

# Biogas in the Netherlands

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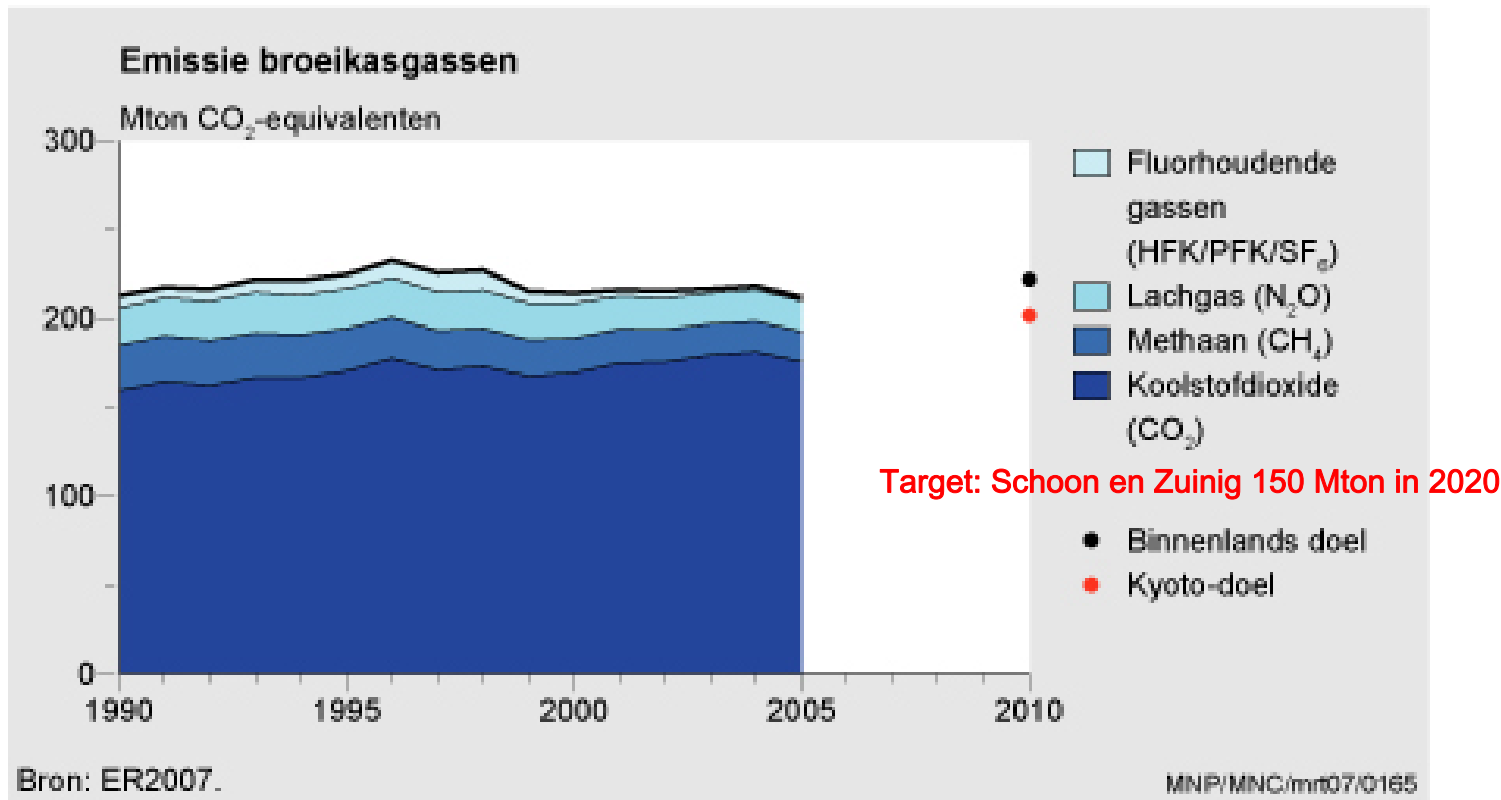


