre of the Netherlands

COUNTRY REPORT the NETHERLANDS

Bram van der Drift

Istanbul, 17 April 2012

NL RENEWABLE ENERGY

political developments

- Innovation is the magic word
- Innovation Contracts developed between Industry, Government and Science
- “Energy” is one of the subjects, Contracts on:
  - Bio-renewables (co-firing, …)
  - Gas (SNG, …)
  - …
- Additional money ~100 MEuro for 7 contracts within Energy

HoSt

small CFB gasification technology for difficult fuels

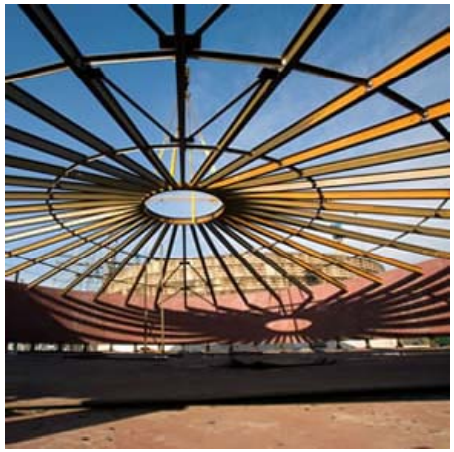
- Portugal: 3 MW_{th} CFB gasifier, OLGA, gas engine, status: commissioning on wood and chicken manure
- 3 ton/h paper-rejects plant in NL, gasifier – cooler – cyclones – boiler – steam, start-up in 2013/Q4, investment subsidy granted, tests in Portugal

HoST BIO-ENERGY INSTALLATIONS

BioMCN

Methanol Chemistry Netherlands

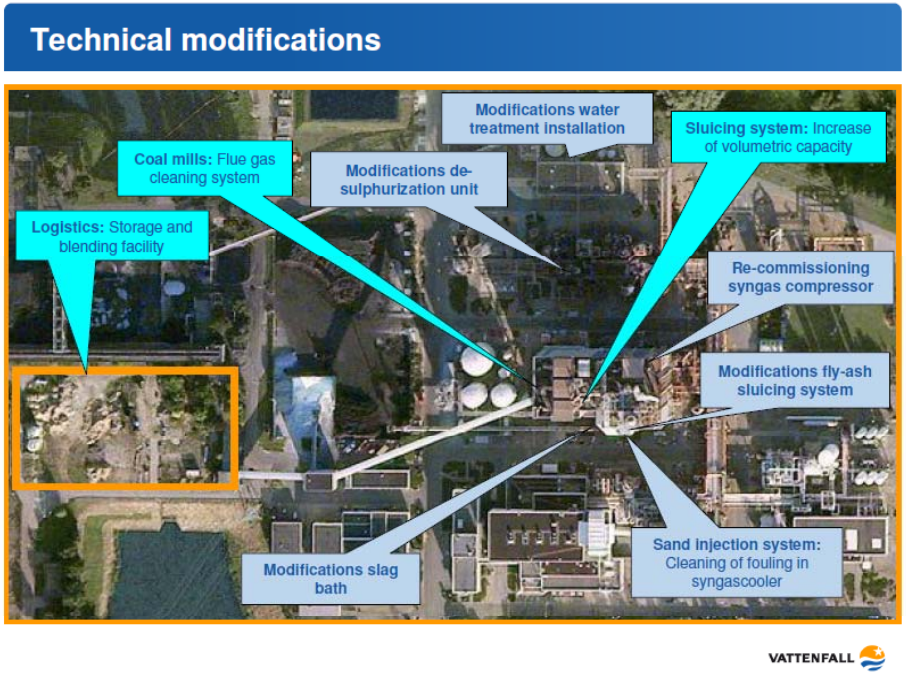
- The largest 2nd generation biofuels plant worldwide
- 30-40% glycerin in Natural Gas reformer, ~150 kton/y bio-methanol (~150 $MW_{bio\text{-}methanol}$)
- Planned: gasification (Siemens) of 1500 kton/y waste wood for 400 kton/y methanol, applied for NER300




NUON (Vattenfall)

250 MWe IGCC in Buggenum

- Biomass co-firing ongoing (<10% e/e); significant extension of co-firing is under investigation (50-70% e/e)
- Refined pellets required: torrefied or steam explosion



