



# **CHRISGAS:**

## **Clean Hydrogen-rich Synthesis Gas**

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***CHRISGAS*** 



**BIO-ENERGY  
ENLARGED PERSPECTIVES**

*Budapest ,16-17 October 2003*

# The Issue Addressed

## Transport Fuel Usage in EU 15

1998	Gas and diesel	244 Mtoe
2010	Gas and diesel (prognosis)	304 Mtoe
1998	Biofuel	0,5 Mtoe
2000	Biofuel	0,7 Mtoe
2010	Biofuel (target 5,75%*)	17,5 Mtoe

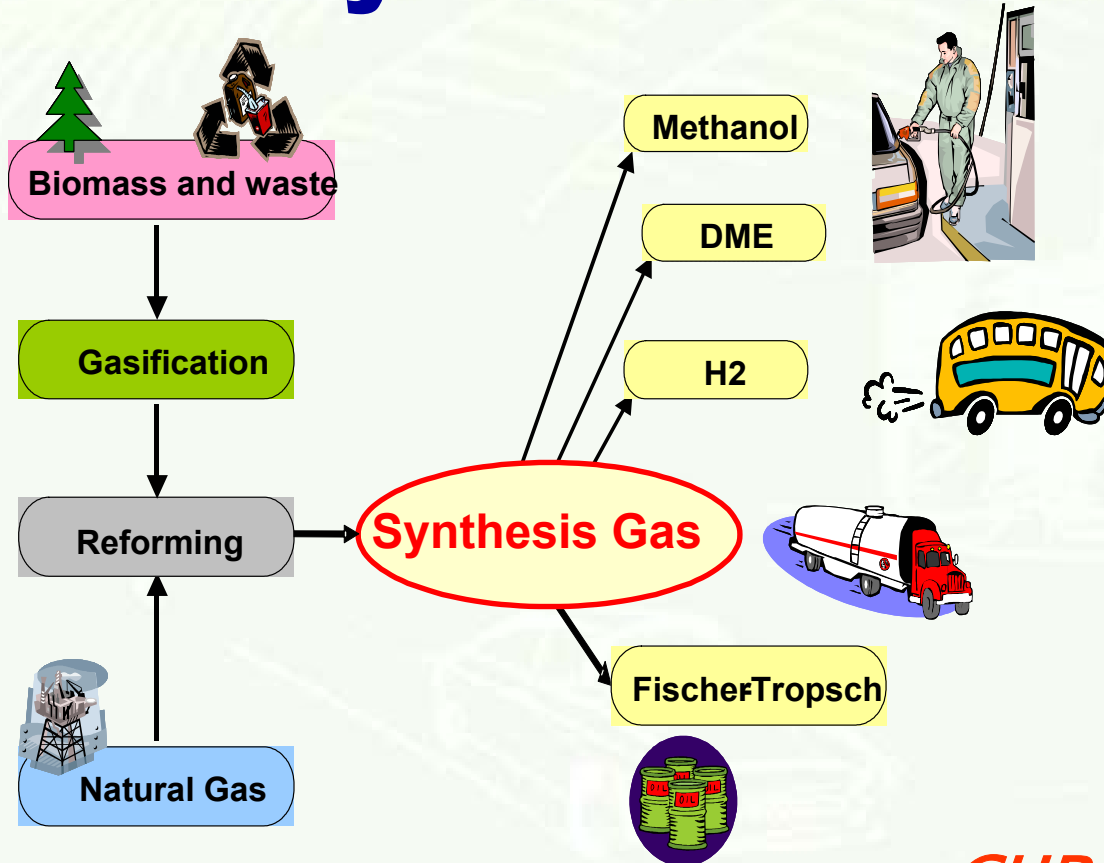
## Equivalent to today's consumption of transportation fuels in BENELUX

\*Directive on Biofuels for Transport, 2003/30/EC



# CHRISGAS

## Clean Hydrogen-rich Synthesis Gas



# CHRISGAS Summary

- The hub of the Integrated Project (IP) is the existing, unique 20 MW biomass-fuelled pressurised air-blown gasification combined cycle CHP plant at Värnamo
- The Värnamo plant will be refurbished to oxygen gasification to produce a hydrogen-rich gas.
- This IP offers already in 2004 gasification RD&D at larger scale at a much lower cost than alternatives
- System studies related to the large-scale use of such plant and its impact on the environment and society at large and Training activities are included in this IP

