



Bioethanol the third way

decentral production of biofuels
in biorefinery clusters

for **sustainability** *and* **economy**

Douwe-Frits Broens, Beethanol BV

Bad Sassendorf 131207

dr. D.F. Broens, Beethanol BV



Beethanol BV

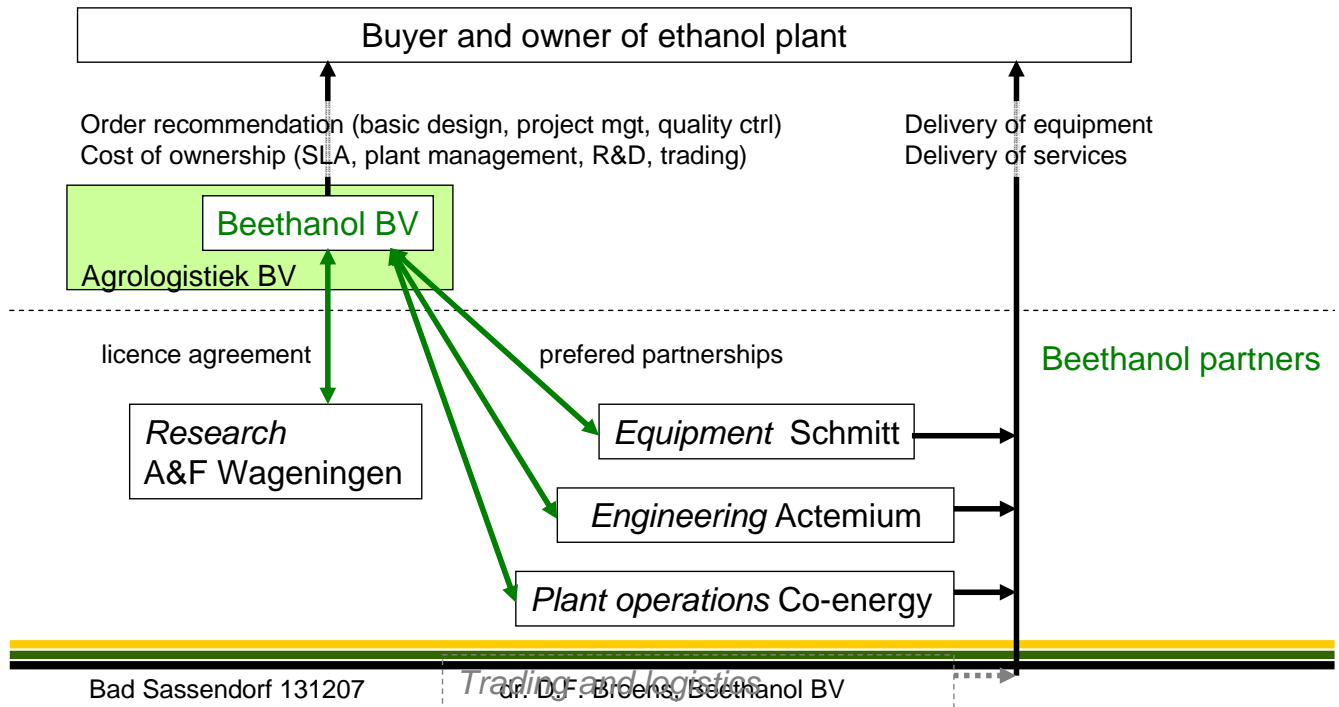
- Building bio-ethanol installations
- Medium size: 5.000 to 50.000 m³/year
- Flexible feedstock
- In clusters with greenhouses and biogas

- Optional 6 locations in NL
- Expanding into Germany

Bad Sassendorf 131207

dr. D.F. Broens, Beethanol BV

Beethanol BV organigram



Bioethanol the third way

- **Perspective**
 - Sustainability
 - Some technology
 - Economy
- Conclusion



Headlines 2012



Oil price above \$200: NYE in mourning

China owns 80% of feedstock from Africa

Old economy multinationals facing hard times

“Second generation” biofuels never paid off

High straw prices: investors face bankruptcy

WTO: new exporting countries dominate prices

Serious energy savings enforced by energy prices

Bad Sassendorf 131207

dr. D.F. Broens, Beethanol BV

Bright future for biofuels



Headlines 2012

More than 50% of transport fuel from biomass

Smallholders finally get their pay

Consumers paying fair prices for energy and food

Small biorefineries drive green innovations

Nordrheinische Bussen auf Nordrheinischer Sprit

Fossiele brandstof onbetaalbaar

Bad Sassendorf 131207

dr. D.F. Broens, Beethanol BV

With hindsight



Biofuel breakthrough:

