

# THE NETHERLANDS COUNTRY REPORT

Bram van der Drift

Gothenburg, Sweden  
21 November 2013

[www.ecn.nl](http://www.ecn.nl)

# ENERGY AGREEMENT



## *for sustainable growth (Sept 2013)*

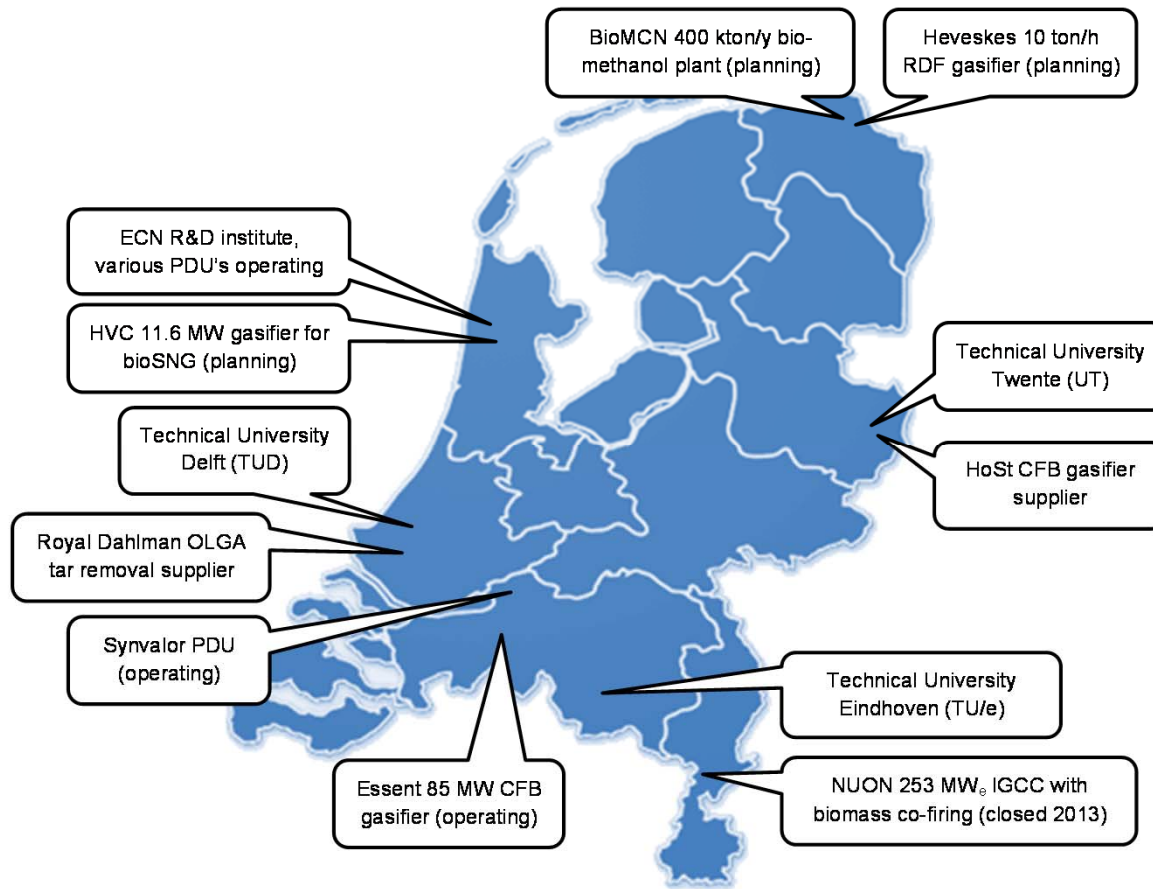
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- Agreement between 40 organisations: government, employers, trade unions, NGO's, financial organisations, ...
- The Dutch way: consensus to ensure it happens, but compromises on the ambitions
- Energy efficiency: 100 PJ in 2020
- Renewable energy: 14% in 2020, biomass forms majority part
- Close 5 coal power plants from 80s in 2016/2017
- The other 2 coal plants (90s) and 3 new coal plants (10s) will have co-firing (max 25 PJ) and CCS



# BIOMASS GASIFICATION in NL

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## WHAT'S NEW?