# Key Data of Proposal

- 22 Partners
  - 13 IND of which 7 SME
  - 4 HE
  - 3 RES
  - 2 OTHER
- 8 member states: S, DK, GR, D, ES, NL, FI, I
- 4 (5) years duration
- Budget 18.9 MEURO + costs outside project
- 9.5 MEURO EU grant allocated by the EC
- Further projects planned with aims to install a complete GTL facility

# Objectives and Deliverables

**Production within 3-4 years of cleaned, hydrogen-rich gas from biomass fuels at the scale of 3 500 Nm<sup>3</sup>/hr H<sub>2</sub> equivalents**

## •RTD Deliverables

- Catalysts, filters, gas cleaning systems etc. used at Värnamo
- Tests and operational data at 3-4 tonne fuel/hr
- Drying and feeder system prototypes tested
- Fuel availability & cost, liquid fuel prod. costs at European level

## •Training Deliverables

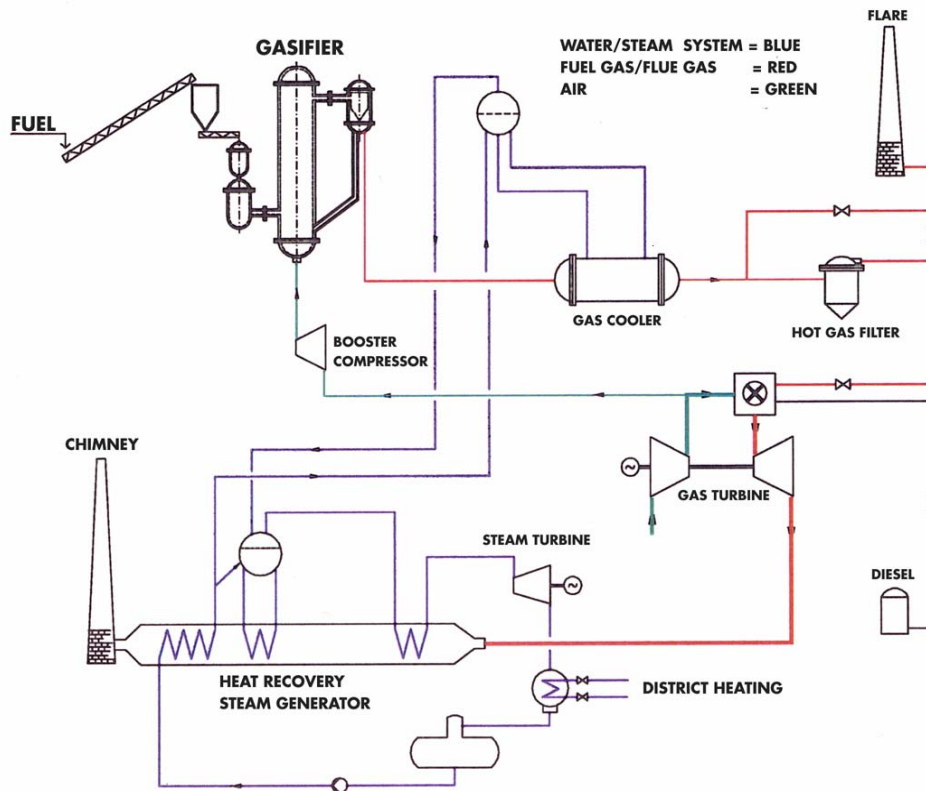
- Web based educational package
- Research school for academia

