

# IEA Task 33 Meeting

Ischia, Italy  
2014-05-13-15

## Country Update Sweden



Lars Waldheim  
Alsätravägen 130  
12736 SKÄRHOLMEN

[lars.waldheim@waldheim-consulting.se](mailto:lars.waldheim@waldheim-consulting.se)  
070 592 81 69



# Policy, R&D and projects

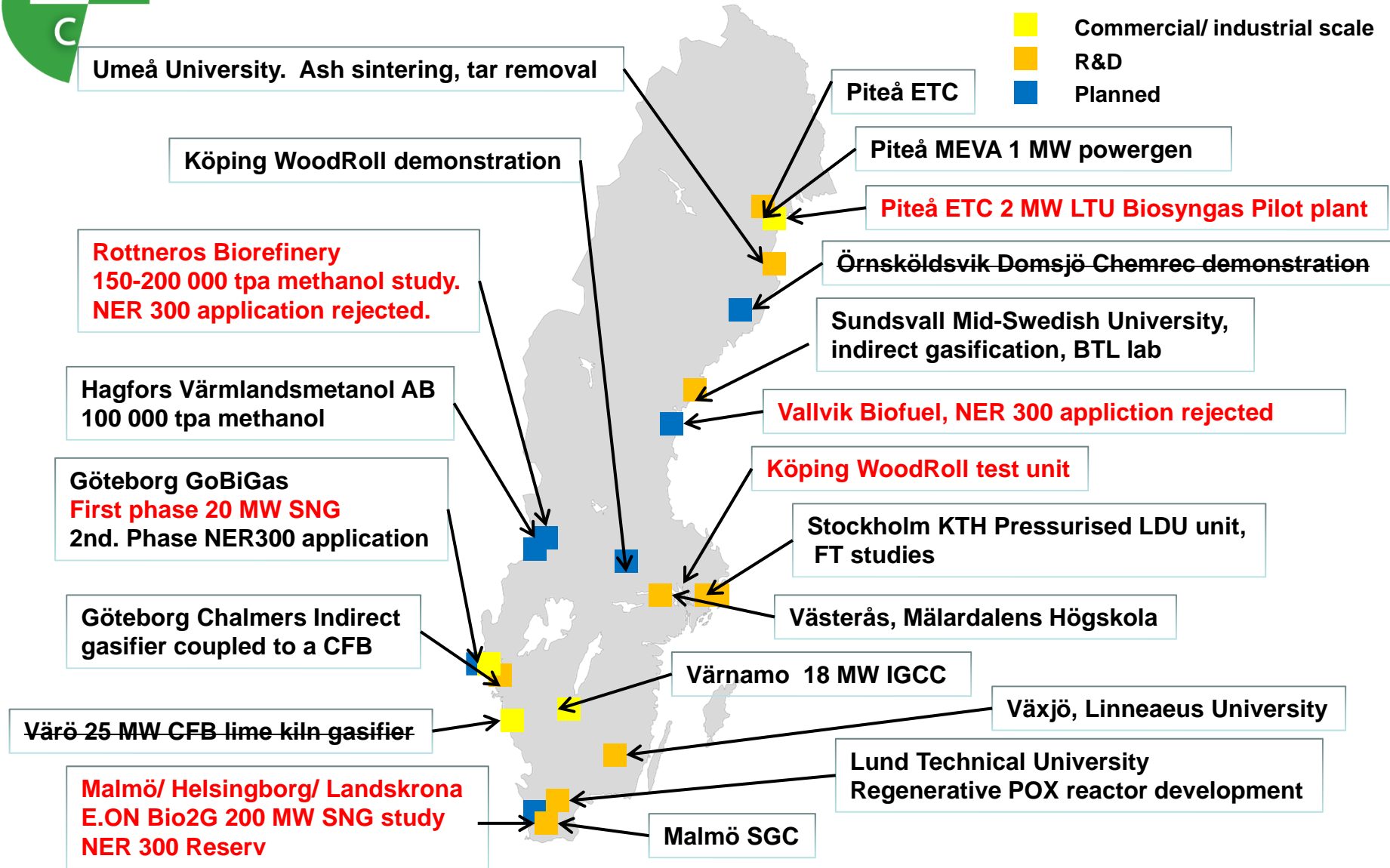
## Purpose of this presentation

**This is a highlight update of developments in Sweden since the meeting in Sweden in November 2013.**

**For additional information on policies, R&D activities and projects where there has not seen significant changes, please refer to the Swedish Country Update from November 2013 available at [www.ieatask33.org](http://www.ieatask33.org)**



