



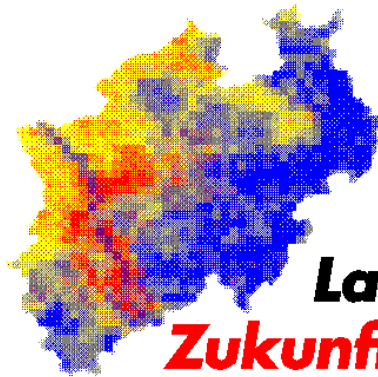
Innovative and sustainable use of bioenergy

RE Asia, Beijing 24. April 2005

Leonhard Thien
NRW State Initiative on Future Energies
Düsseldorf



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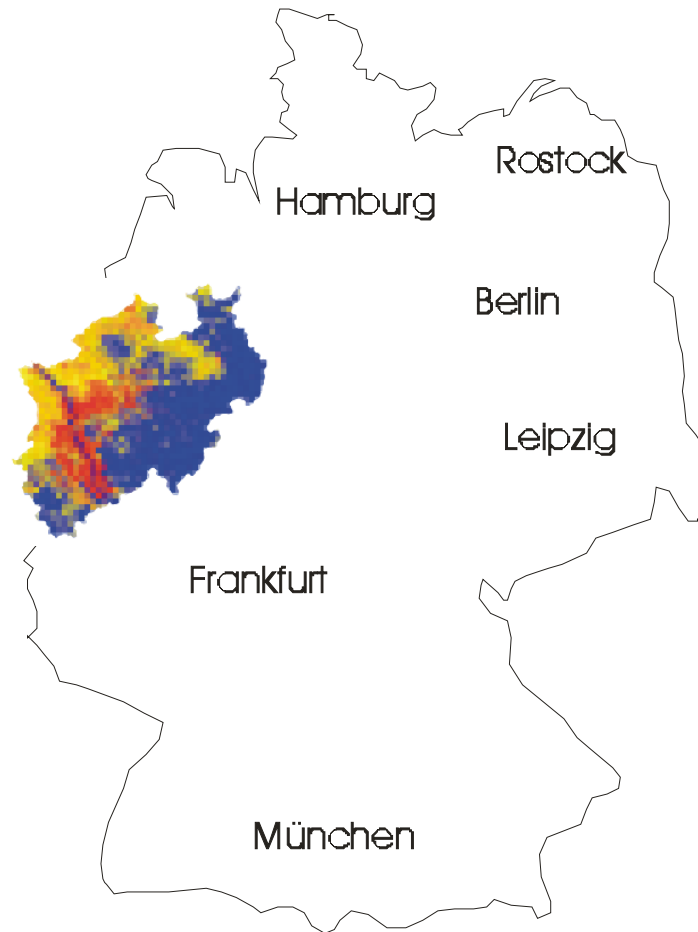
**Landesinitiative
Zukunftsenergien NRW.**





Nordrhein-Westfalen

NRW.





NRW State Initiative on Future Energies

Initiative for the energy industry and science founded in 1996 by the NRW State Government

The Aims

- to intensify the efficient use and generation of energy
- to promote innovative processes
- to support the development of renewable energies technologies and to speed up their market launch

Workshops and Networks

- Energy services
- Energy concepts for specific industries
- Light-emitting diodes
- Housing & construction
- Heat pumps
- Solar heating
- Photovoltaics
- Biomass
- Wind energy
- Hydro-electric power
- Geothermal energy
- Mine gas
- Hydrogen power
- Decentralised power systems
- Co-generation of power and heat
- Power plant technologies
- Fuel cells (*NRW Fuel Cell Network*)
- Foreign affairs

What is the State's Initiative Offer?