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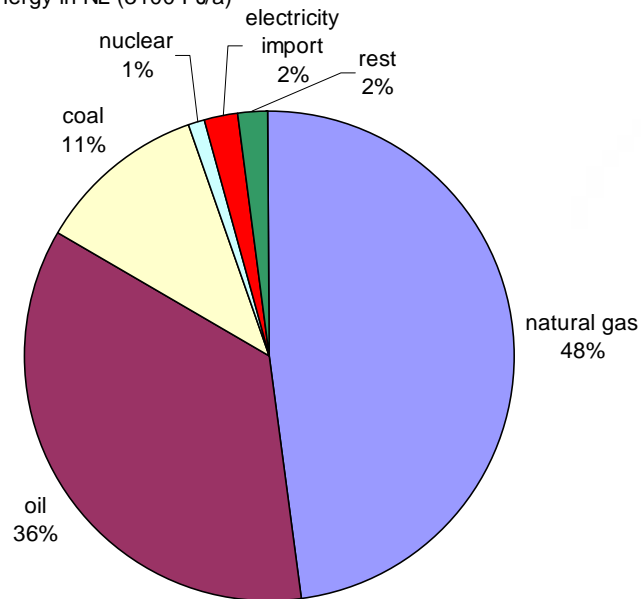
## Development: emission of green house gases



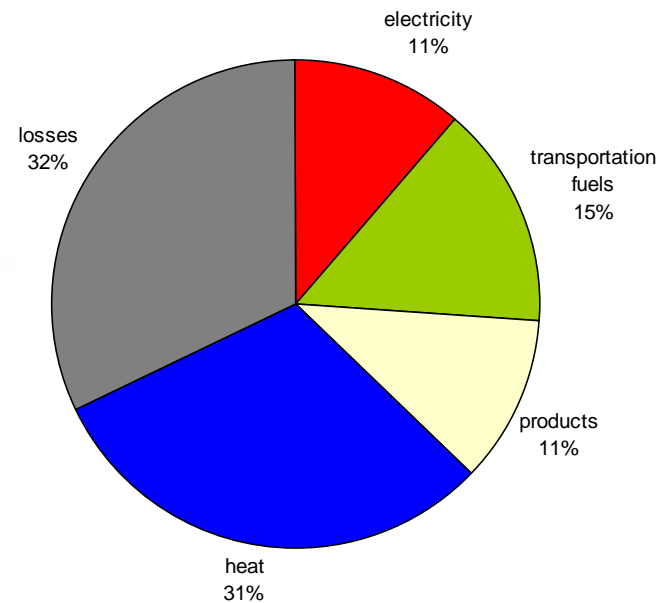
# Energy situation in the Netherlands

## Netherlands and Natural gas

primary energy in NL (3100 PJ/a)



secondary energy in NL (3100 PJ/a)