Sustainability was **not the issue**

Technology was **not the issue**

“It was the economy, stupid”

Bioethanol the third way

- Perspective
 - **Sustainability**
 - Some technology
 - Economy
- Conclusion



Sustainability is **not** the issue

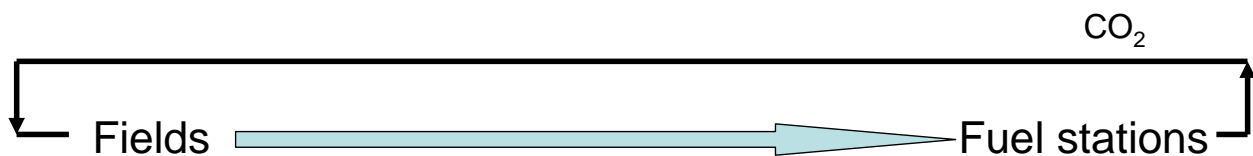


- **All** biofuels more sustainable than fossil fuels
 - On **all** criteria
- The **only available** alternative in transport
 - For decades to come

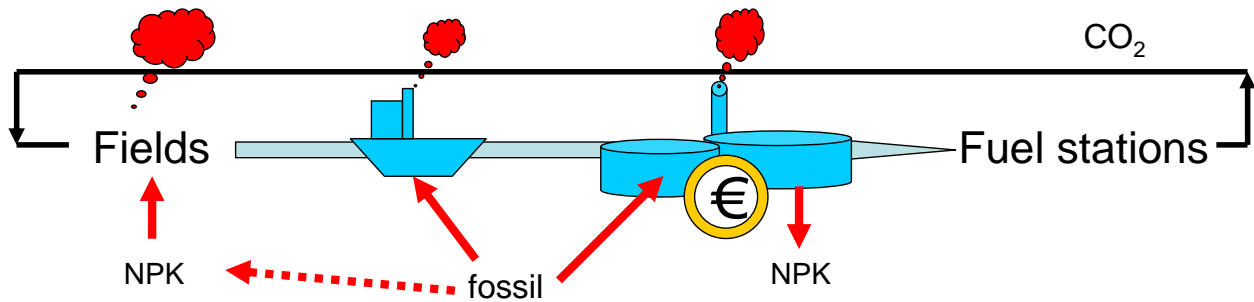
We **may strive** for better sustainability
but in the end **we need them all**

Now let's talk about sustainability

Bioethanol: renewable?