➤ Information and Communication

Working groups, business contact forum, conferences, magazines

➤ Projects

Initiation of projects, looking for project partners, support in the realization stage, initial consultation on incentives

➤ Settlements

cooperation with local economic development agencies, acquisition

➤ International Markets

Participation in national and international conferences and trade fairs (common stand at trade fairs), organisation of future energies symposia

➤ Public Relations Work

Internet, magazine, brochures, news service, industry atlas for future energies, press releases

Topics

- **Framework**
- **generation of electric power**
- **generation of thermal energy**
- **generation of biofuels**



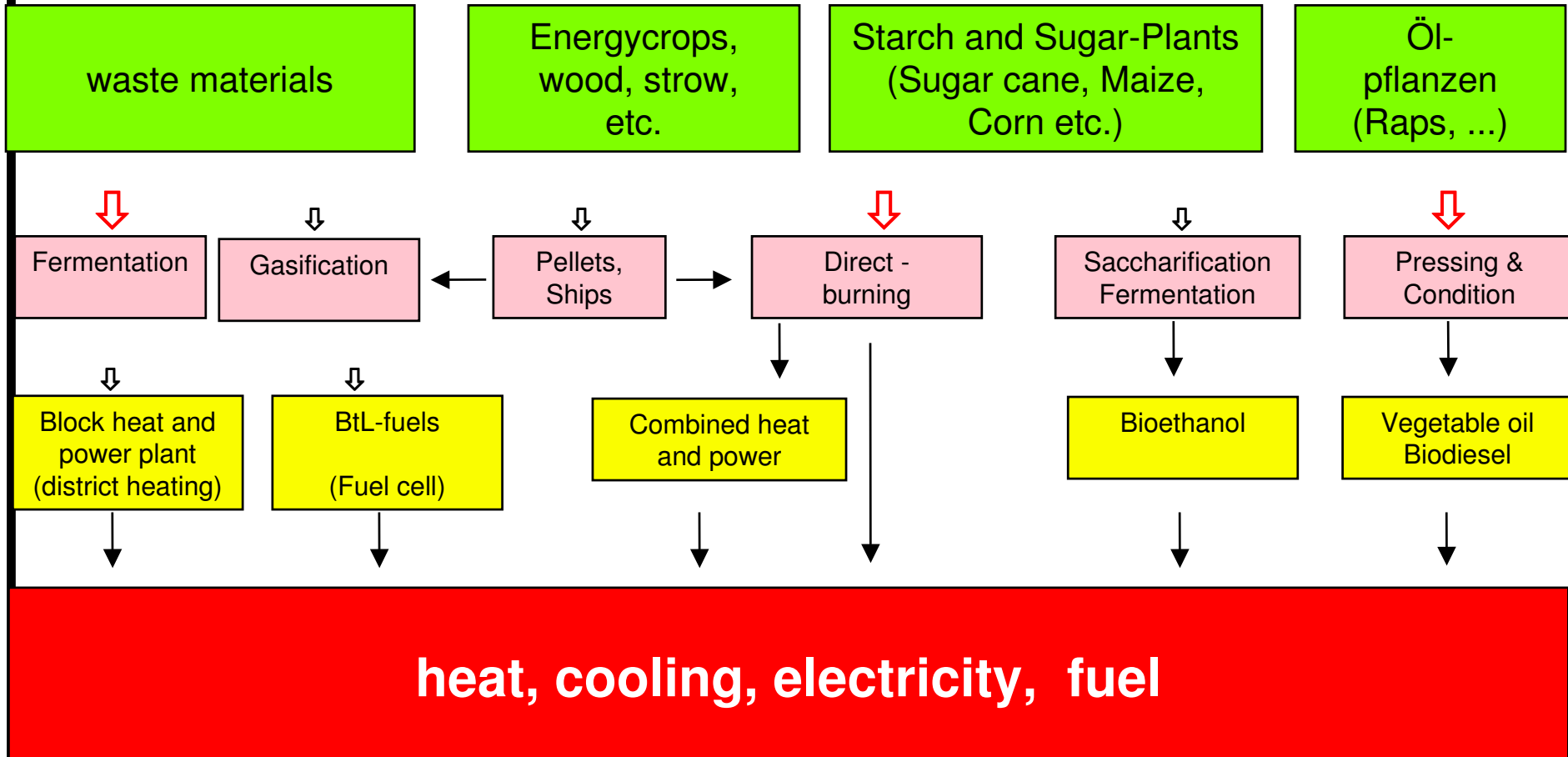
Biomass as energy source

- **added value for the region**
- **reduction from the petroleum dependence**
- **no transport risk**
- **CO₂ neutral fuel**
- **domestic energy source**