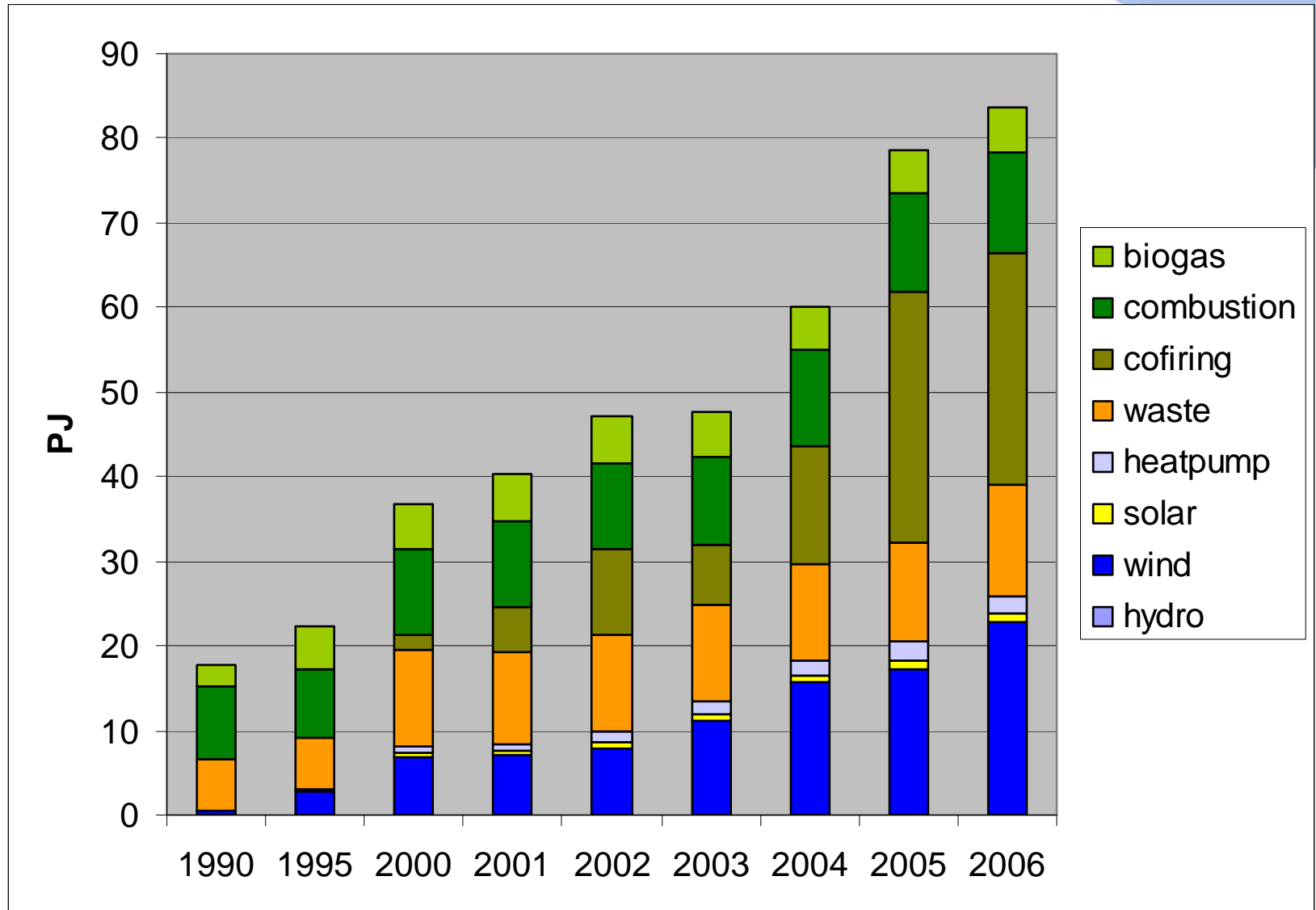
## Dutch objectives renewable energy

- Old policy up to 2010:  
9% production from use electricity  
and 10% of total energy use in 2020  
5/3/EEC obligation
- New policy up to 2020  
20% renewable energy  
39% emission reduction of greenhouse gases  
(reference 1990)  
2% energy saving yearly  
5/3/EEC obligation

Total GHG emission in 2020: 150 Mton CO<sub>2</sub> eq  
Government plan 'Schone Zinge' published 18<sup>th</sup> sept. 2007  
2007

# Renewable Energy

2,7% total energy use; 6,7% of electricity (2006)



## Developments in biogas projects

- About 110 projects in operation, under construction or in preparation with a total capacity of 75 MW, with a guaranteed MIP preparation with a total capacity of 75 MW, with a guaranteed MIP subsidy
- 50 projects in direct preparation

## Sustainability criteria as a basis for future stimulation: Selection of Themes

- ~~Greenhouse gas balance in the production chain~~
- ~~Competition with food, local energy supply, medicines and construction materials~~  
~~medicines and construction materials~~
- Biodiversity
- Environment
- Economic prosperity
- Wellbeing

## Green House Gas Balance

- Minimum reduction of GHG 70% in comparison with the reg. production based on fossil fuel comparison with the reg. production based on fossil fuel
- Minimum emission reduction of 39% for the production of first generation biofuels in transport production of first generation biofuels in transport
- Setting up a CO<sub>2</sub> budget for calculation of these emission effects by different reg. conversions. emission effects by different reg. conversions.
- Preliminary calculations show that this minimum criteria can be met by biogas production with digestion criteria can be met by biogas production with digestion. Critical point is methane resp. in CH<sub>4</sub> and end storage. Critical point is methane resp. in CH<sub>4</sub> and end storage.

