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Stimulating co-digestion in the Netherlands the Dutch case

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Introduction

- SenterNovem
  Dutch partner for innovation and sustainable development - Turning policy into reality
- Agency of the Dutch Ministry of Economic Affairs.
- Our core competence is converting government policy into reality.
- On behalf of the Dutch government we implement policy regarding:
  - Innovation
  - Energy and Climate Change
  - Environment and Spatial Planning
- Partner in Probiogas

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Development of co-digestion in the Netherlands (summary 2004-2005)

- January 2004:
  Few digestion plants operational (manure and organic waste)
- June 2004:
  Ministry of Agriculture presented “Positive list” for co-digestion while digestate remains legally manure
- April 2005:
  Document legislation of co-digestion plants
- January 2005:
  Financial stimulation of renewable energy in the Netherlands (MEP)
- January 2006:
  30 co-digestion plants operational
- August 2006:
  Financial support stopped

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Dutch biogas installations (2004)

(excl. landfill gas and digestion of sewage sludge)

LEGENDA

- biomass firing plants (CHP)
- Gasification plant
- manure co-digesters
- Organic waste digesters
- co-firing plants

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Dutch case study: Basics

- Region: south part of the Netherlands
  (near the city of Eindhoven)
  - livestock intensive area
- Characteristics (region)
  - manure (cattle and pig) 2.5 million ton/a
  - poultry manure (110 kton/a)
  - crops (4,650 ha)
  - organic community waste (150 kton/a)
  - wood (35 kton/a)
  - industrial organic waste?
- Potential bio-energy (2.4 PJ ~ 0.7 million MWh)

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Case description

- Centralized Anaerobic Digestion plant: 220,000 tonnes
  - Cattle manure
  - Pig manure
  - Poultry manure
- Cooperation of 30 farmers
- Characteristics
  - 600 tonnes/day
  - thermophillic temperatures (52-55 °C)
  - sanitation step (70 °C)
  - CHP production 3.5 MW electricity
  - no industrial organic waste

Activities (Dutch case)

- Organizing a meeting project-group Eindhoven area
- Check use digestate as fertilizer
- Inform local farmers
- Meetings with local authorities and members project group
- Assessment case study (mid 2006)
- Presenting results of Danish study
- Supporting other co-digestion projects

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Assumptions assessment study

Capacity CAD-plant (tonnes per year)	220,000
Investment costs CAD-plant, € (millions)	6.13
Investment costs CHP facility (3.5 MWe), € (millions)	2.112
Required storage capacity solid/liquid manure in months, reference	11
Price, electricity sold, € per kWh	0.06
Price, electricity purchased for process purposes, € per kWh	0.2
Price, heat sold, € per MWh	0
Treatment fee, organic waste, € per tonne	0
Capacity of trucks in use, tones	40
Average distance from farm to CAD plant, km	20
Average distance, long distance transport, km	100

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Profitability CAD-plant (€ x 1,000)

Electricity sales	1,372
Heat sales / Treatment fees	0
Sales in total	**1,372**
Electricity purchase for process	-236
Maintenance and Sand removal (-300) and (-6)	-306
Insurance	-22
Other costs and Premises (-43) and (-16)	-59
Staff costs and Administration (-124 and -54)	-178
Capital costs	-595
Costs in total	**-1,396**
Net result of the plant	**-24**

Socio-economic results **Biogas plant:**
Annual costs and benefits **Noord-Brabant region, The Netherlands.Base Case**

Costs (levellised annuity)	**Result 0**	**Result 1**	**Result 2**	**Result 3**
			mio.EUR/year	
Invesments:				
Biogas-plant	0.574	0.574	0.574	0.574
Transport materiel	0.000	0.000	0.000	0.000
CHP-plant	0.184	0.184	0.184	0.184
Operation and maintenance:				
Biogas production / biogas plant	0.566	0.566	0.566	0.566
Transport materiel	0.071	0.071	0.071	0.071
Sum:	**1.395**	**1.395**	**1.395**	**1.395**

Benefits (levellised annuity)	**Result 0**	**Result 1**	**Result 2**	**Result 3**
			mio.EUR/year	
Energy production:				
Biogas sale	0.000	0.000	0.000	0.000
Electricity sale	0.785	0.785	0.785	0.785
Heat sale	0.000	0.000	0.000	0.000
Agriculture:				
Storage and handling of liquid manure		-0.037	-0.037	-0.037
Value of improved manurial value (NPK)		0.308	0.308	0.308
Distribution of liquid manure		-1.374	-1.374	-1.374
Transport savings at farms		1.066	1.066	1.066
Veterinary aspects				n.a.
Industry:				
Savings related to organic waste treatment		0.000	0.000	0.000
Environment:				
Value of GHG reduction (CO_2, CH_4, N_2O-reduction)			0.631	0.631
Value of reduced N-eutrophication of ground water:			0.347	0.347
Value of reduced obnoxious smells				0.108
Sum:	**0.785**	**0.747**	**1.725**	**1.833**