Biomass as job-engine

- **to save jobs**
- **to provide new jobs**
- **saving the income from agriculture and forestry**
- **to create short, regional raw materials cycle**

Energy from Biomass



Topics

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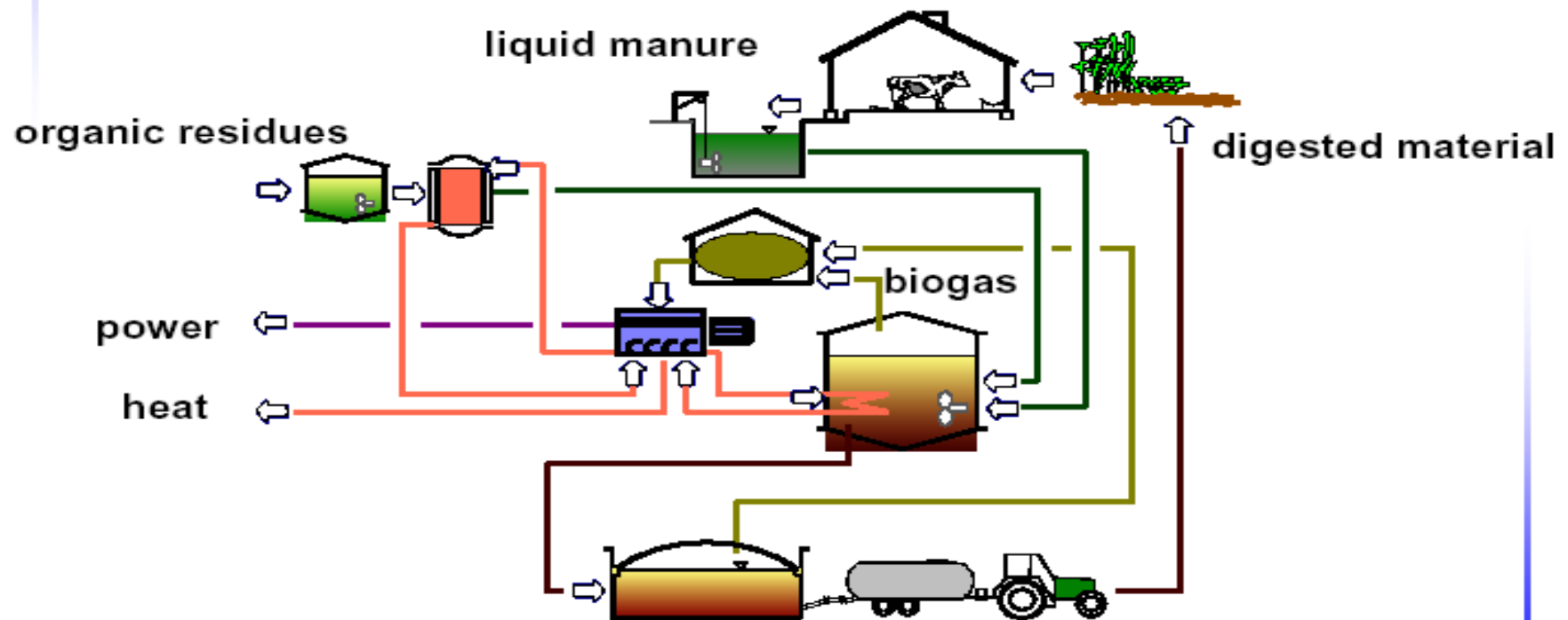
Generation of electric power

- **biogas plant**
- **biomass thermal power plant**
- **biooil/biodiesel – (power and heat)**
- **biomass – gasification**

Biochemical Conversion - Anaerobic Digestion -



Example of a biogas plant using animal manure as feedstock



From Farmer to Energy Entrepreneur

**Beet as an
energy source**



Input:

