



Biogas in the Netherlands experiences and visions

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Dutch ambitions on renewable energy

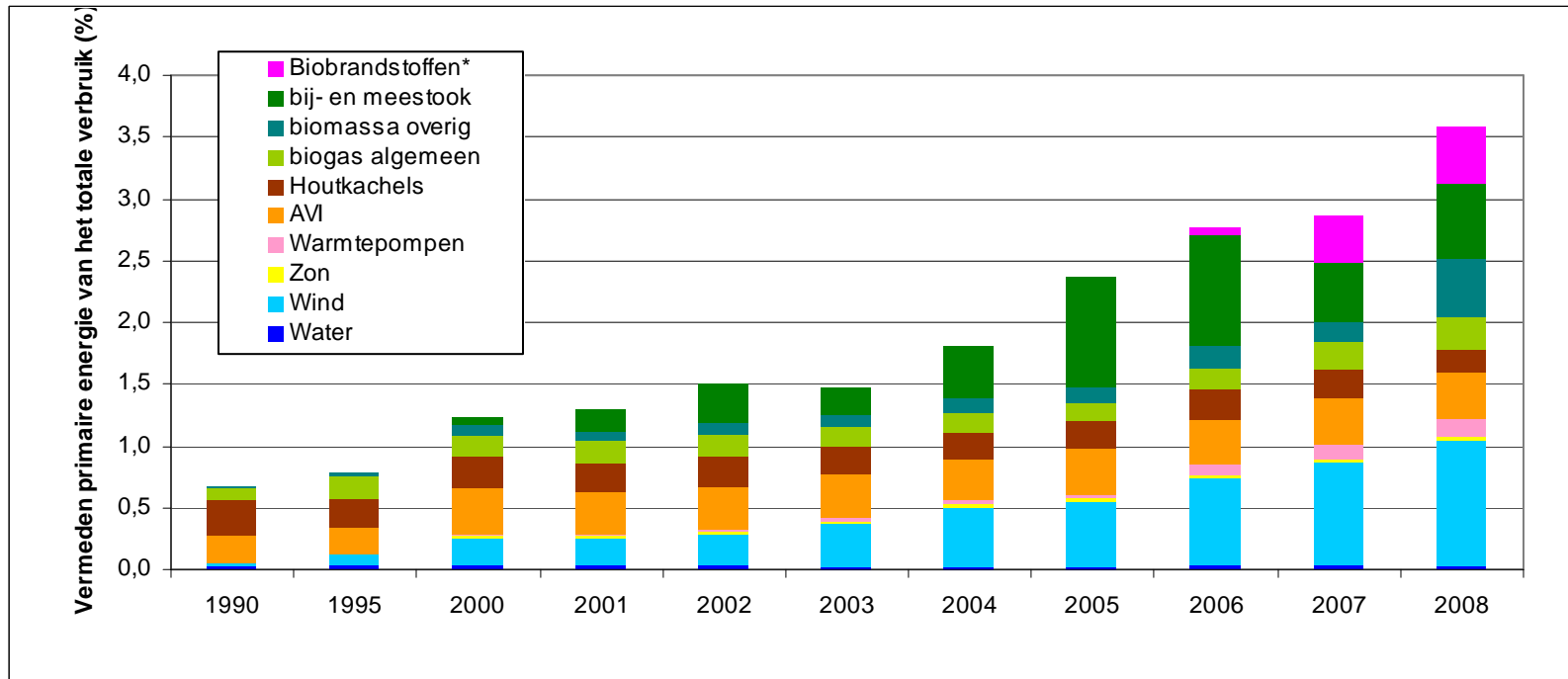
- policy target up to 2020
 - 20% renewable energy
 - 30% emission reduction of green house gases (reference 1990)
 - 2% energy saving yearly

Total GHG emission in 2020:

