

Presentation of the Netherlands

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- Sources of Biogas, NL
 - Landfills
 - Sewage sludge
 - Anaërobic digestion of manure, maïs, residues
- Landfill and digester gas composition

• CH ₄	50-60%	60-70%
• CO ₂	25-45%	25-40%
• O ₂	<0,5%	<0,2%
• N ₂	4-8%	<0,5%
• H ₂ S	50-3000 ppm	50-3000 ppm
• CFKW	10-300 mg/m ³	0
• Vocht	100% verz	100% verz
• Wobbe Index	20-25 MJ/m ³	24-33 MJ/m ³

■ History

- 1980's: several initiatives (technical problems)
- In the 90's: focus on green electricity
- Early 2000: removal REB subsidy (Regulierende Energiebelastung)
- June 2004: co-digestion acceptance gave a boost in new projects



- Biogas upgrading
 - Pressure increase
 - H₂S removal
 - CFK's removal
 - CO₂ removal
 - Drying
 - Smell
 - Quality and quantity control



- Biogas upgrading systems
 - Membranes
 - Water washing (absorption under pressure)
 - VPSA (adsorption with molecular sieves)
 - LP Coaab (chemical absorption)

- Advantages/disadvantages of upgrading systems
 - Well-known and documented
 - Can be supplied if desired

- Biogas upgrading VPSA, landfill gas, 1989 (example)



- Active players in Netherlands (see next slides)
 - Cirmac International
 - GTS, Gastreatment Services BV
 - BioGast Sustainable Energy
 - ENECO, Ecogas project
- Sweden
 - 30 biogas upgrading systems of which:
 - 4 are delivering to the gasnet
 - 26 are used for transportation fuel
- Switzerland
 - 6 upgrading plants delivering to the grid
 - 2 more are under construction



Target groups /market actors

Gasunie Engineering & Technology

LTO Noord Projecten,

LTO werkgroep Duurzame Energie

Biogas Branche Organisatie

Coöperatie Biogas Midden Drenthe

Technologie Centrum Noord Nederland

Energy Valley

InterProvinciaal Overleg

Virage, BioGast Sustainable Energy, Hoogheemraadschap Hollands Noorderkwartier

Ekwadraat, HoSt, Oosterhof Holman Milieutechniek, Gastreatment Services,

DMT Environmental Technology, CCS, ECN, Essent Warmte, SenterNovem, Eneco Netbeheer

Jeroen de Veth, JDV Ensys (consultant)

ETC.



- Constraints (according to Cirmac)
 - No national quality requirements and analyses prescription
 - No obligation for the distributor to accept Green Gas
 - Investment costs for piping, measures to be taken
 - No incentive for increased efficiency or lower emission
 - No consistent government policy
- More chances by (according to BioGast)
 - Introducing certificate system
 - Obligated percentage Green Gas in f.i. 2010
 - Level playing field for gas and electricity
 - No government interference with technology

- GPP[®] system (Gastreatment Power Package)
 - Compression to 10 barg
 - TCR technology for gascleaning and cooling to minus 25 °C
 - SOXSIA catalyst for H₂S, siloxans and water removal
 - Cooling to minus 80 °C to condens the CO₂
 - Results in wobbe index of 43,7 MJ/Nm³
- Pilot plant of 30 Nm³/hr biogas
 - Max. 16 Nm³/hr SNG
 - Liquid CO₂ amounts to 18 kg/h
 - Electricity consumption is 12 kW_e
 - Four test locations
 - Results so far are very promising



■ BioGast

- Operational since September 2006
- Private company producing Green Gas
- Stand-alone units at biogas production location
- Network of small units
- Many advantages to CHP
- “Gas is a fuel, electricity is energy”