700 t/a liquid manure

1800 t/a beet

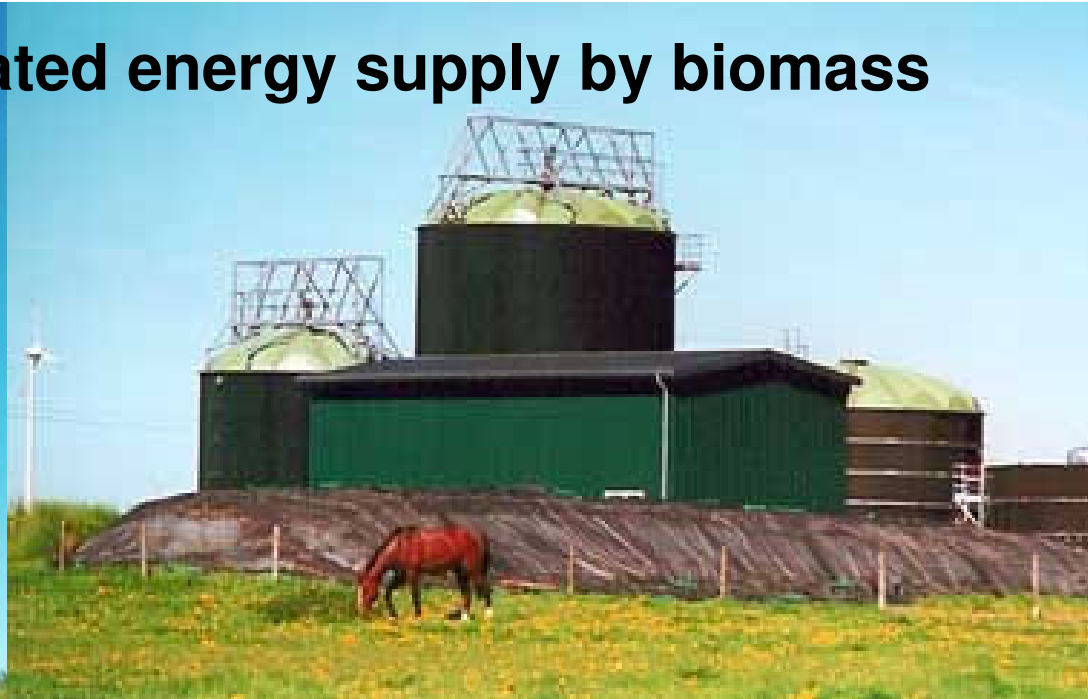
Output:

100 kW electrical energy

100 kW thermal energy

Biogas Plant with food scrap

Integrated energy supply by biomass



Input:

3900 t/a liquid manure

2000 t/a corn silage

5000 t/a food scrap

Output:

250 kW electrical energy

100 kW thermal energy

Biogas Community Plant

19 Partners have foundet



Input:

90 m³/d liquid manure

10 m³/d dund

30 m³/d corn silage

Output:

2 X 511 kW electrical energy

approx. 8 Mio kWh el. energy

approx. 11 Mio kWh th. energy

Biomass thermal power plant



Pilot Gasification Plant



Energie aus
BIOMASSE & RESTSTOFFEN

Gestufte Reformierung:
Durch die Vergasung von biogenen Abfällen entsteht ein Gas, das zur Strom- und Wärmegewinnung genutzt werden kann.

Die Projektpartner:

D.M.Z. HERTEN

DMT ESSEN

Technische und Lebensqualität

STADT HERTEN

ITWH KREFELD

DER BLAUE TURM
THE BLUE TOWER

INFORMATION:
Dr. Mühlen GmbH & Co. KG
Tel. 0 23 66 / 30 52 68

DER BAU DIESER PILOTANLAGE IN HERTEN WIRD GEFÖRDERT DURCH DIE EU, DAS LAND NORDRHEIN-WESTFALEN UND DIE VORARLBERGER ILLWERKE AG.