# Developments in policy instruments: SDE Exploitation subsidy repleceman of the MEP-subsidy wich stopped august 18 2006

Subsidy for production of renewable energy in 3 categories:

- Renewable electricity
- Renewable gas
- GHG (CO<sub>2</sub> equivalent GHG)

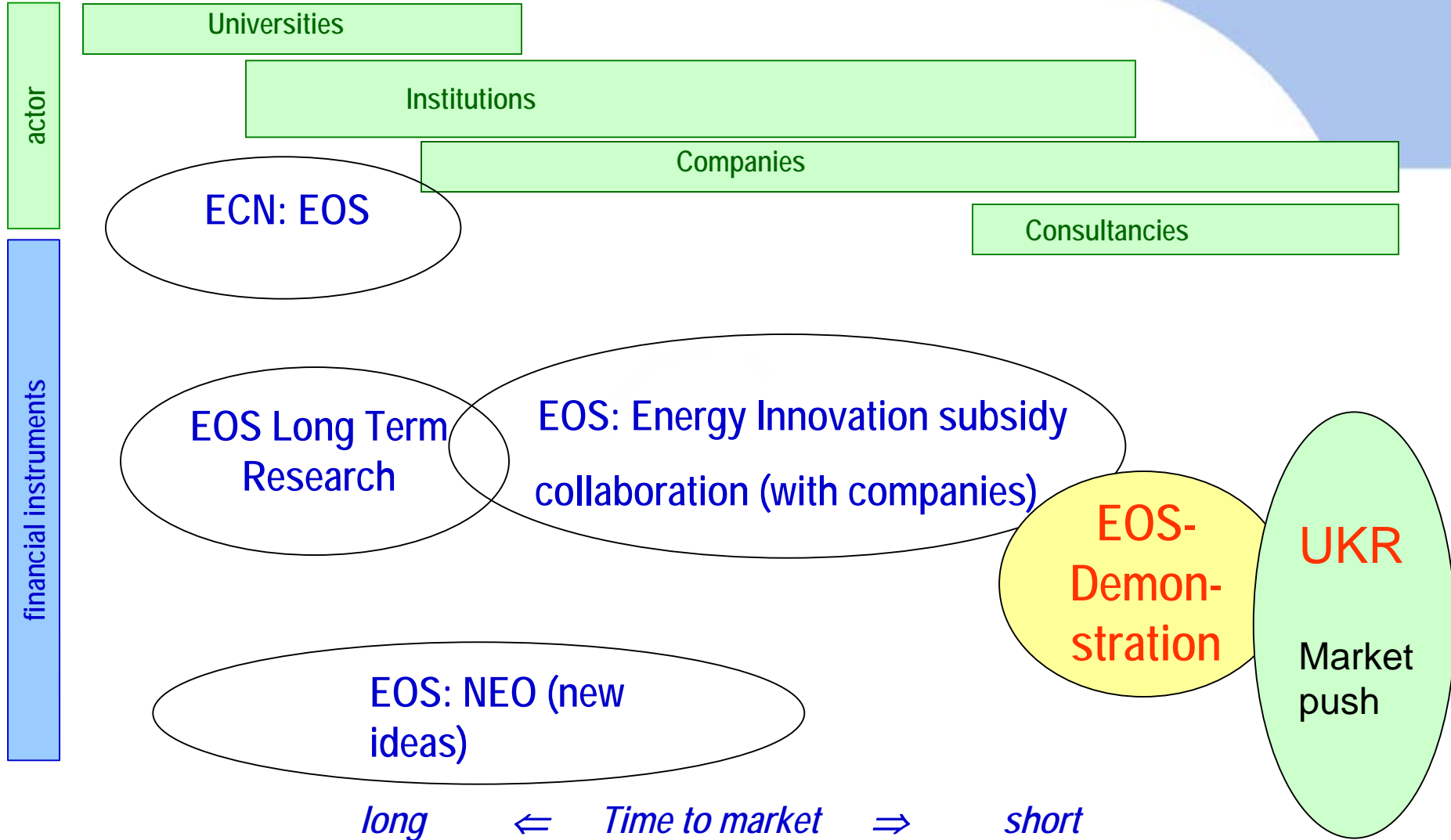
Report on sustainability

There is a SDE spare allowance in the beginning of 2008  
2008

# National Energy Research Strategy

## EOS R&D-instruments

### Investment subsidy



## Highlights new approach from Government: Schoon en Zuinig

- Simulating European Emission Trading System (ETS)
- Investigation of participation from ETS sectors in the system