- Test 70%: capacity drops to 170-200 MWe
- “Issues”, mostly upstream, but can be solved

IEA Clean Coal Conference on Co-firing, 27/28 March 2012, Copenhagen

ESSENT (RWE)

Amer-9 power station, Geertruidenberg

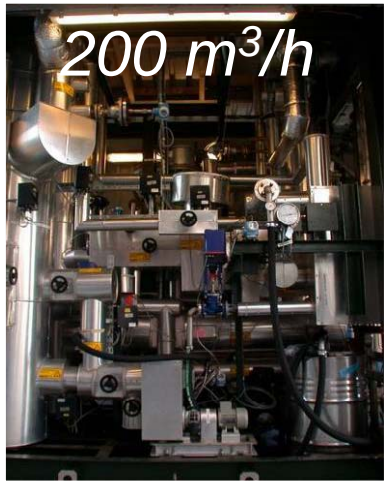
- 600 MW_e coal-fired PF boiler
- 36% w/w direct co-firing, will be increased to 50%
- Plus 5% e/e indirect co-firing by gasification of waste wood: CFB, cooler to ~450C, cyclone
- ~5000 h/year, cooling remains bottle neck

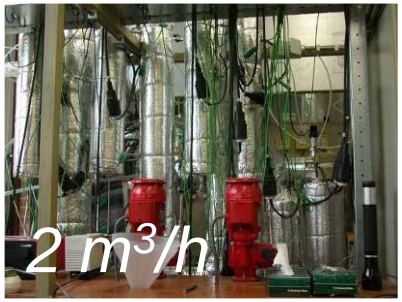
DAHLMAN

www.dahlman.nl

DAHLMAN

- Dahlman Renewable Energy: 4 fte
- Became Royal Dahlman in Jan 2012
- www.renewableenergy.com





HEVESKES ENERGY

Project Delfzijl

- Technology: oxygen driven JFE gasification technology and based on 3-years operational experience
- Feedstock will be high-caloric waste (RDF)
- www.heveskesenergy.nl
- 10 ton/h RDF, start-up end 2013 / start 2014

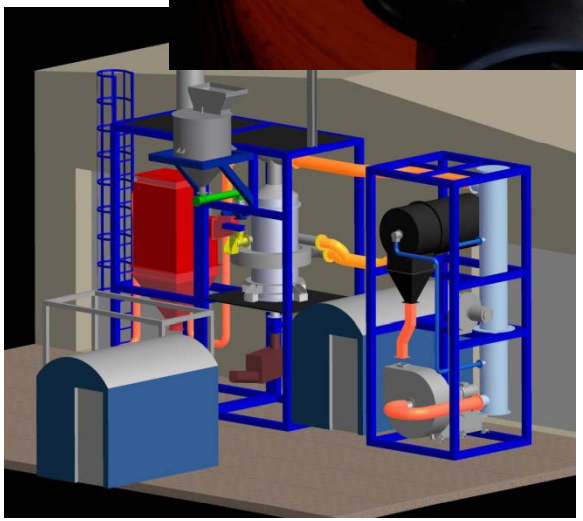
SYNVALOR

Vortex technology

- New multi-stage low-tar concept for all, but more specifically difficult fuels
- Based on Vortex reactor designs
- Aimed at affordable (< 2.500 €/kWe) and reliable technology
- www.synvalor.com
- CEO Jacques Poldervaart: history in Torbed gasification through Polow Energy Systems