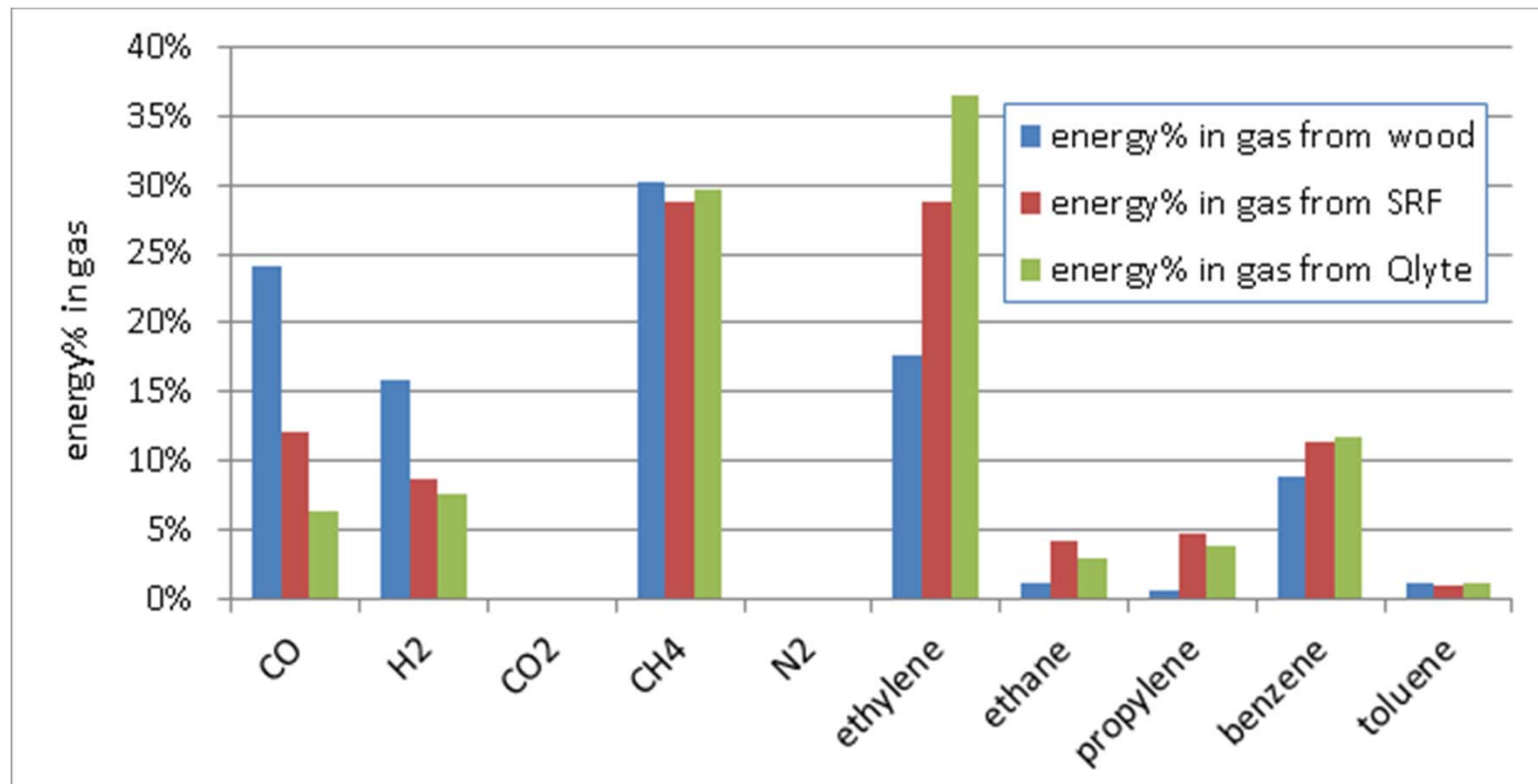
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- NUON/Vattenfall IGCC 250 MWe closed earlier 2013
- Essent/RWE indirect cofiring 85 MWth CFB gasifier is looking for a post-subsidy new life on waste
- Royal Dahlman acquired the license for MILENA gasification technology (Europe, N-America, and few SE-Asia countries)
- Woodspirit project (BioMCN, Siemens, Andritz) heading for 400 kton/a bioMethanol plant with torrefaction and entrained flow gasification (NER300 grant)
- HoSt preparing 15 MW plant on paper rejects
- Torrgas preparing 10-15 MW gasifier plant on torrefied wood
- Synvalor developing new technology, 50 kW pilot plant
- Heveskes developing green syngas network with waste gasifier