- Setting the emission levels for sectors
- Tax measures for stimulating gas projects and "green behavior"
- CH<sub>4</sub> emission reduction by digestion of sewage sludge digestion
- Agricultural sector:
  - simulation of digestion with limited CH<sub>4</sub> emission and use of heat
  - regulation of use of digestate as artificial fertilizer
  - simulating gas production with gas grid injection
  - limited simulation of the use of regogas
  - simulation of digestion residues from food processing industry

## Energy transition platforms

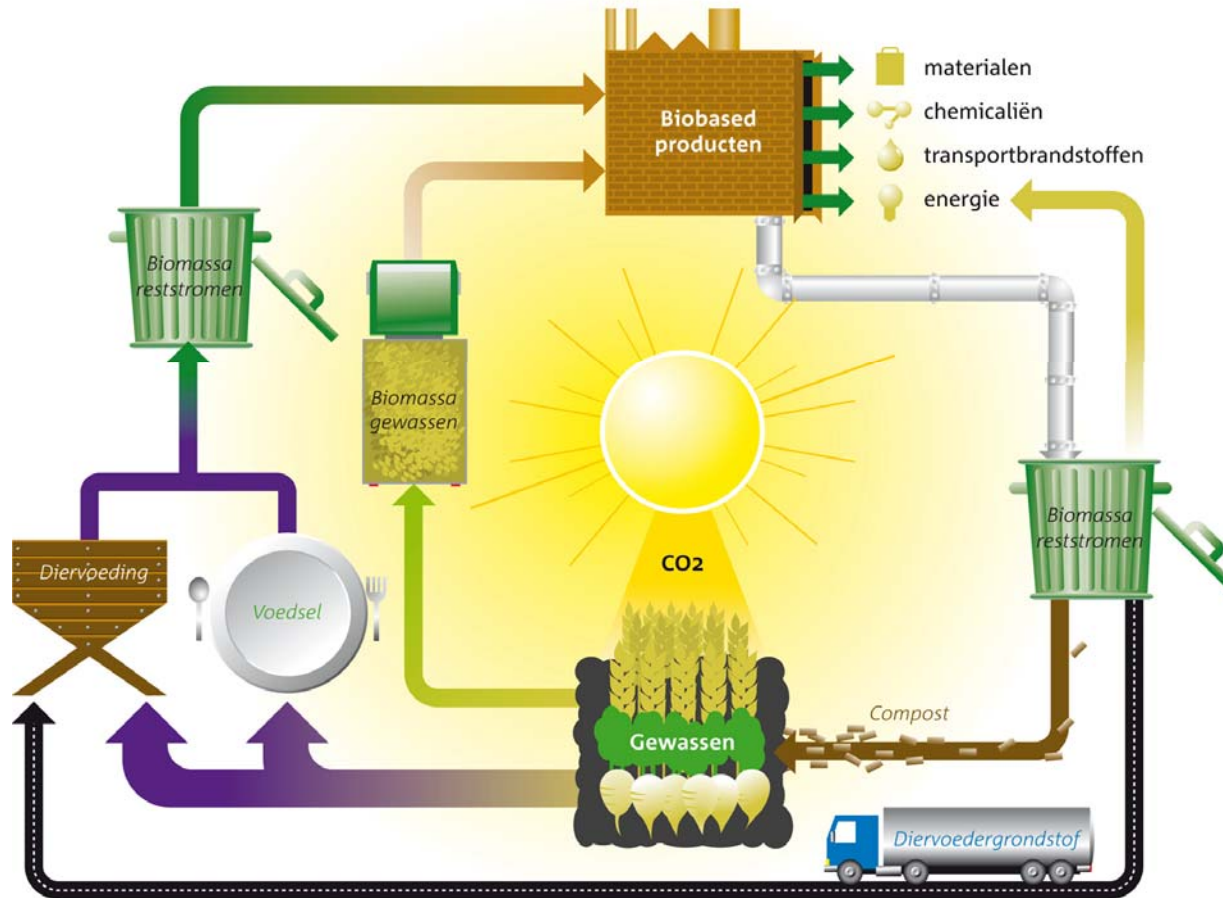


Transition approach by discussion platforms  
info: [www.creatieveenergie.nl](http://www.creatieveenergie.nl)