	Result 0	**Result 1**	**Result 2**	**Result 3**
			mio.EUR/year	
Difference as annuity: Benefits - costs	**-0.610**	**-0.648**	**0.330**	**0.438**

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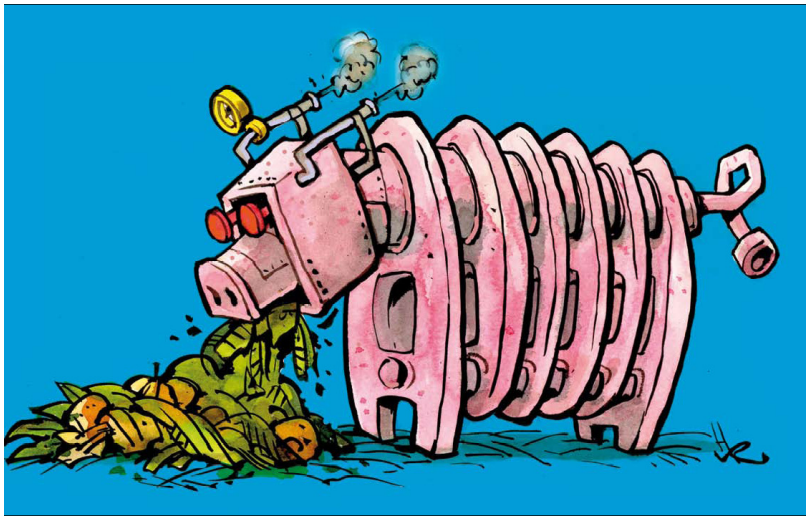
Conclusions assessments

- Good preconditions for CAD plant (manure surplus situation)
- Less transport costs (farmers delivering manure)
- Less use of fertilizer (farmers receiving digested manure)

Improvements (assessment)

- Electricity price is low (EU-context)
- No heat utilisation
- No organic waste is co-digested (increasing biogas production)



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Results (Dutch case)

- Project put on HOLD
  - Financial support stopped (18th of August 2006)

- Other aspects
  - Location of the plant
  - Technology of manure treatment

Example of a Dutch co-digestion plant

Capacity 36,000 ton manure

Electrical power 440 kW

Thermal power 600 kW

Electricity production

~ 3,5 million kWh per annum

Dimensions:

3x 800 m3 digester

3.000 m3 storage

Total investment € 2.000.000

Pay-back time 8 years

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Maize digester (36,000 ton/year)

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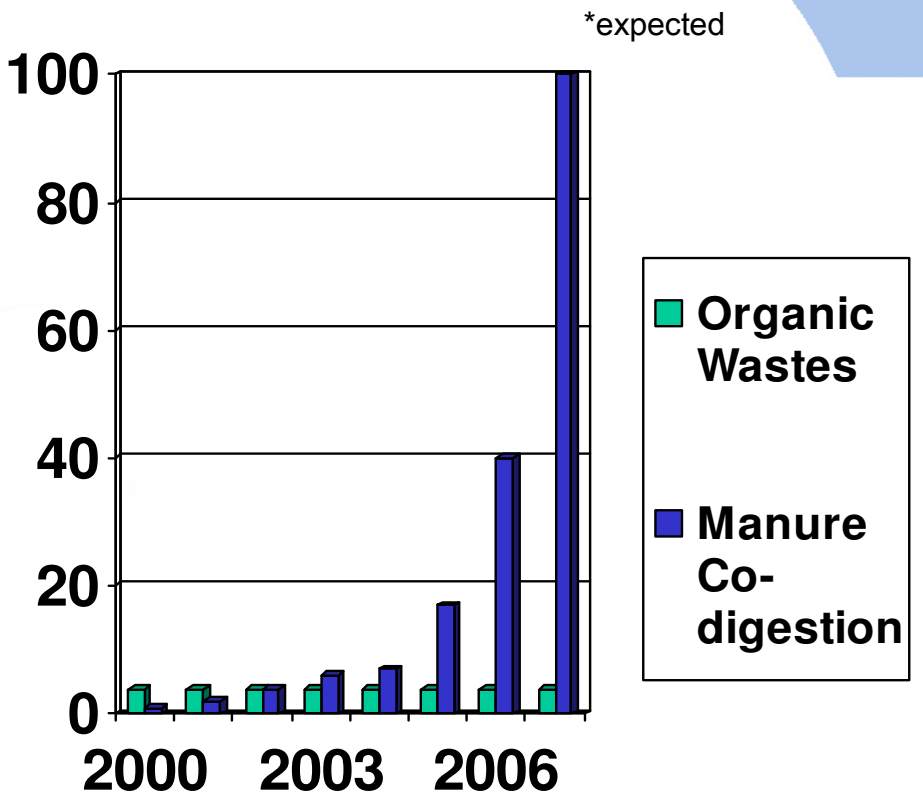
Growth of Manure Digestion through co-digestion