DIESES VORHABEN IST VOM EUROPÄISCHEN FONDS FÜR REGIONALE ENTWICKLUNG KOFINANZIERT WORDEN

Example for Gasification

Gasification of bioorganic products, wood, straw, organic waste

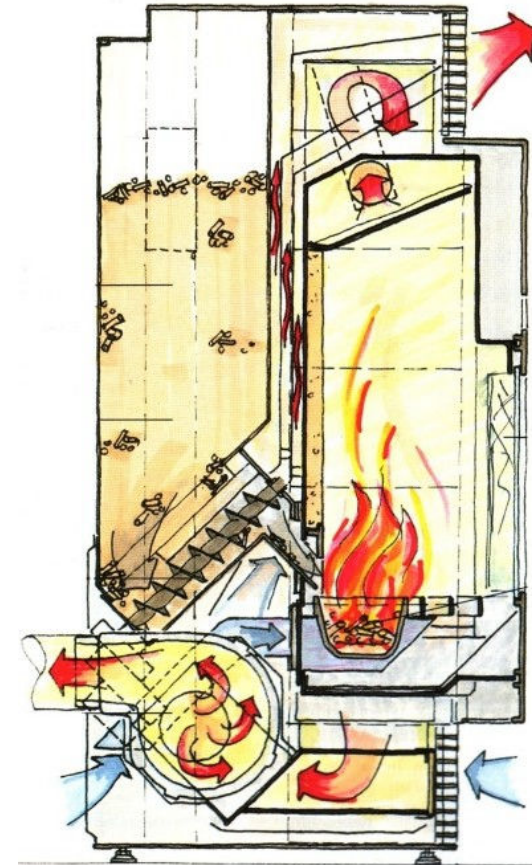
output:
biogas, coke

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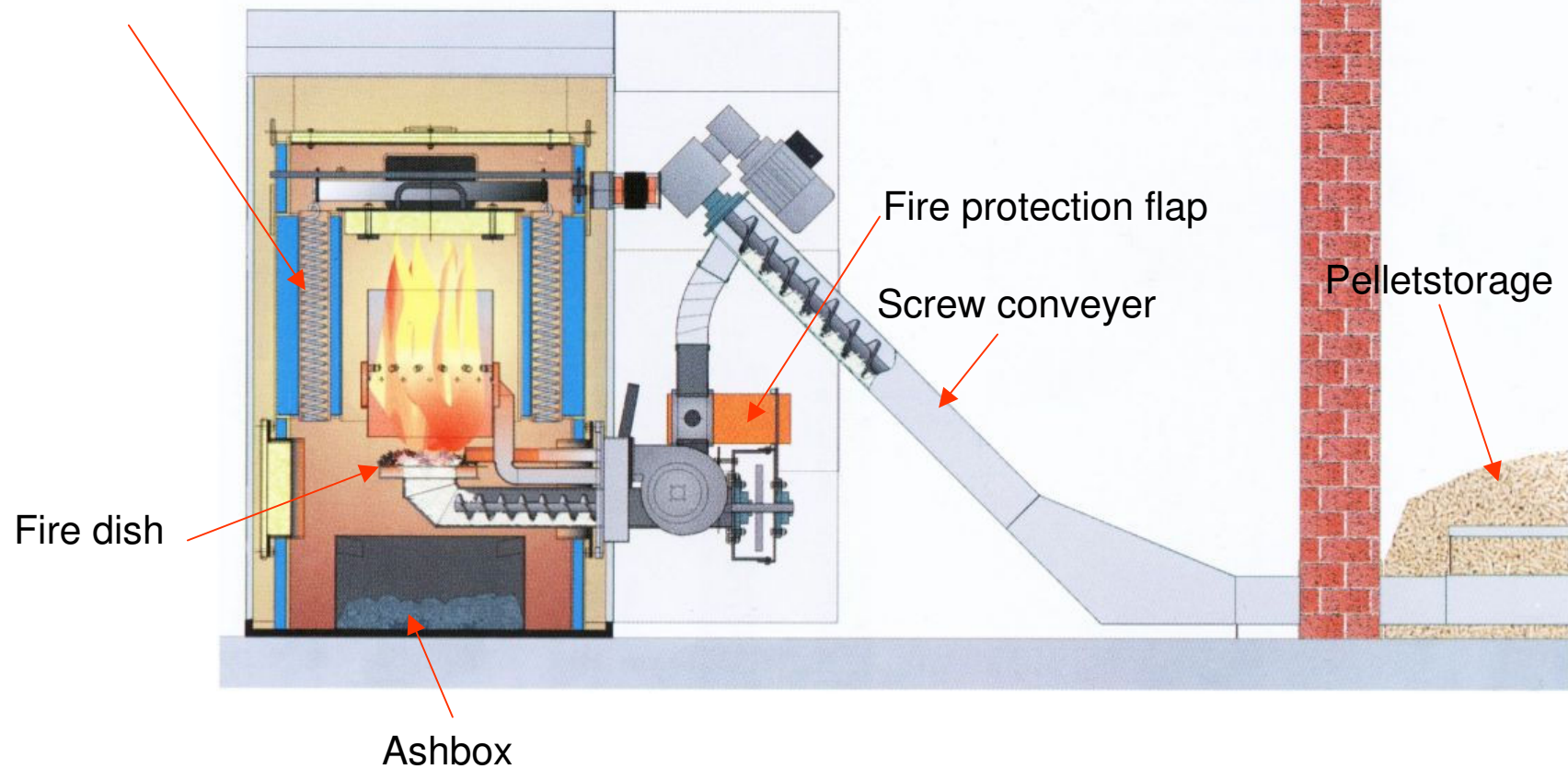