SYNVALOR

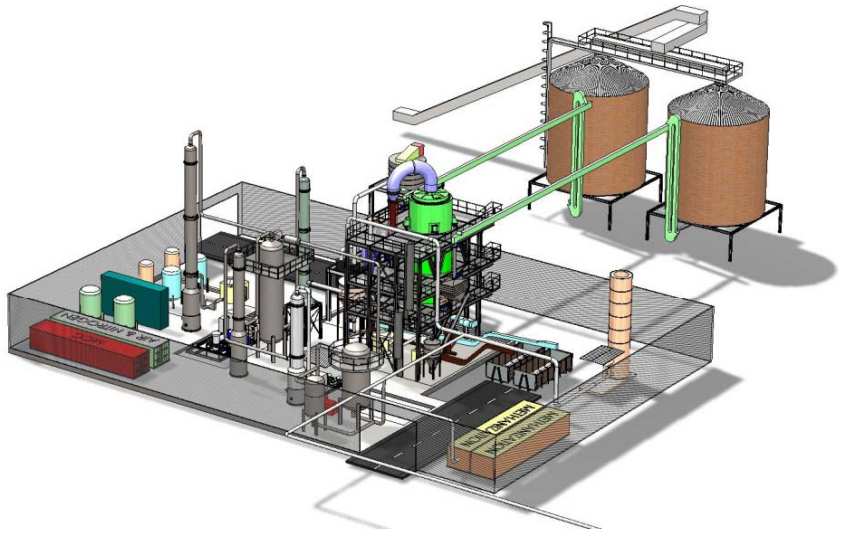
Synvator® test unit



HVC

SNG demo plant, Alkmaar

- 12 MW (waste wood input) plant in preparation
- Based on MILENA gasification and OLGA tar removal
- Phase 1a: heat production (first few years)
- Phase 1b: additional gas cleaning and SNG production
- ~850 Nm^3/h bioSNG
- Investment decision 2012
- Phase 2: 50-100 MW plant



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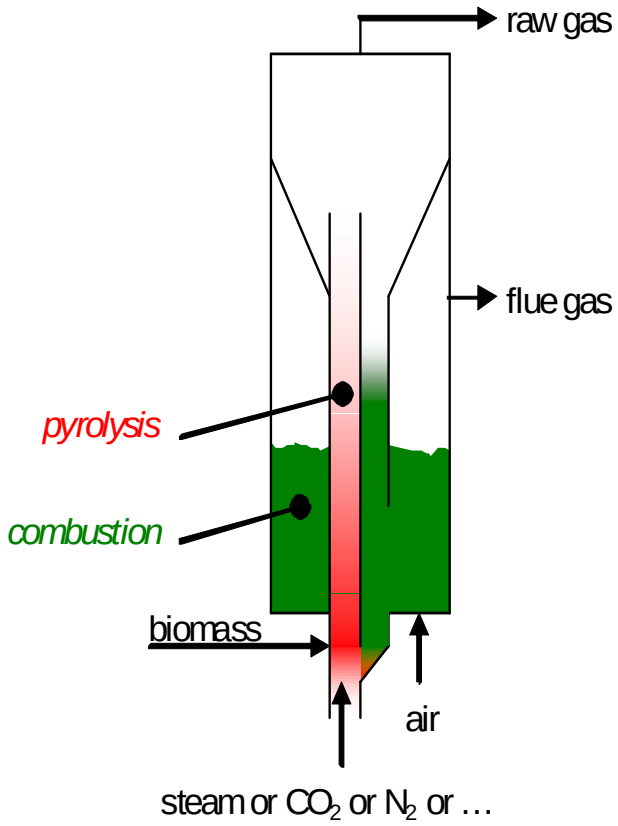
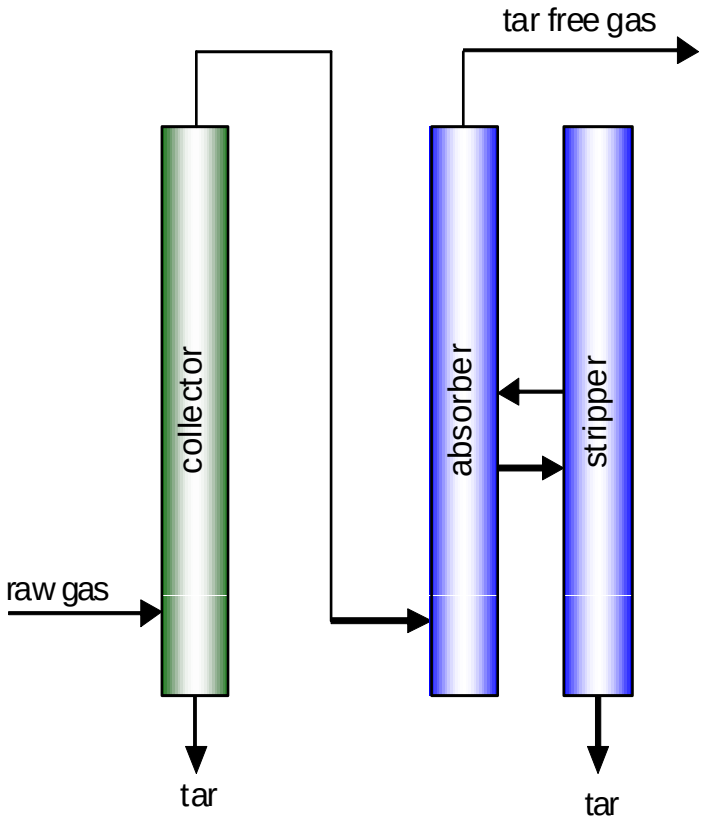
gasification and gas cleaning technologies