The doom stories



0. Old fashioned picture (maize, USA)

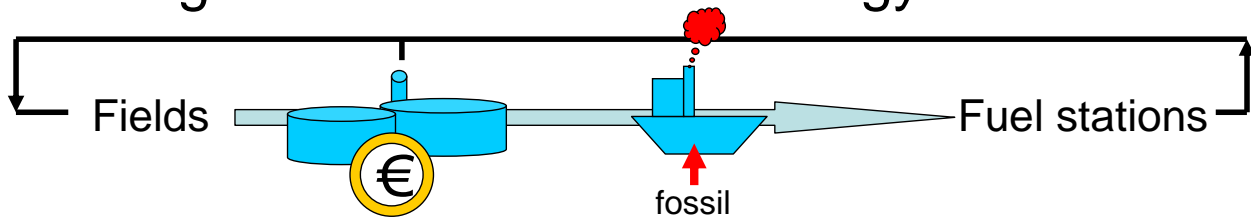
Bad Sassendorf 131207

dr. D.F. Broens, Beethanol BV

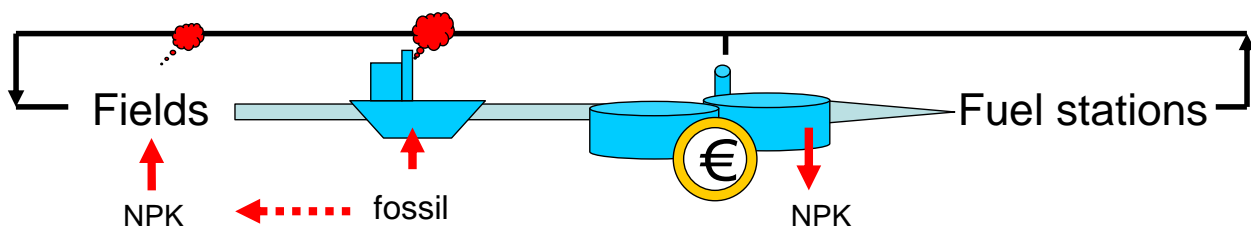
Large scale models



1. Sugar cane / renewable energy



2. Wheat, maize / renewable energy



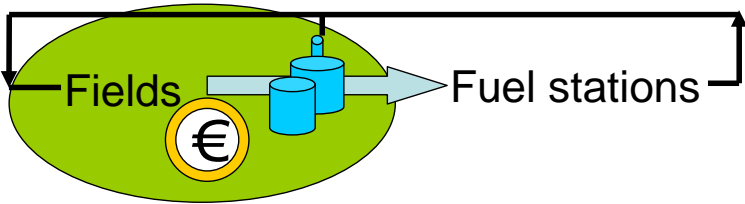
Bad Sassendorf 131207

dr. D.F. Broens, Beethanol BV

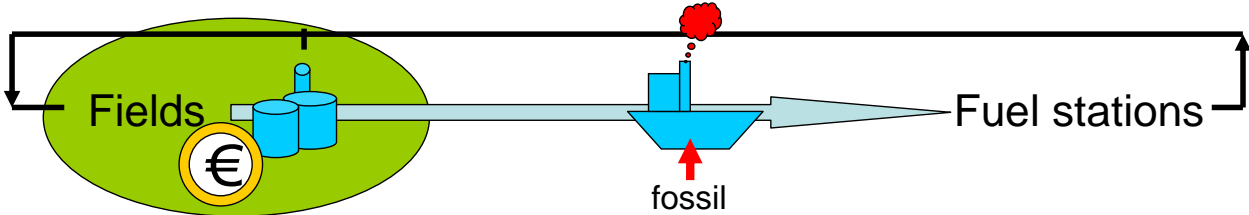
Best available: decentral model



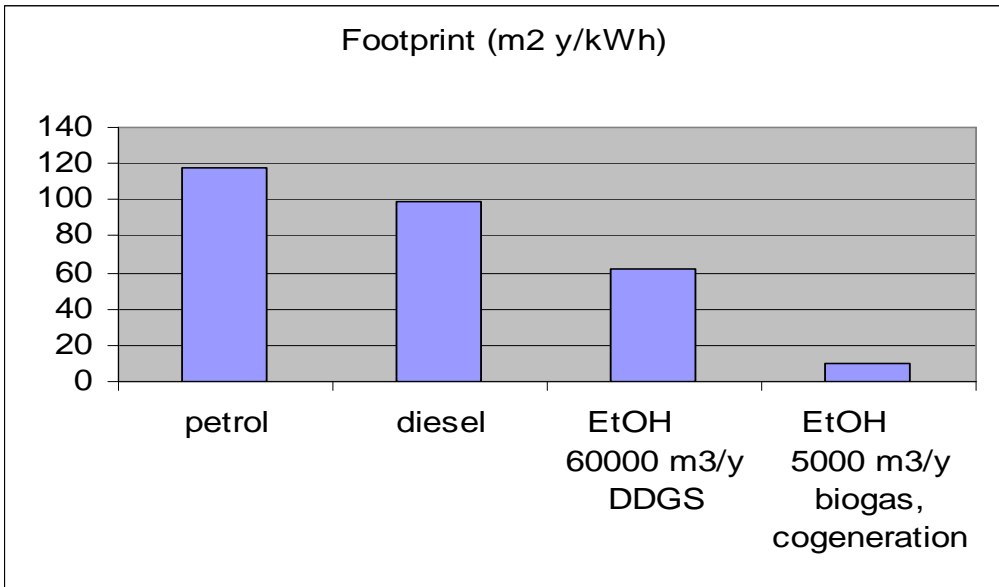
The third way (local for local)



The third way (import from smallholders)



Some references



Prof. Friedl, Wien (Berlin Mai 2007)