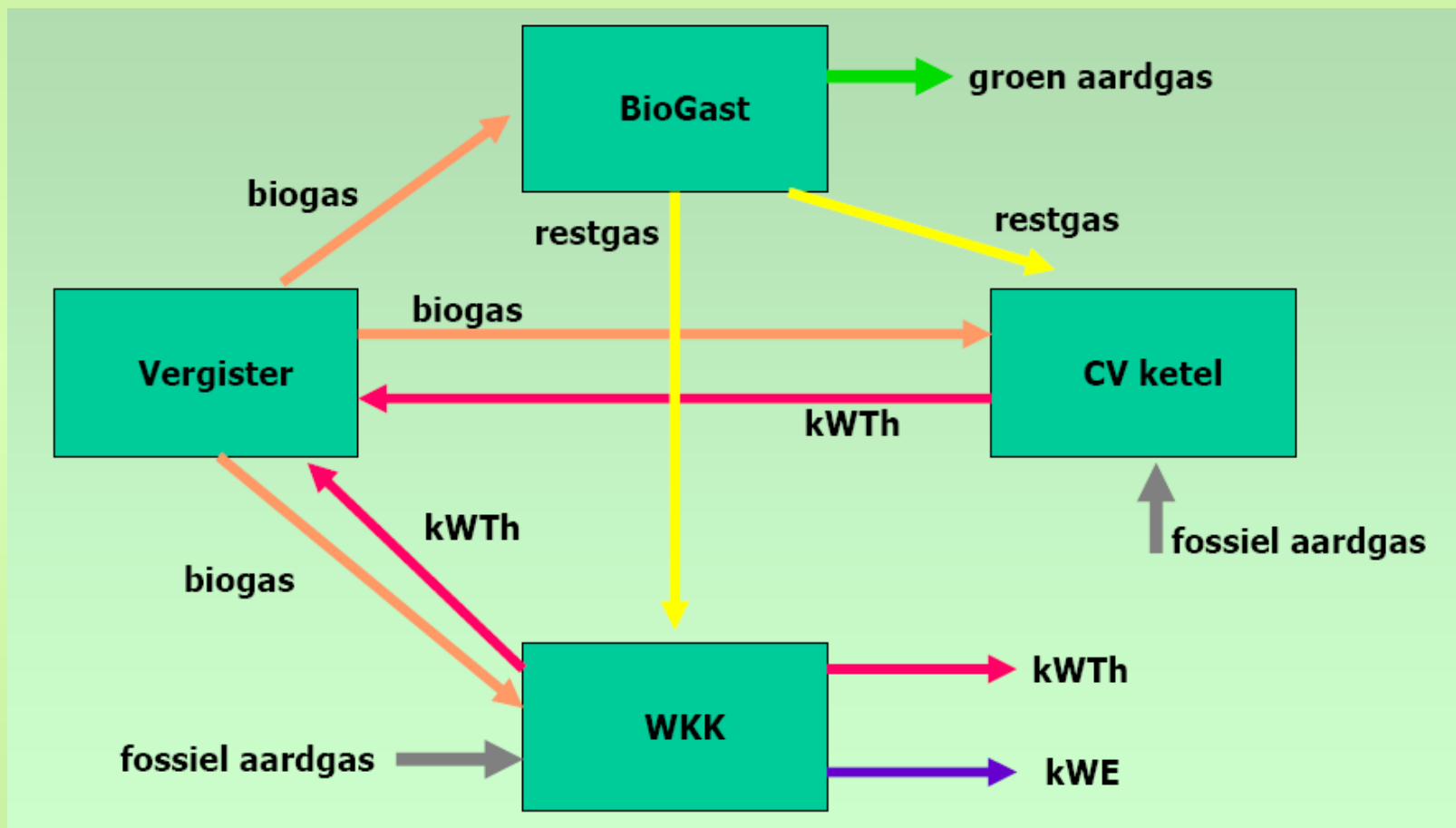
■ Potential

- Now: Sewage sludge and landfills: 50-100 million m³ SNG
- Within 10 years: >> 1000 million m³ SNG
- Natural gas supply is limited and uncertain
- Can be applied at each location



- Ecogas project (ENECO)
 - Requirements to the biogas feed
 - Need for second Wobbe Index meter?
 - Reliability Sulphur measurement?
 - Allowable fluctuation of the Wobbe Index?
 - Whole list of parameters and values
 - Injection of 75 m³/h biogas on the 100 mbar distribution network
 - Safety requirements are slightly increased
 - Adjustments took much more time and more money!

Situation is crucial (heat demand or not?)



- Potential study of biogas in the Netherlands, (report of January 2007, SenterNovem)
 - 11% of natural gas can be replaced by SNG
 - Certification is needed like green electricity
 - Quality ensurance is needed
 - Arrangements of green gas injection to low pressure grid is needed
 - Financial support or fiscal measures is needed
- Netherlands
 - Platform New gas (PNG) started in 2001
 - Within PNG: working group “Green Gas”



- Letter by Minister of Economic Affairs to the parliament (26 March 2007):
 - Green gas can contribute to sustainable development and solving the manure disposal problems
 - The technology need to be further improved (digestion, gasification and upgrading to SNG)
 - The question: is Green Gas sustainable need to be answered
 - UKR (Unieke Kansen Regeling) can be applied, not the MEP (meant for green electricity only)
- Before summer 2007 (to be expected)
 - Document “Visions on Green Gas” by SenterNovem
 - Response from the parliament (priority statements by 2020)
 - Meeting of Dutch partners within Redubar with SenterNovem

- “Green Gas” activities in 2007
 - Medium to long term vision on green gas injection (digestion and gasification)
 - Facilitating 12 projects to
 - Establish consortia
 - Develop green gas certificate system
 - Organise workshop
 - Introduce instruments to stimulate green gas
 - SWOT analyses on Green Gas developments in the NL
 - Key-issues in distribution of Green Gas (decentral networks)
 - Transition Green Gas
 - Short term: biogas
 - Medium term: SNG by gasification
 - Long-term: hydrogen

Thank you