# Värnamo Biomass Gasification Center





# Sydskraft IGCC Plant, Värnamo

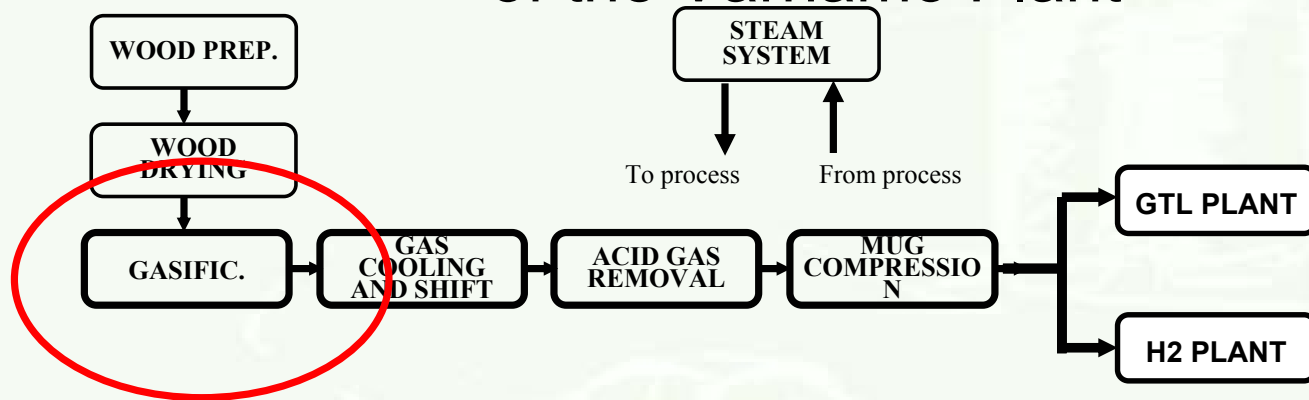


- Op. 1994-2000
- Air blown gasifier, 20 bar for GT
- Typhoon GT
- **18 MW** thermal,
- 4 ton/hr feed
- **8 500** hours op.
- **3 600** hours GT

# RTD Objectives, Experimental

**OBJECTIVE:** Gasification of biofuels to a hydrogen rich gas

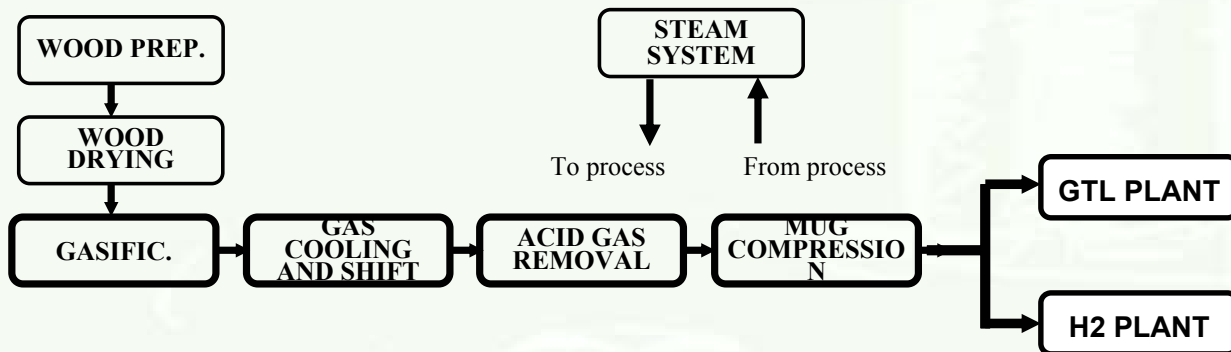
**METHODS:** Laboratory and bench-scale work  
Modification and operation of the Värnamo Plant



# RTD Objectives, Studies

**OBJECTIVE:** Production system and cost  
**METHOD:** System studies

- Preferred process system
- Fuel availability, cost
- Plant capacity, product cost