Some references



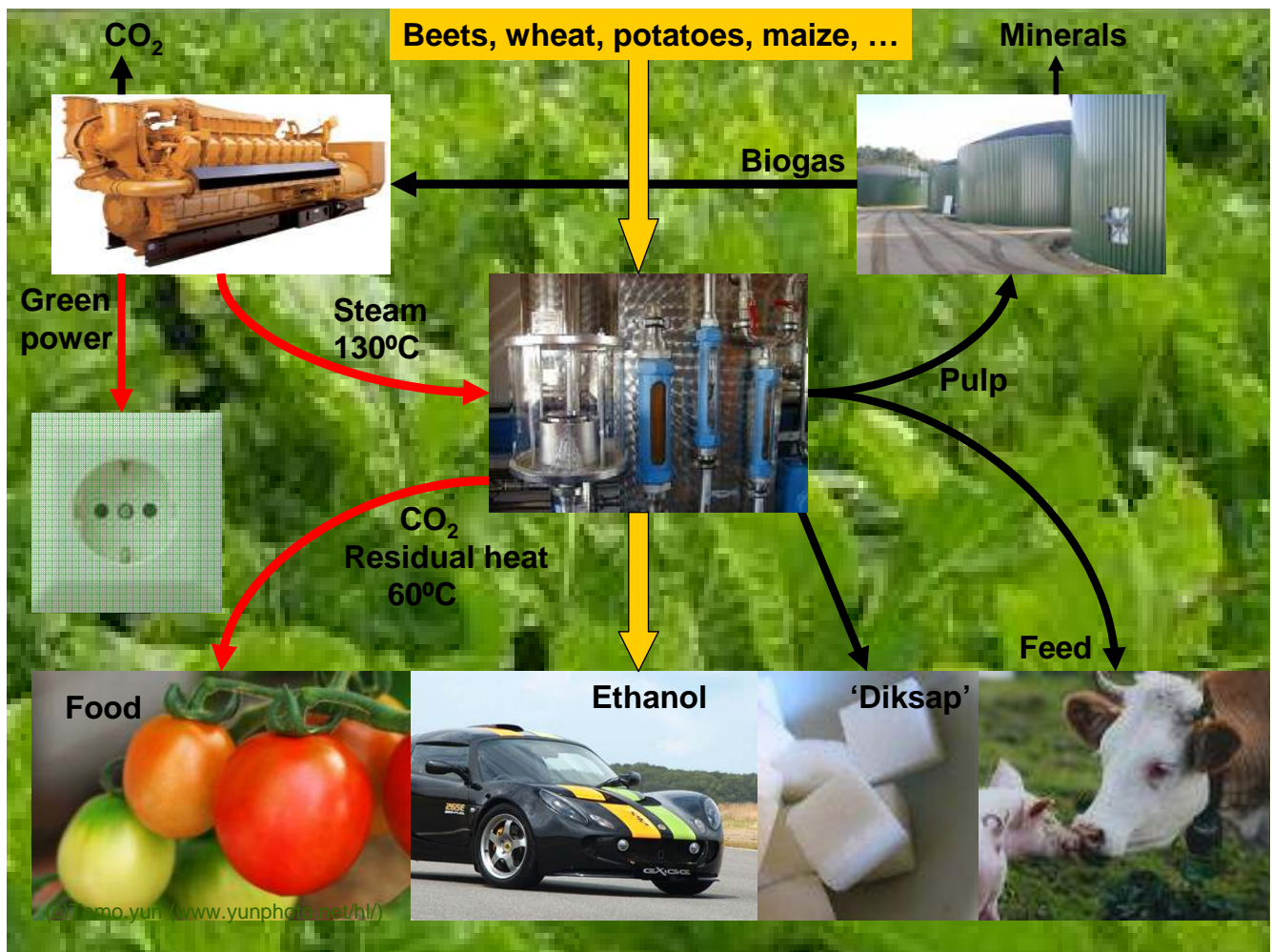
Superior CO₂ emission savings

- 9909 ton less than traditional
- when EtOH production capacity of 5000 m³
(own calculations)

Bioethanol the third way

- Perspective
 - Sustainability
 - **Some technology**
 - Economy
- Conclusion





Decentral production = smart solutions



- Use of locally produced exergy
- Clusterwise integration
 - Material cascades (biorefinery)
 - Energy cascades
 - Zero waste
 - Zero soil degradation
 - Zero fossil fuels

Decentral production = available technology



- Biorefinery
- Combination of 1st and 'shallow' 2nd generation
- **Many improvements possible**
 - On the field
 - In the core process
 - In neighbour processes (spin-off) ® Gesloten Kas
 - Towards bio-economy / biochemicals
 - Introduce 'deep' 2nd generation 'on the fly'
 - Develop from running cash flow

This is what investors like

Bioethanol the third way

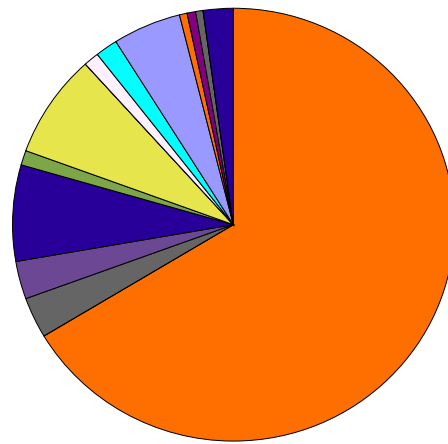
- Perspective
 - Sustainability
 - Some technology
 - **Economy**
- Conclusion



Feedstock: the name of the game



Cost price breakdown



- Wheat
- Beet
- Enzymes, yeast
- Electricity
- Gas
- Water (netto)
- /- dehydration
- Transport wheat
- Transport beet
- Transport ethanol
- Labour
- Depreciation
- Maintenance
- Overhead
- Insurance
- Rents
- Interest

Where to put my money?