- Sustainable Mobility Platform
- Efficient Raw Material Platform
- New Gas Platform
- Platform for Carbon Efficiency
- Sustainable Electricity Supply Platform
- Energy in the Built Environment Platform

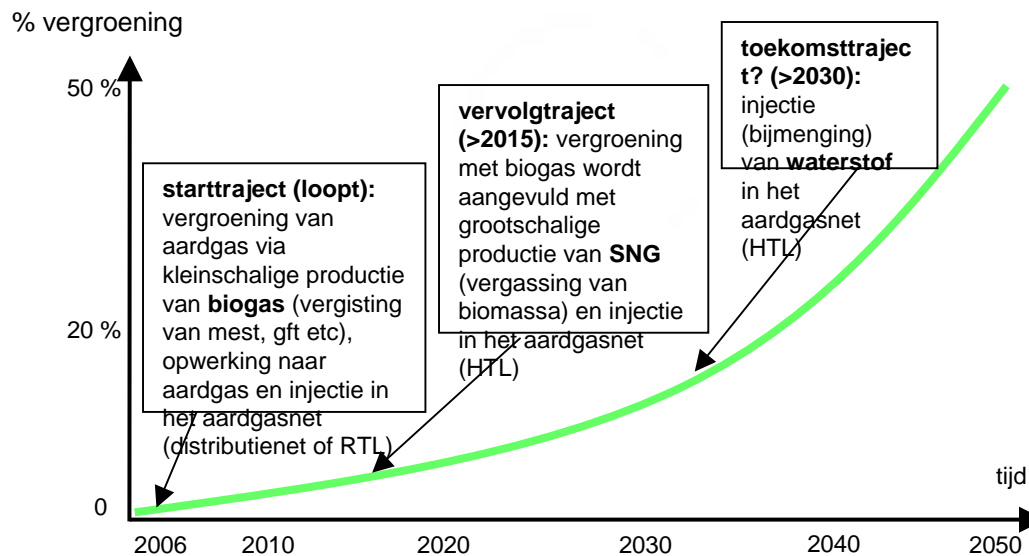
# Governmental vision on BIO-BASED ECONOMY in energytransition

*'Close the loopn'*



# Green Gas: Ambition Green Gas group in energy transition

- 8-12% in 2020, 20% in 2030 and 50% in 2050,
- 70 Mtonnes dry matter + residues for agriculture;  
potential 5% replacement (by gas) of natural gas (20 Lj. Nm<sup>3</sup>)  
Over "Green Gas" potential for SNG and import of biomass



Figuur 1: Transitietraject voor de geleidelijke vergroening van aardgas

## Present Biogas upgrading projects in the Netherlands

Location	Method	Since	Production 2003 m <sup>3</sup> /y
Tilburg	Waterwash	1985	278440
Nierren	FSA	1985	3082795
Vijster	FSA	1985	392750
Colerdon	Methane	1993	201.106
Baerijk	Methane	2006	(160m <sup>3</sup> /h) 1280000

- Upgrading project "de Marke" small scale biogas upgrading

# Different technologies for biogasupgrading available

- VFA
- membrane
- airwashing
- oxygenic

From biogas to green gas  
 natural gas quality,  
 From biogas to green gas





## Upgrading to natural gas quality From biogas to green gas



**Biogas is produced by fermentation of a mixture that includes crop waste, liquid waste streams and maize, often in combination with manure. Nowadays, biogas is mainly used to produce electricity. But there is a more sustainable and more efficient option: upgrading the biogas and returning it to the gas grid. Biogas that has been upgraded to natural gas quality is called 'green gas'.**

**The Netherlands depends on natural gas for around 50% of its primary energy supply. There is therefore a lot of work left to be done to achieve 20% sustainable energy and a 30% reduction in greenhouse gas emissions (such as CO<sub>2</sub>, methane and nitrous oxide) by 2020, as defined by the EU and the Balkenende IV government. The obvious solution is to use the Netherlands' experience as a gas-producing country to achieve these targets.**

**The Netherlands is a green gas country**  
 The Netherlands has a great deal of knowledge and expertise in relation to gas. It also has an excellent gas infrastructure, which is capable of transporting more energy than the electricity grid. In addition, the Netherlands has biomass at its disposal in the form of waste flows, including those from agriculture and the food industry, and it has ports that can be used to import biomass.