- Now also 100% maize digestion possible
- Financial support stopped
- End 2006: 40 installations, 20 MWe
- 2007, additional call: 32.6 M€/yr (10yr contracts) for 40 MWe
  ~ 60 plants in preparation
- 2008, new governmental financial support system (wider focus towards renewable energy
- ~ 200 plants in planning



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Dutch biogas installations (2007)

(excl. landfill gas and digestion of sewage sludge)

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- biomass firing plants (CHP)
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Dutch objectives renewable energy

- Old policy up to 2010:
  9% production from used electricity
  and 10% of total energy use in 2020
  5,75% biofuel obligation

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

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Items in developments on biogas

- Energy crop production
- Mono-digestion without manure
- Process control systems (Germany and Denmark)
- Quality of silage
- Sustainability of biogas production
- Utilization of produced heat in CHP
- Biogas upgrading (production of green gas)
- Biogas as transport fuel

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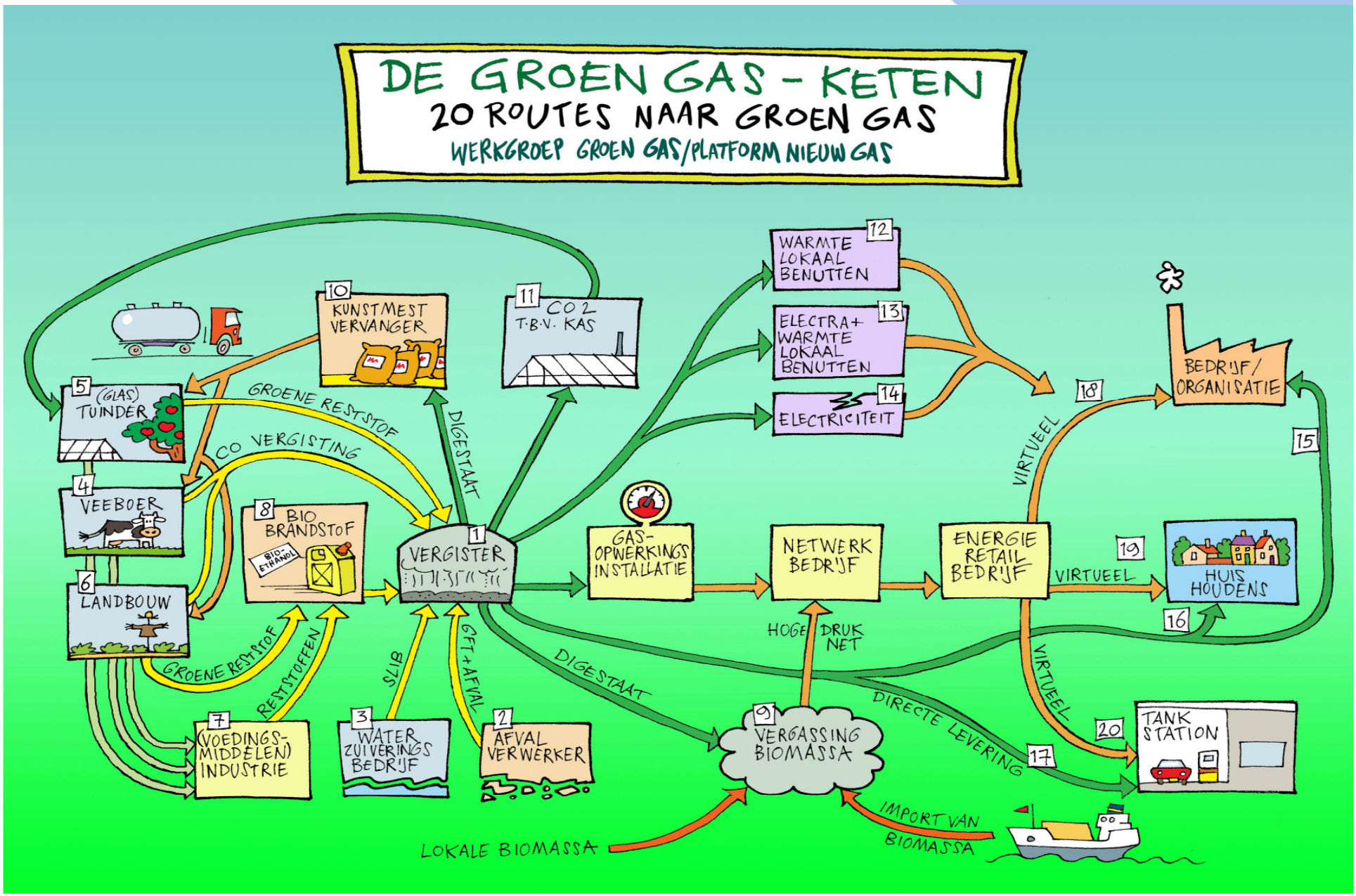
Integral green gas approach



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Thank you for your attention

more information:

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