# Biomass Gasification Sweden 2011





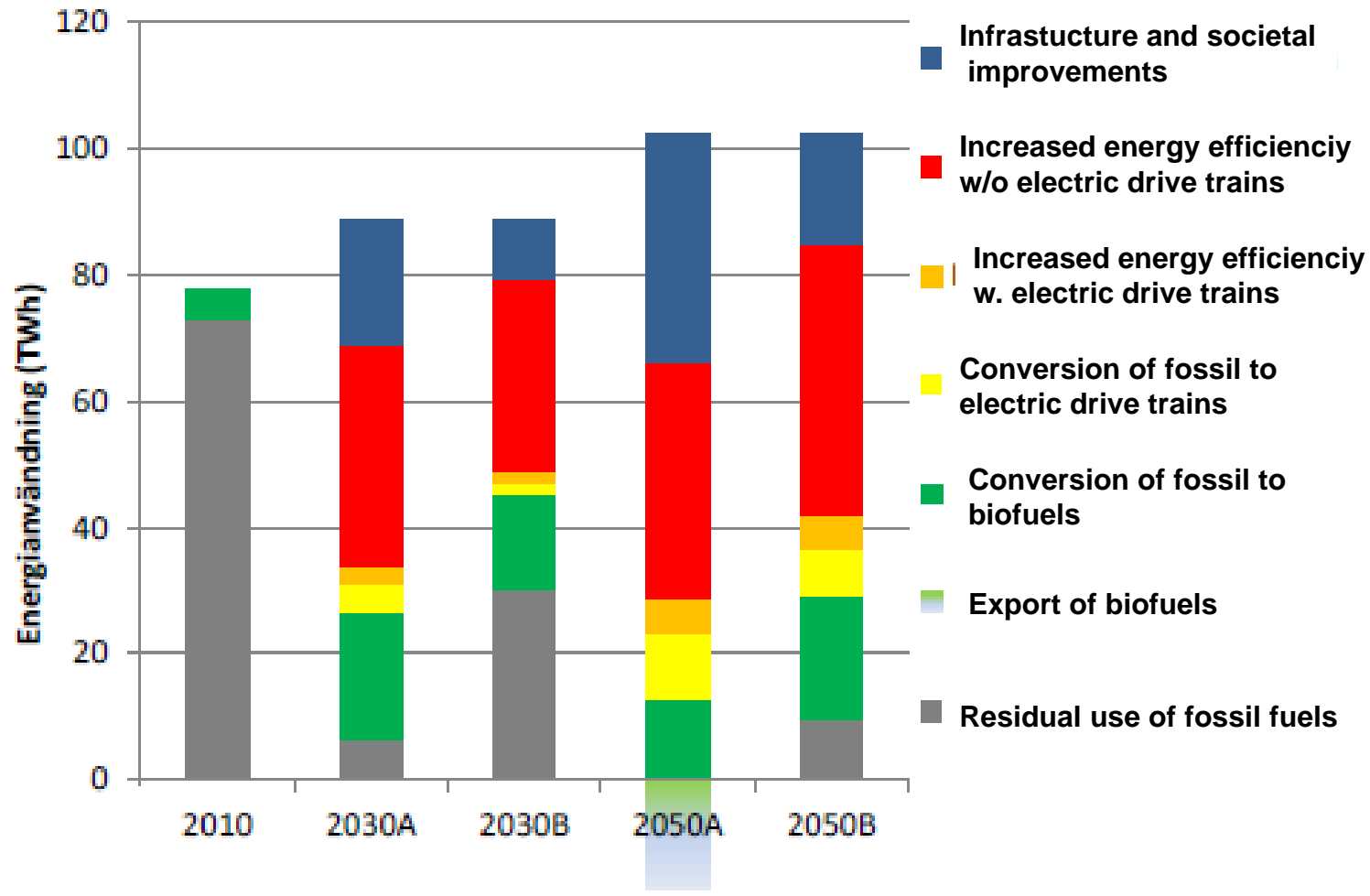
# Parliamentary commission on fossil-free vehicle traffic