Modern Wood-Pellet-Stove for living spaces

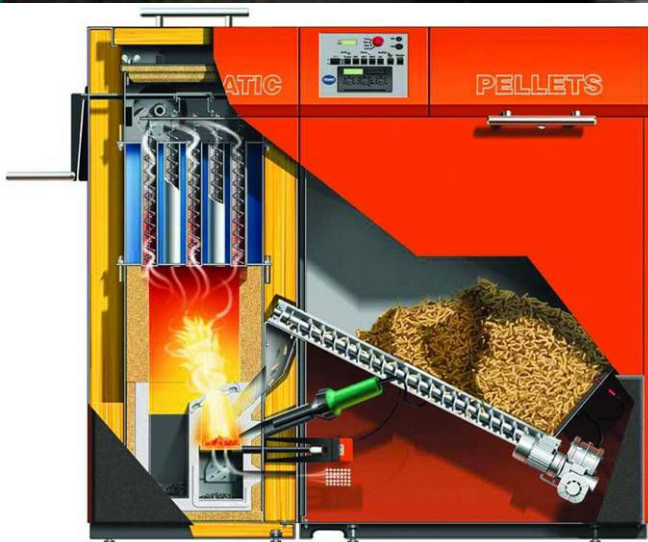


Pellet central heating system

Heat exchanger with cleaning spring



Pelletdelivery und Pelletstove



District heating with wood chips



two wood boiler per 2 MW power
two storages per 300 Srm
forstry wood chips
Sawmill scrap wood