150 Mton CO₂-eq

Governemental plan: “Schoon en Zuinig” published sept. 18th; 2007

Renewable Energy situation: avoidance CO2-emission through RE-production (%) in the period 1990-2008 (ref: CBS)



Approach implementation

- Voluntary agreements with several sectors based on national plan: “Schoon en zuinig”
- Agricultural sector (june 10th) with total ambition RE of 200 PJ; with a strong focus on digestion
- Energy sector (oct 28th) with total ambition RE of 200 PJ; including ambition of grid connections for Green Gas projects
- Regional authorities (Provinces), nov. 08

Energy transition platforms: approach to Green Gas discussion

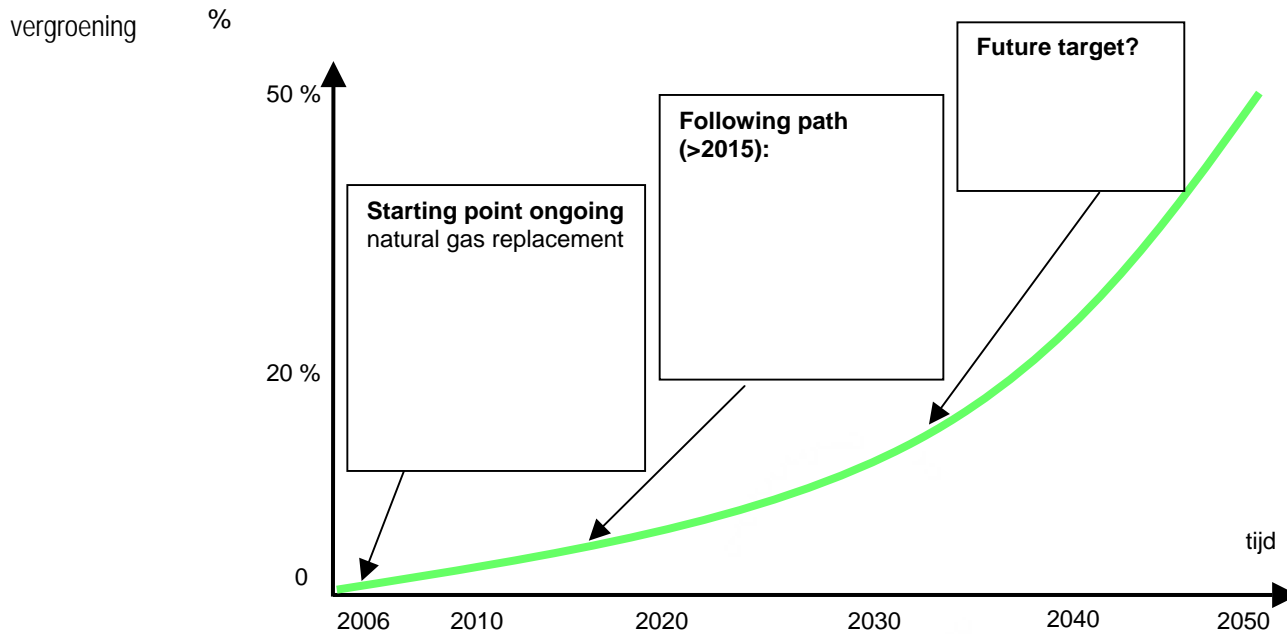


Transition approach by discussion platforms:

info: <http://www.senternovem.nl/EnergyTransition/Index.asp>

- Sustainable Mobility Platform
- Biobased Raw Material Platform
- New Gas Platform (with working group on Green Gas)
- Platform for Chain Efficiency
- Sustainable Electricity Supply Platform
- Energy in the Built Environment Platform