- **Policy areas requiring to be addressed**
  - Urban and societal planning to reduce need and improve efficiency in transport,
  - Change in traffic modalities and infrastructure, i.e. more railway transports, improved railways etc.
  - Drive train efficiency improvements
  - Promote eco-driving
  - Increased use of biofuels
  - Introduce and deploy electric drive trains
- **Main recommendations for future policy actions**
  - Gradually increase the quota obligation to 2020
  - Biofuel price guarantee to make investments more bankable
  - Expand the use of electrical energy by charging infrastructure etc.
  - Bonus-malus policies to improve efficiency
  - Promote citizen change (from individual to collective transports, taxes, insurances, ecodriving etc.)
  - Infrastructure and urban planning actions



# Parliamentary commission on fossil-free vehicle traffic

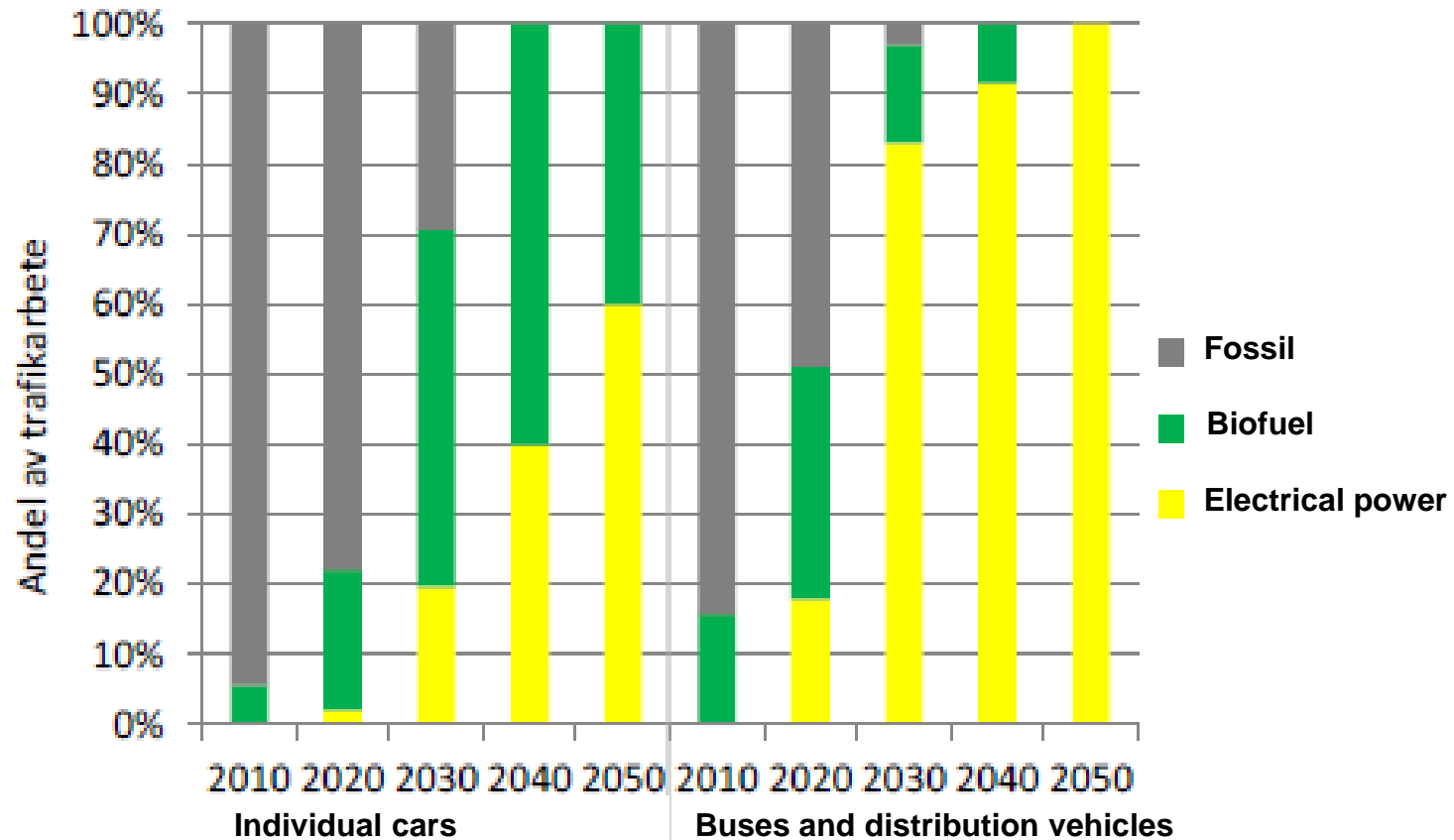
Energy for transports, TWh





# Parliamentary commission on fossil-free vehicle traffic

Share of transport work %





# Swedish Gasification Centre (SFC)



**CDGB - Centre for Direct Gasification of Biomass**

**CIGB – Centre for Indirect Gasification of Biomass**

**B4G – Biomass for Gasification, Entrained Flow Centre**

Academies Chalmers, Gothenburg Univ., KTH, Linnaeus Univ., Luleå Technical Univ., Mid-Swedish Univ., Mälardalen Univ., Umeå Univ.

Companies E.ON, Metso, Göteborg Energi, Fortum, Mälarenergi, Cortus, Nynas, Eskilstuna Energi och Miljö, Nordkalk