**This means that green gas has great potential as an economic engine. This is already being proved in practice: Dutch companies are often forerunners in the development of upgrading techniques for biogas and the supply of green gas is an attractive option for producers of biogas. It is also possible to use upgraded biogas as vehicle fuel.**

**Green gas has added value**  
 The promotion of sustainable energy by the government will in the future be based on the level of sustainability, which is better for green gas than for electricity production through fermentation. Green gas is the cleanest option: the net reduction in CO<sub>2</sub> emissions is much greater.

**CLEAN PROFITS IN ZWIGGELTE**  
 In the province of Overijssel, a number of farmers have formed the Central Overijssel Biogas Cooperative (Coöperatie Biogas Rivierland Overijssel) to jointly produce sustainable energy. They opted to ferment biomass, in this case mainly manure. The cooperative intends to upgrade the biogas produced to natural gas quality, so that it can be supplied to the natural gas grid as green gas.

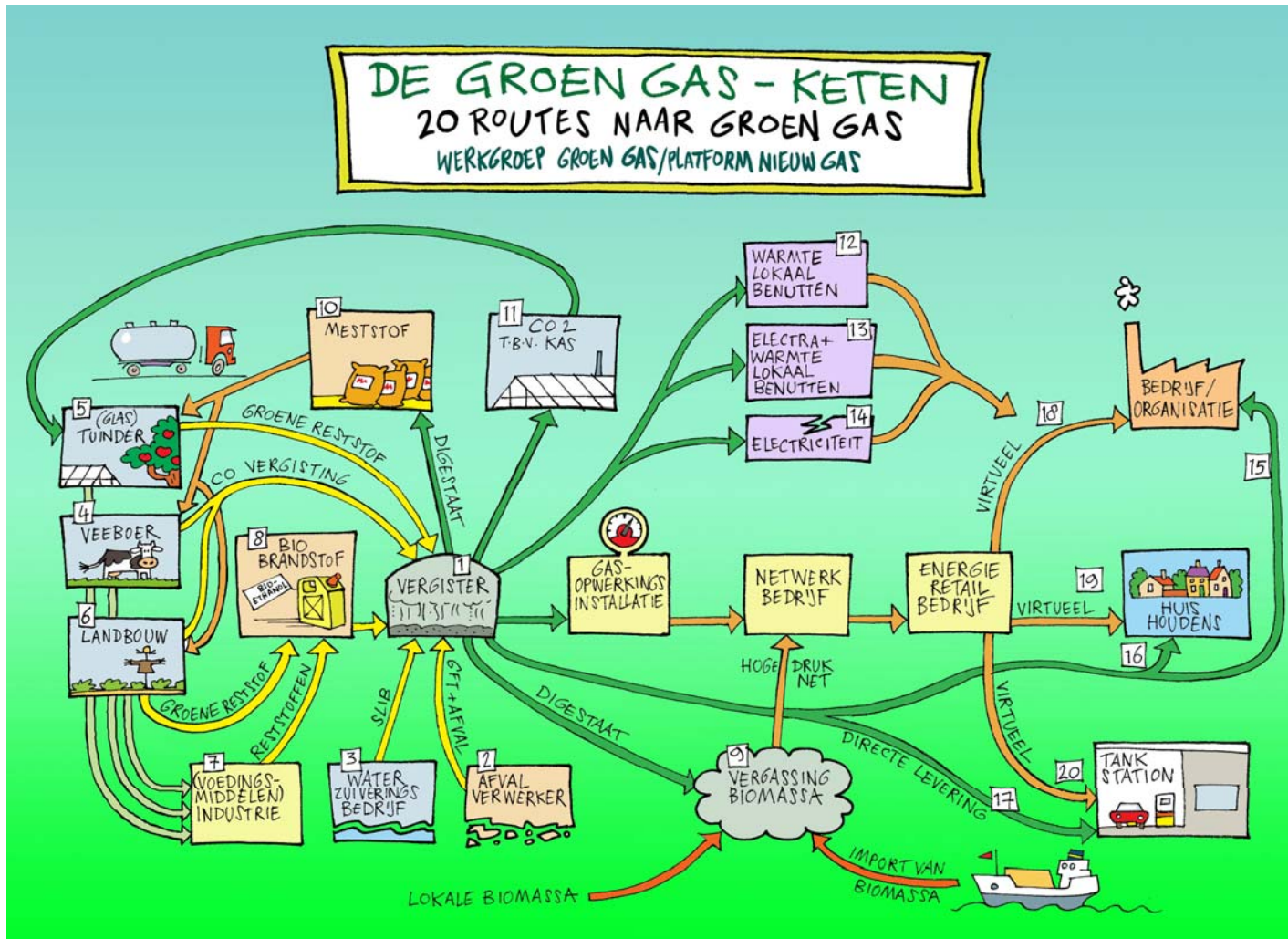
## Problems to solve for gas grid injection