Ambition for Green Gas

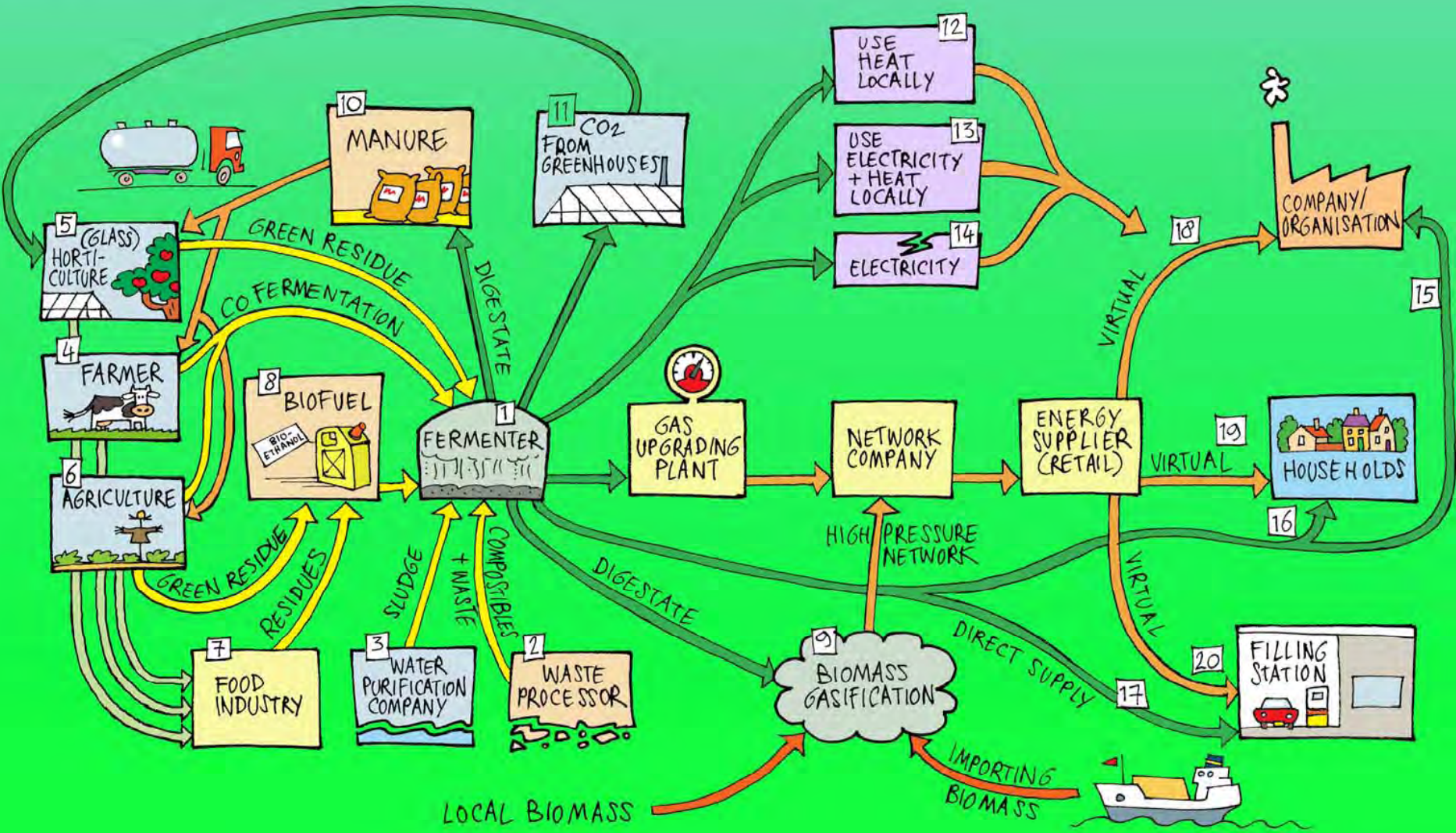


- Short term target: Replacement of natural gas by upgraded biogas 1-3%
- Midterm target: 8-12% replacement of natural gas in 2020 (4 billion Nm³/y), inclusive SNG production from biomass
- Long term: Upscaling to 50% replacement of natural gas by green gas in het gasgrid