**Application for 4 year activity, 58 MSEK/year 2013-2017 approved**







# Swedish Gas Centre

## ”Energy gas program”

New project period 80 MSEK, 9 M€ for 2013-2015

On-going gasification related activities

- ***International Gasification Seminar***

Malmö, October 15-16, 2014

- ***Particulate contaminants from indirect gasifiers***

- ***Autothermal regenerative POX tar reactor***

- ***On-line detection of water vapor***

- ***CO2 removal in indirect gasification***

- ***Fuel tests in 500 kW Wood Roll prototype***

On-going, KTH, Cortus





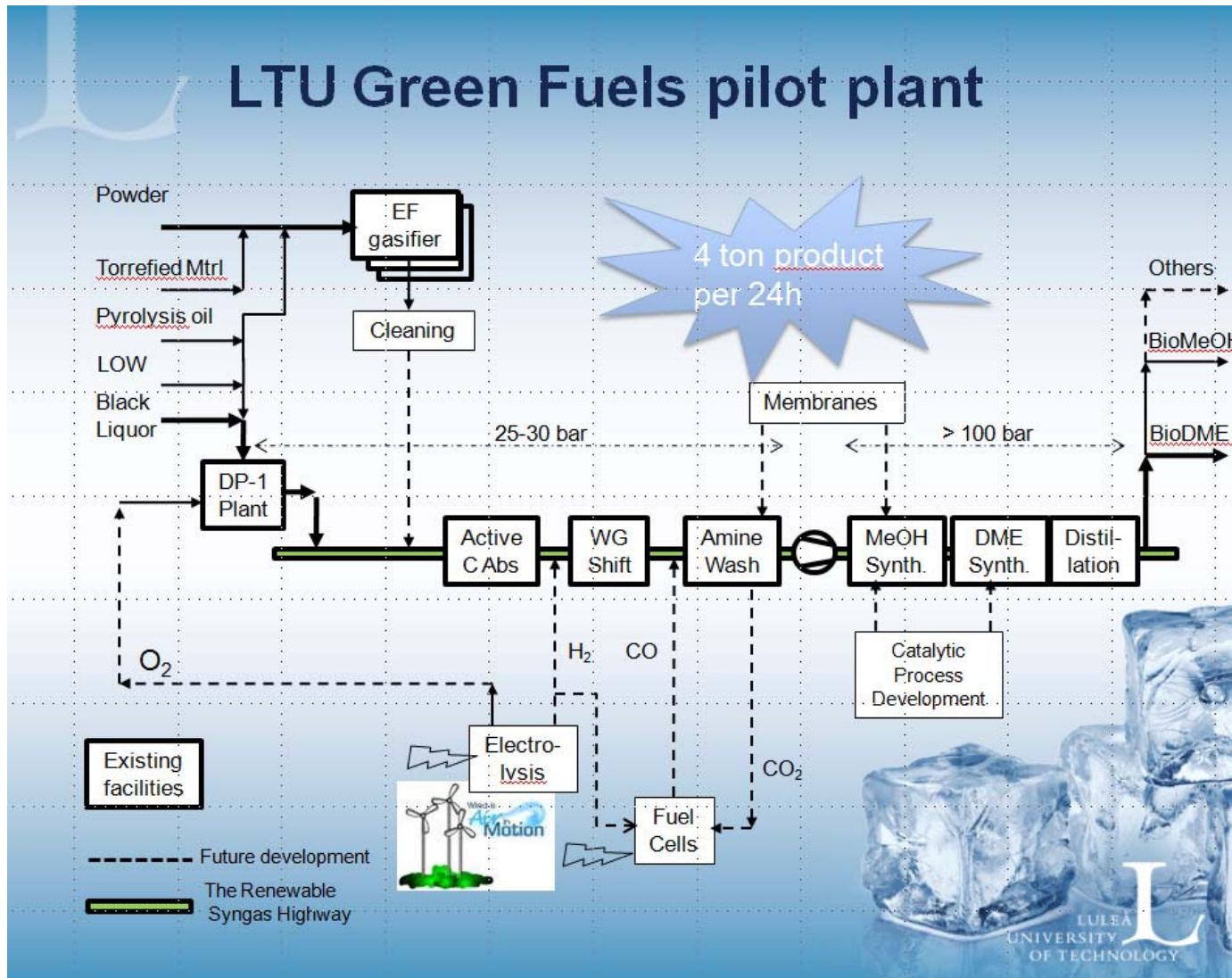