First generation bioethanol, e.g. wheat

- buyers market 1955 - 2005 € 95/tonne
- suddenly sellers market 2006 € 250/tonne
 - world wide harvest failure 2006 (2007)
 - demand China, Middle East *up-up-up*
- result: Abengoa, Südzucker reselling wheat contracts and stop producing ethanol
- long run equilibrium € 170/tonne ? BE

Where to put my money?



Second generation bioethanol (fibers)

- technological **risks**
 - not yet ready: when ??
 - only large scale and single feedstock
- Straw (logen): cheap residual products
 - Does not remain cheap - **price risks**
 - Logistics!
- Wood
 - Nature conservation - **environmental risks**

Decentral production = smart solutions



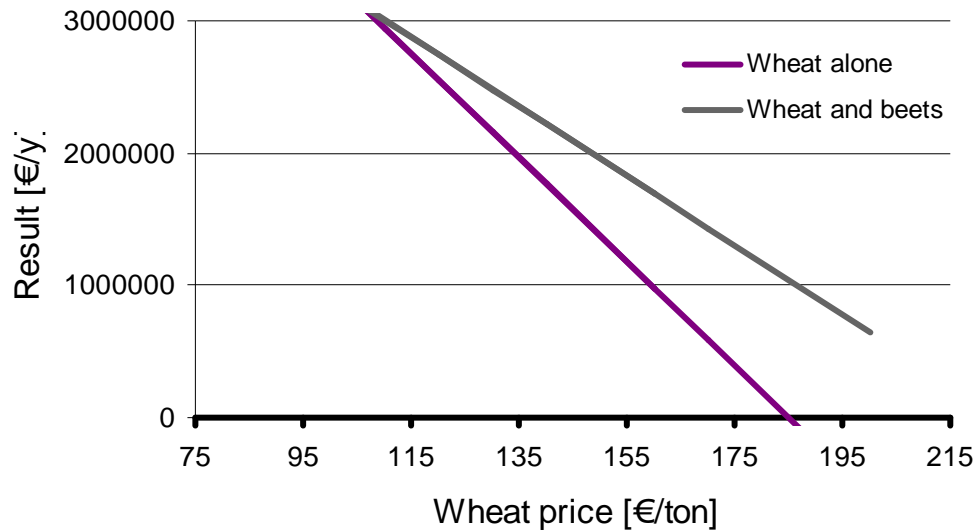
Flexibility on feedstock

- All feedstock that is locally available
- Also heavy feedstock like beets (short cycles)
- Optimal margin per hectare
- Risk reduction
- Small additional investments
- Introduction new (2nd gen.?) tech 'on the fly'

Decentral production = smart solutions



Economy: Flexibility reduces price risks



Bad Sassendorf 131207

dr. D.F. Broens, Beethanol BV

Decentral production = smart solutions



Local optimal use of side products

- Up to 25% of total revenue
- Outside integration cheaper than inside

Driver for economy and innovation of rural areas

- Farmers may own the installations
- Innovations by reinvesting cash flow
- Headstart for bio-economy
- Employment and value added within the region

Bad Sassendorf 131207

dr. D.F. Broens, Beethanol BV



Bioethanol the third way

- Perspective
 - Sustainability
 - Some technology
 - Economy
- Conclusion



Decentral production

- **Asks for smart solutions**
 - Smart local combinations
 - Cheap local energy
 - ‘Shallow’ 2nd generation technology
- **The economic alternative**
 - Less risk through flexibility in feedstock
 - Up to 25% revenues from side products
 - Driver for rural bio-economy (Europe and 3d world)
 - Building scale through repetition: learning curve

Decentral production



- ***The sustainable alternative***
 - Zero fossil fuel
 - Zero soil degradation
 - Payoff to smallholders in EU and 3d world
- **Available as of today**
 - Feasible with available technology
 - Many improvement options
 - Low investment threshold

Bad Sassendorf 131207

dr. D.F. Broens, Beethanol BV



We **may strive** for better sustainability
But in the end **we need all** biofuels we can get

Beethanol BV

call 0031 6 28848720

e-mail df@agrologistiekbv.nl

Bad Sassendorf 131207

dr. D.F. Broens, Beethanol BV