THE GREEN GAS CHAIN

20 ROUTES TO GREEN GAS

GREEN GAS WORKING GROUP / NEW GAS PLATFORM



State of the art digestion 2009 (Numbers); and examples gasupgradingplants

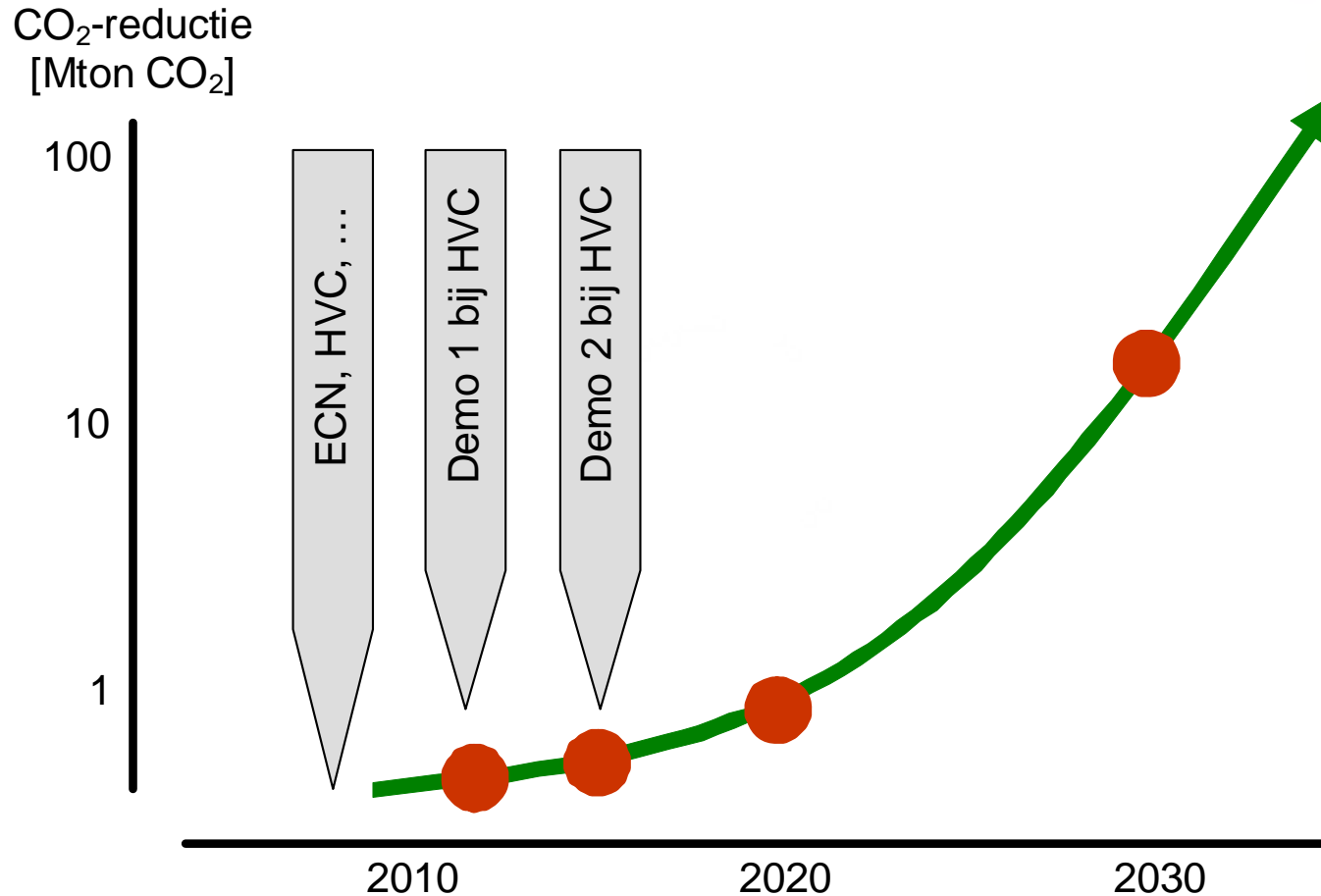
- About 130 projects in operation with an installed capacity of 130 MWe
- In 2009 4-6 new Green Gas projects will start with biogasupgrading and grid injection