# Chemrec BLG

## LTU Biosyngas program

- The LTU Green Fuels (Luleå Technical University) has bought the Chemrec pilot plant and the bio-DME plant.
  - Operating staff and some key Chemrec staff hired
  - LTU Biosyngas program, approx. 250 MSEK, 2014-2016
  - Objectives:
    - DME fuel for truck tests, other test activities
    - catalytic gasification of liquids
    - Develop to solid fuel gasification
    - Gas cleaning developments
    - Development of catalytic synthesis reactions
-



# LTU Biosyngas program

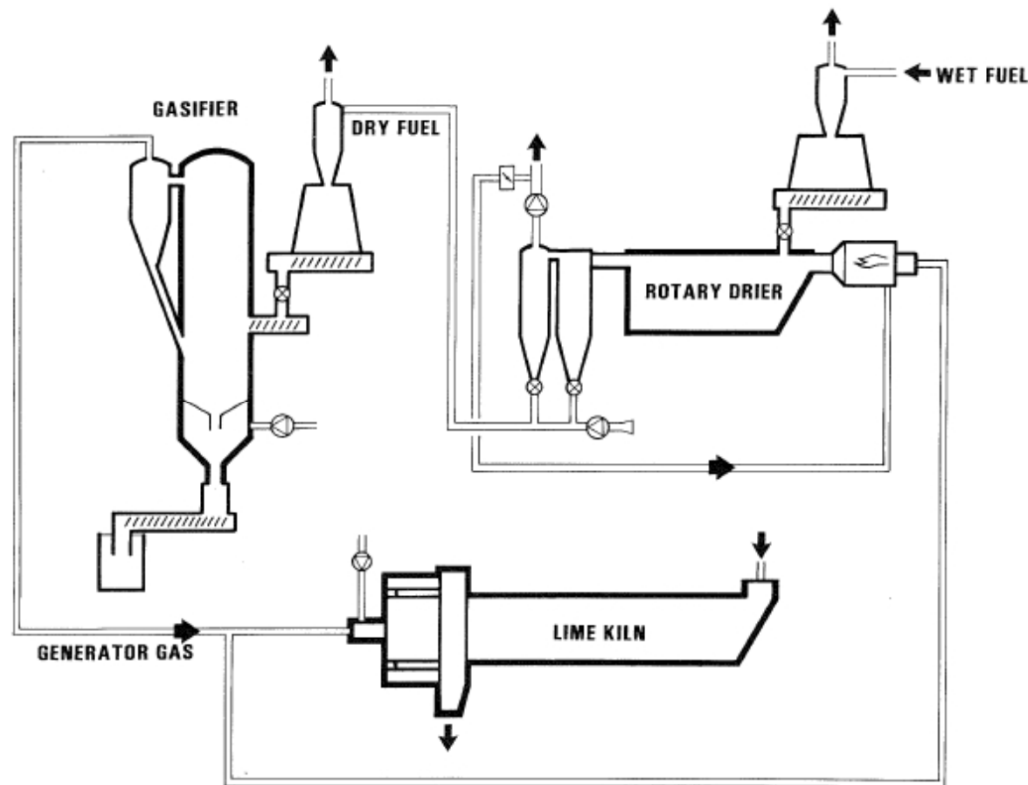




# The Värö Gasifier

The gasifier at Värö was not stopped in 2013, it was operated until April 2014, longer than planned .