# ECN



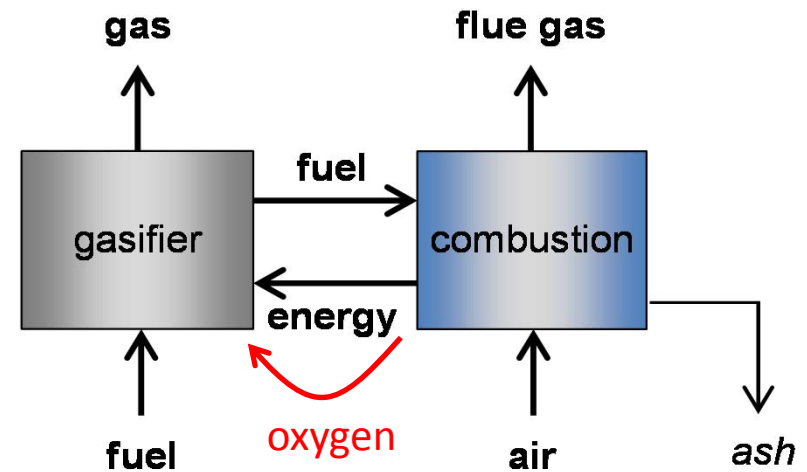
## *MILENA gasification at 850°C*



## *oxygen transport in MILENA*

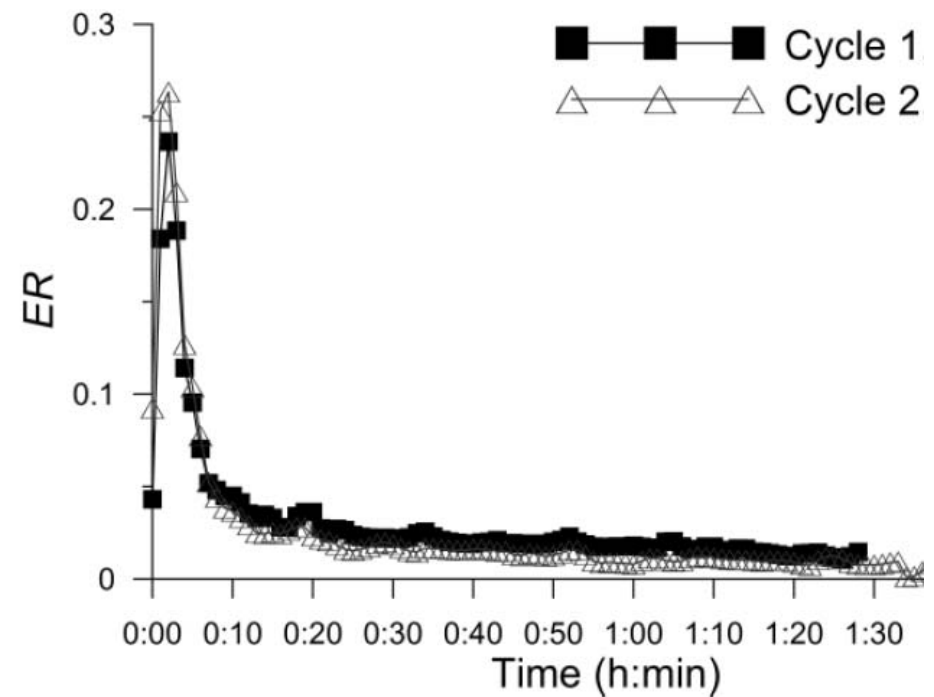
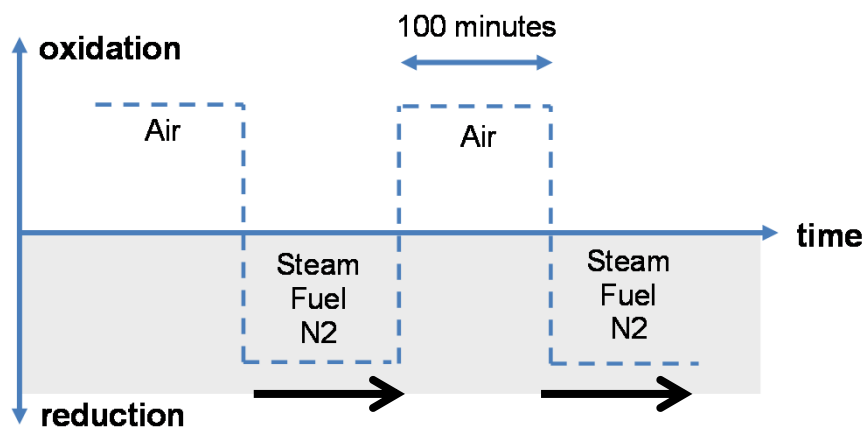
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- Olivine as bed material is capable of transporting O from combustion to gasifier
- Fe is the working element
- Chemical looping process