# CHRISGAS Status

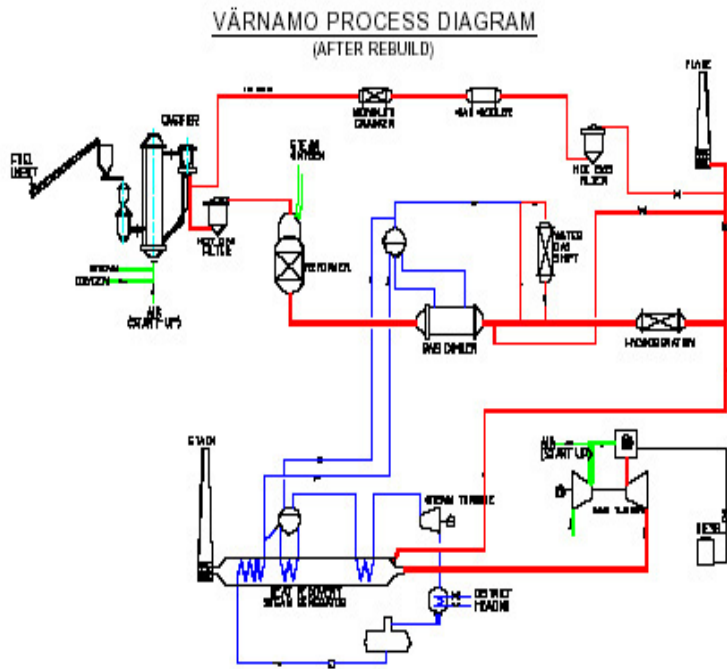
## • 2004-2009

- CHRISGAS Application for MÅP6 and Project
- Swedish Energy Agency
- May-August: Positive evaluation by the EC
- September-2004: Preparation of Environmental Protection and
- September-2004: Preparation of
- December 2004: DG TREN joint
- Road Traffic Authority joint
- Technical Annex and Consortial Agreement
- Other projects
- Renewable Fuel Policy emphasis on
- Co-financing application
- Full scale plant in Vaxjo kommun
- Biomass-based Synthesis Gas RD&D

# FP6 CHRISGAS

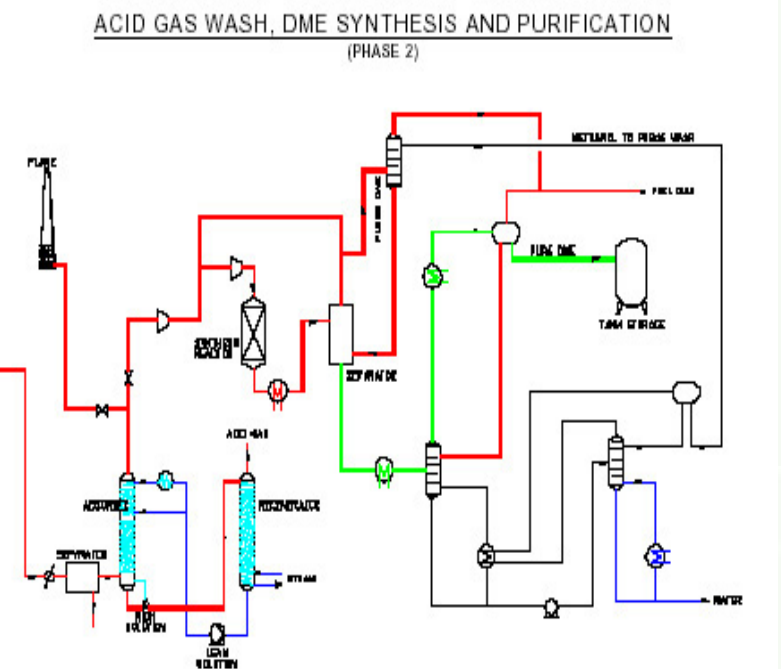
## CHRISGAS

### Hydrogen-rich gas



## PHASE II

### Automotive fuels



# Exploitation of Results

- **Exploitation of technical results and IPR**
  - Directive 2003/30/EC generates new opportunities
  - Partners, e.g. **Linde**, engaging as technology suppliers/ contractors / owner & operators for liquid biofuel plants
  - Training
- **Exploitation plan for VBGC plant**
  - Syngas production 2003-2008, GTL facility 2005-2010
  - Production of liquid fuels for fleet tests e.g. AFFORHD project 2009-
  - Parallel use of VBGC as platform for training, customer RTD work on gas cleaning, GTL, FC etc. to generate customer values and IPR

# CHRISGAS offers

## • From the VBGC plant in relation to 2003/30/EC • To Europe and Sweden

- Establish raw syngas production already in 2005-2006
  - A show case project of Swedish and European
  - Lower cost as plant already exists
  - Ambitions to acilitate the implementation of the directive
  - Syngas and GTL products 2007-2008 for fleet tests
  - VBGC as platform for
  - Create a center of excellence on an a training center
  - European scale for i.e. gas cleaning, liquid fuels, FC:s, H<sub>2</sub>
- know-how in the area of gasification  
for liquid biofuel