MILENA gasification



OLGA tar removal



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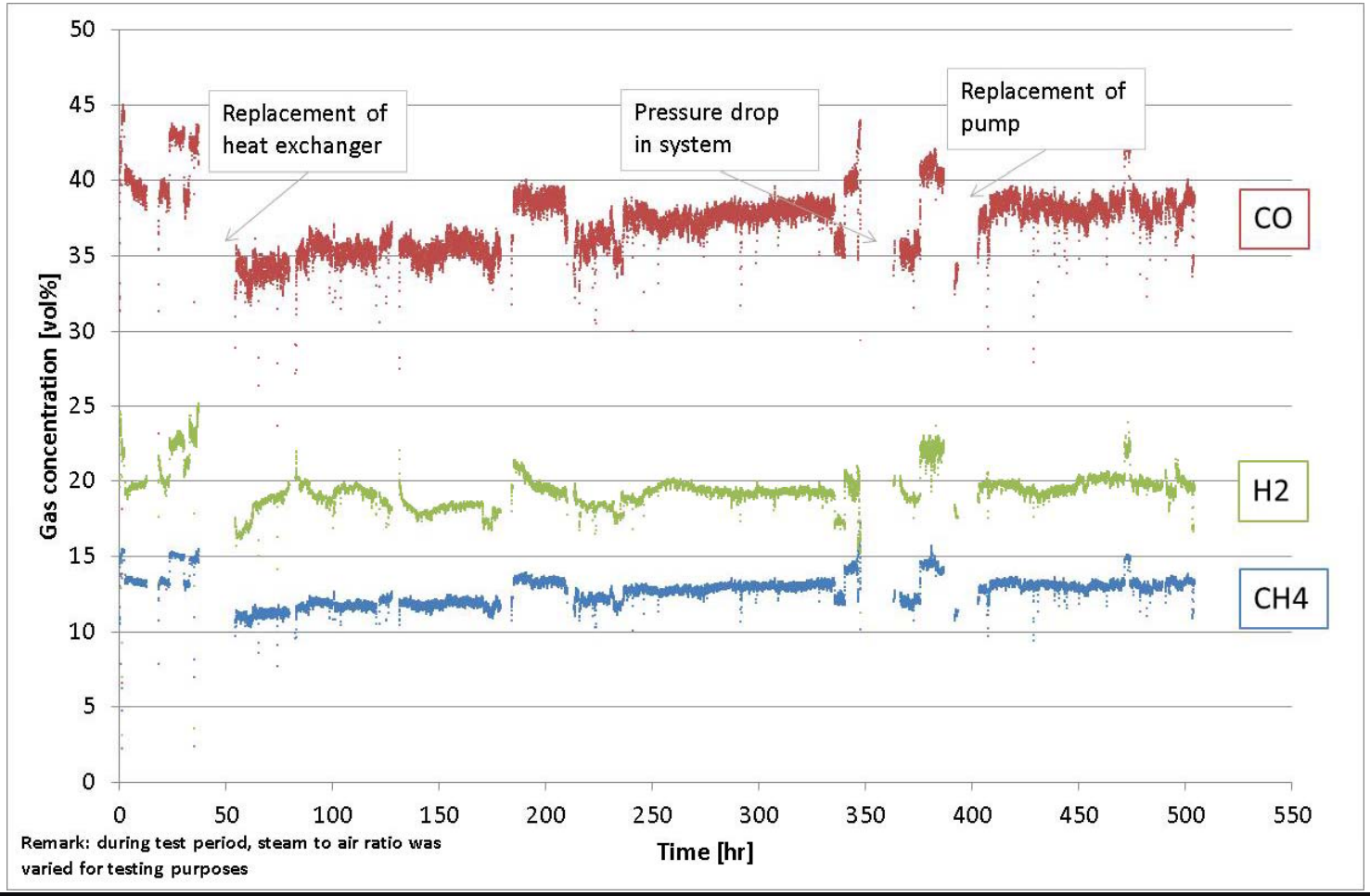
recent 500h test 0.8 MW MILENA-OLGA on wood