This was due to delays in the installation of the new lime kiln.





# E.ON Bio2G

- Fuel input ~345 MW<sub>th</sub> (including Power Island)
- Biogas production 202 MW, ~21 000 m<sup>3</sup>/h
- Biogas efficiency 60-65% (excl. ASU)
- Total efficiency up to 80%
- Power production 14 -23 MW (for internal use)
- Heat production up to 55 MW (depend on fuel moist)
- Total investment: ~450 MEUR
- Possible production grant from EU (NER300) 2016-2020 (decision expected end of 2012).
- Three good sites identified for E.ON Bio2G localisation (Malmö, Landskrona and Helsingborg)

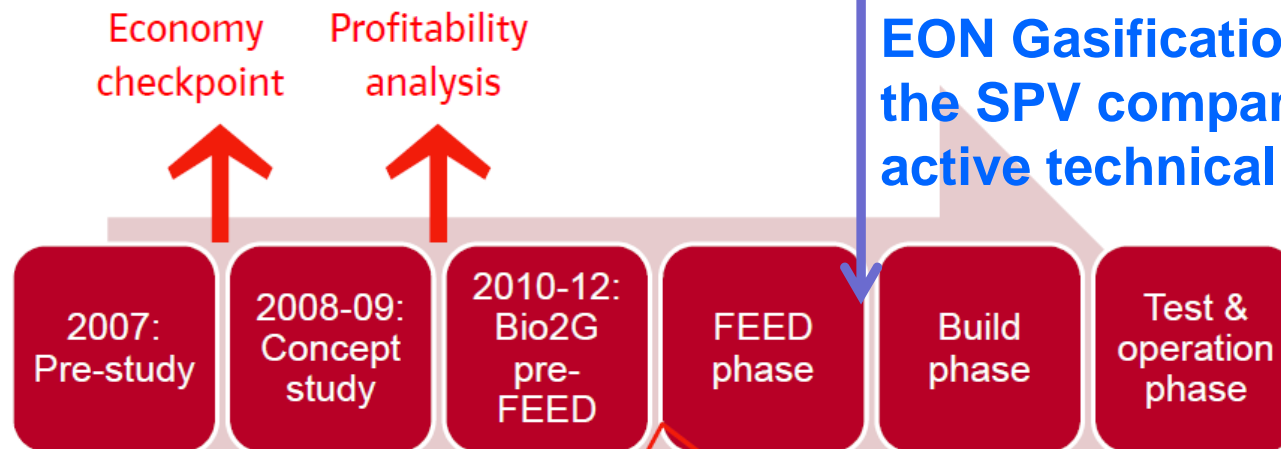


“Lighthouse” candidate for first-mover support,  
i.e. NER300, EIBI, etc



# E.ON Bio2G

## Bio2G – main time schedule



FEED decision has been postponed indefinitely in wait for support policies being in place and the fall-out of NER 300.

EON Gasification Development, the SPV company is dissolved, active technical work on halt.

- Now proceeding with:
- Verification testing @ GTI - further increasing confidence
  - NER300 application - decreasing financial risk
  - Solid political support - firm policies awaited