New stimulationprogramm (SDE) in 2009 publised and already over- subscribed

- Biomass electricity (digestion and small scale biomass firing plants):
43-55 MWe; stimulation period 12 years
 - production price Digestion of Green household waste:
€ 0,129/kWh – € 0,149/kWh
 - production price co-digestion: € 0,152/kWh - € 0,177/kWh
 - production price digestion industrial waste: € 0,158/kWh
 - small scale biomass firing plants: € 0,115/kWh - € 0,156/kWh
 - correction price 7,8 €ct/kWh
- Biomass: Green Gas Production: 16-22 MW;
stimulation period 12 years
 - production price Digestion of Green household waste :
€ 0,465/Nm³
 - production price digestion (others): € 0,583/Nm³
 - correction price 27,3 €ct/Nm³

Planing for a biomass gasification plant with syngasupgrading en gridinjection in demo 2 (50 Mw)



State of the art in developments green gas market

- Certification system Green Gas, to enable virtual trade of green gas, will be published this summer (Gasunie)
- New requirements gasquality (in case of grid injection) defined by gasgridoperators
- Monitoring gasgridinjection new projects (gasquality, pathogenes(a HEPA-filter is required))
- Changes in gaslaw, to regulate infrastructural costs, in preparation
- Feasibility studies available
- Use of Green Gas as transportfuel in progress:
 - development in the number of filling stations
 - stimulation of use of gas in public transportsector as launching customer




Aftertreatment of animal manure and digestate

- Kick off 10 pilotprojects with aftertreatment animal manure and digestate to produce artificial fertilizers



Pamphlet: biogasupgrading see: www.creativeveenergie.nl



FROM BIOGAS TO GREEN GAS

Upgrading techniques and suppliers

Biogas is produced by fermenting plants such as crop residues, liquid residues and maize, often in combination with animal manure. It is usually used to generate electricity. However, there is a more sustainable and profitable option: to upgrade the biogas and inject it into the national gas grid. Biogas that has been upgraded to natural-gas quality is known as 'green gas'.

The Dutch government (Cabinet Balkenende IV) and other EU Member States have set ambitious targets for making energy supplies more sustainable. The Dutch goal is to achieve 20% sustainable energy by 2020. Making the gas supply more sustainable can make an important contribution to this target.

Around 10% green gas in 2020

The pre-conditions are present: green gas can be certified (just like green electricity) and there is financial support available via the SDE scheme (an incentive scheme for sustainable energy production). In its vision document 'Let's give full gas' the Green Deal working group states a target of 8-12% natural-gas replacement by the year 2020. This target is included in the Energy Innovation Agenda, as one of the subjects that the Dutch Cabinet plans to focus on over the next five years.

Green gas based on fermentation

Green gas can be produced in two ways: by upgrading biogas from fermentation of wet biomass to natural-gas quality, or by gasification of biomass. This brochure explains green-gas production based on fermentation, details example projects and lists suppliers of these installations.

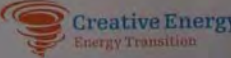
UPGRADING BIOGAS

Increasing methane levels...

When upgrading biogas to green gas the energy content is increased until the Wobbe-index is equal to that of natural gas. A higher methane content is achieved by extracting the CO₂ from the biogas.

...and cleaning

Siloxanes (organic materials, such as chlorine, sulphur etc.) also need to be removed in a pre-treatment or post-treatment process. Cleaning is important in order to prevent air pollution, contamination of surface water, as well as pollution of engines, for example.



Thanks for your attention

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