## *oxygen transport in MILENA*

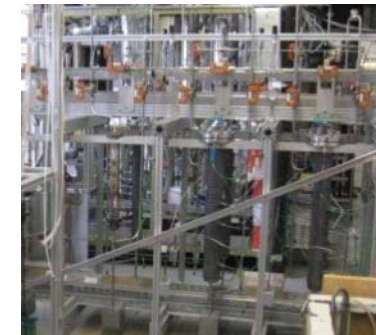
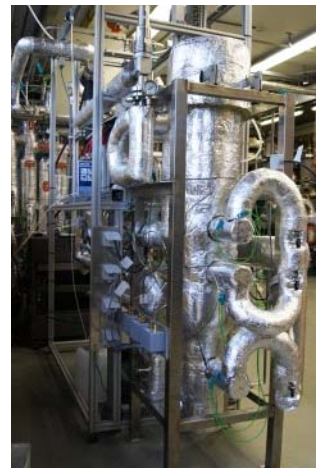
- Batch test to simulate cycle
- First few minutes most oxygen is released
- Equivalent to  $ER=0.2$
- This should reduce tars



# ECN



## *new lab facility from biomass to bioSNG*



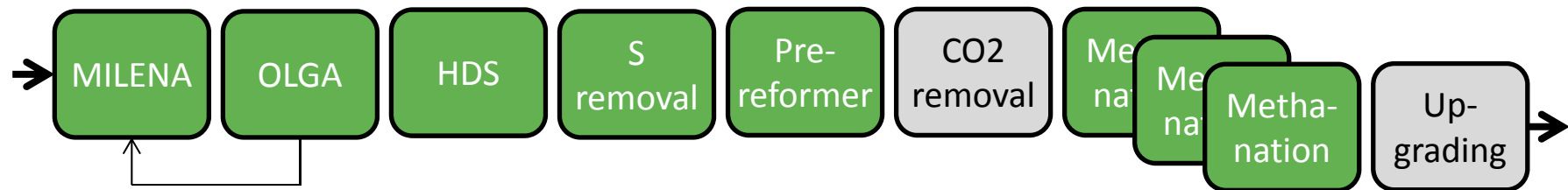
*MILENA gasifier*

*OLGA tar removal*

*HDS reactor*

*Further gas cleaning*

*Methanation reactors*





# THANKS FOR THE ATTENTION

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