- Quality assurance  
Influenced by bacteria, influenced by SO<sub>2</sub>, grid corrosion  
grid corrosion
- Balancing the grid
- Certification system for Gas Gas  
Interplay between production and consumption of gas by creating a virtual market system  
gas by creating a virtual market system
- (local) grid capacity

Kwaliteitscomponent	Conform advies Gastec	
	Grenswaarde	eenheid
Calorische bovenwaarde	31,6 – 38,7	MJ/nm <sup>3</sup>
Wobbe-index	43,46 – 44,41	MJ/nm <sup>3</sup>
Waterdauwpunt	-10(8 bar)	°C
Temperatuur in te voeden gas	0-20	°C
Zwavel (totaal)	45	mg/nm <sup>3</sup>
Anorganisch gebonden zwavel (H <sub>2</sub> S)	5	mg/nm <sup>3</sup>
Mercaptanen	10	mg/nm <sup>3</sup>
Odorantgehalte (THT)	>10, nom 18<40	mg/nm <sup>3</sup>
Ammoniak	3	mg/nm <sup>3</sup>
Chloorhoudende verbindingen	50	mg/nm <sup>3</sup>
Fluorhoudende verbindingen	25	mg/nm <sup>3</sup>
Waterstofchloride (HCL)	1	ppm
Waterstofcyanide (HCN)	10	ppm
Koolmonoxide (CO)	1	Mol%
Kooldioxide in droge gasnetten (CO <sub>2</sub> )	6	Mol%
BTX (benzeen, toluen, xyleen)	500	ppm
Aromatische koolwaterstoffen	1	Mol%
Zuurstof in droge gasnetten	0,5 (3)	Mol%
Waterstof	12	Vol%/nm <sup>3</sup>
Methaangetal	>80	-
stof	Technisch vrij	-
Siloxanen	5	ppm
Ruikbaarheid (geodoriseerd biogas)	voldoende	

**Gasquality requirements for gasgrid injection in Dutch gaslaw; since nov. 22<sup>nd</sup> 2006**

# Introduction green gas and interaction with other chains



## Activities in preparation Green Gas implementation

- Development of a "Goengasboek"; see [www.goengasboek.nl](http://www.goengasboek.nl)
- Investigation of gas companies
- Vision document of the regulatory transition working group Green Gas
- Background document on Gas quality requirements
- Strategic "verkenning" digestion
- Symposia and workshops
- Demonstration Projects
  - de Veste 18 Nm<sup>3</sup>/h
  - Biogas 80 Nm<sup>3</sup>/h



## Further Information

- [www.enr.com/digest](http://www.enr.com/digest)
- [www.enr.com](http://www.enr.com)
- [www.enr.com/ECS](http://www.enr.com/ECS)
- [www.biogas.net](http://www.biogas.net)

Thanks for your attention  
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