Studies and tests with Carbona, Haldor Topsøe and others concluded early 2014

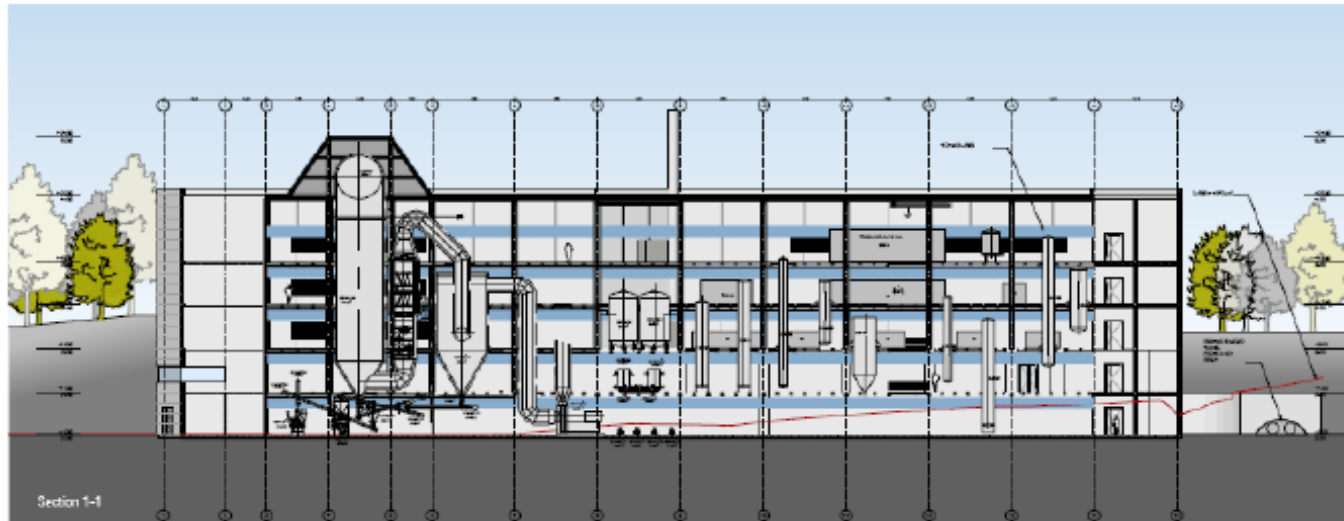




# Biomass to SNG: GOBIGAS

## GoBiGas – phase 1

Production:		Consumption:	
Bio-SNG	20 MW	Fuel (pellets)	32 MW
District heating	4 MW	Electricity	2,5 MW
Heat to heat pumps	8 MW	RME (bio-oil)	0,5 MW



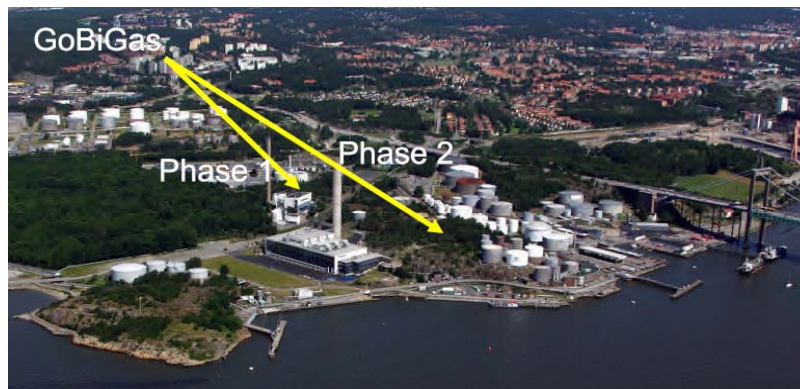
 Göteborg Energi



# Biomass to SNG: GOBIGAS

## GoBiGas – step by step

- **Performance goals:**
  - Biomass to biomethane 65 - 70%
  - Energy efficiency > 90%
- **Phase 1:**
  - Demonstration plant
  - Evaluation, R&D programme
  - 20 MW generating 160 GWh/year
  - In operation early 2013
  - Allothermal (in-direct) gasification
- **Phase 2:**
  - 80-100 MW generating 640-800 GWh/year
  - In operation after evaluation of Phase 1
  - Technology not yet chosen



**Official start-up initiated  
October 28, 2013.**

**Site visit as part of  
Gothenburg meeting 2013**

**NER 300 grant for Phase 2**





# GOBIGAS May 6, 2014



Initial problems with fuel feeding and excessive tar formation (surprise!) have now been resolved to allow continuous op.

The gasifier has been operated for well over hundred hours since Easter under stable conditions with on spec. gas, and operation is planned to continue for some time.

The SNG unit has undergone functional tests with N<sub>2</sub>. Commissioning to be initiated shortly and first SNG production is expected by the end of May

## Flaring gas

Pictures uploaded daily at

[http://gobigas.goteborgenergi.se/Sv/Anlaggningen/Folj\\_bygget](http://gobigas.goteborgenergi.se/Sv/Anlaggningen/Folj_bygget)