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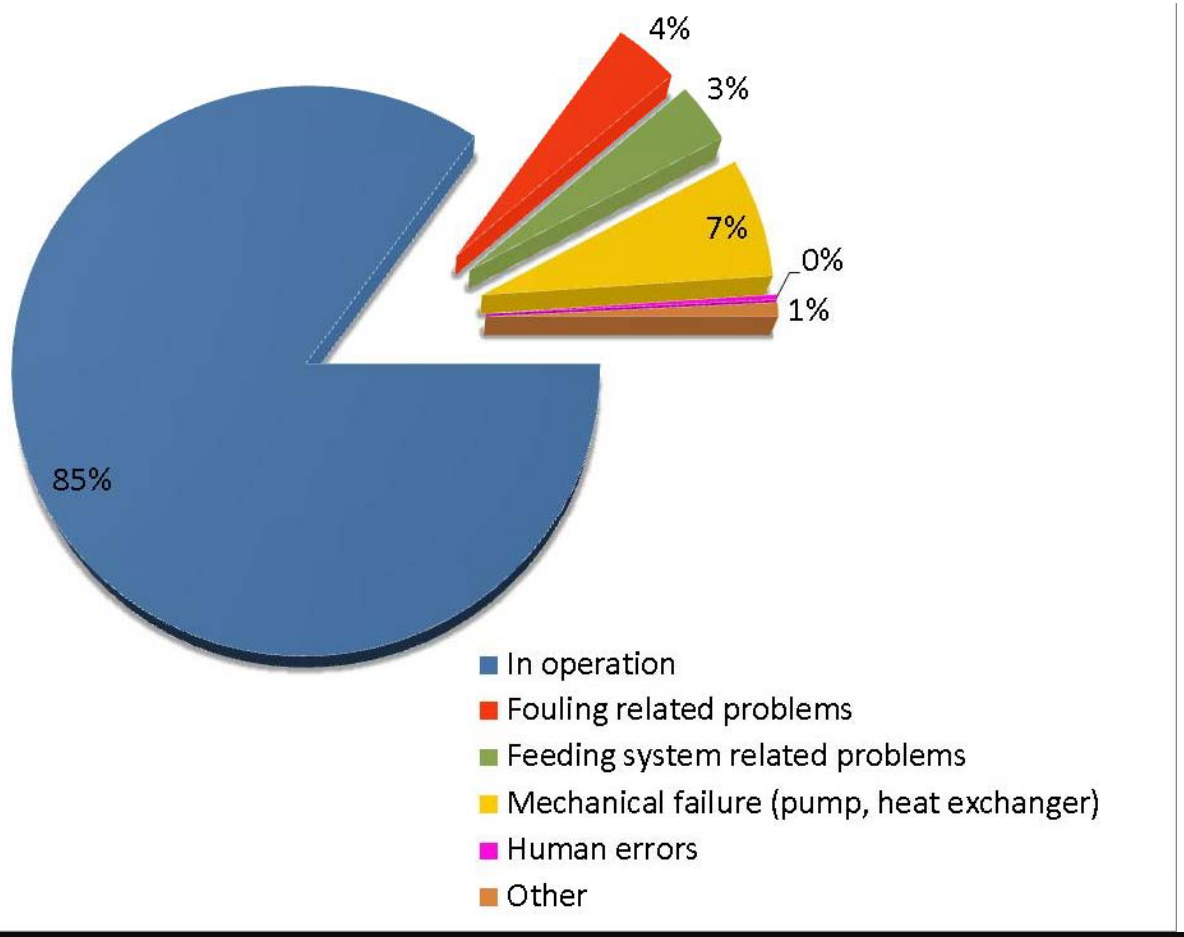

ECN

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Wood chips, but it never is 100% perfect for feeding

MORE INFORMATION

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fuel composition database: www.phyllis.nl
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Milena indirect gasifier: www.milenatechnology.com
OLGA: www.olgatechnology.com / www.renewableenergy.nl
SNG: www.bioSNG.com and www.bioCNG.com