Annual need approx. 3.000 t/a
Investment approx. 1,5 Mio €

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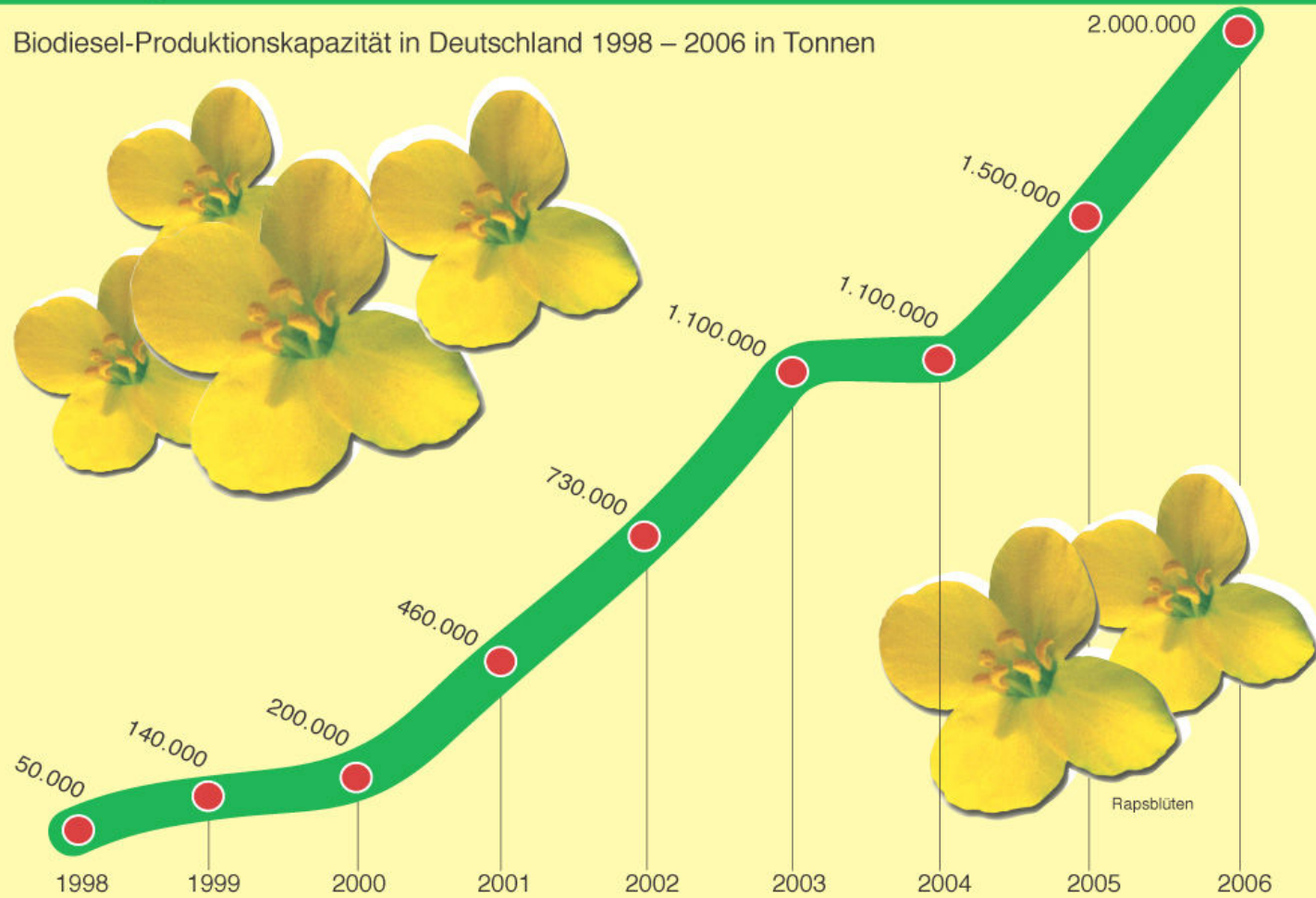


Biofuels

- **biodiesel**
- **rape-oil/vegetable-oil**
- **bioethanol**
- **biogas**
- **BtL-fuels**

Biologisches Wachstum

Biodiesel-Produktionskapazität in Deutschland 1998 – 2006 in Tonnen



Quelle: UFOP

Biodiesel application in Germany

- **blending (up to 5 % to the fossil diesel)**
- **mono-application from biodiesel for cars**
- **a large contingent from biodiesel goes directly to lorry fleets/truck fleets**

Bioethanol

- **blending (up to 5 % to the fossil petrol**
- **blending (E85) for FFV-vehicle**
- **mono-application from ethanol for lorry fleets/truck fleets**

Biogas/ethanol - filling station in Sweden



BtL – Produktion in Germany



Demo-Gasification -
Plant to make
Synthese gas

ex 2006 should be
produced approx.
10.000 t/a BtL

- **generation of electric power**
 - biogas plant with agriculture resources
 - biomass thermal power plant with wood resources and agriculture resources
 - biomass gasification with wood resources

- **generation of thermal energy**
 - efficient use of biomass in pellet and wood chips heating systems

- **generation of biofuel**
 - biodiesel, vegetable oil, bioethanol
 - BtL fuels