

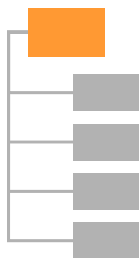
## German Environmental Technology Strengths and Opportunities

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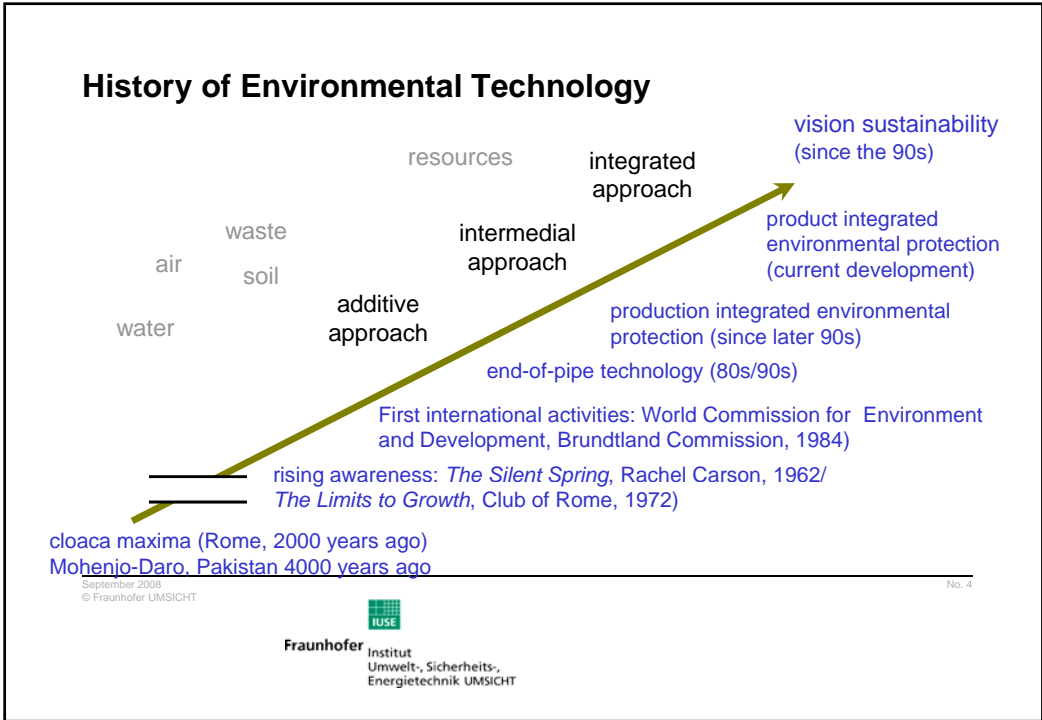


## German Environmental Technology Strengths and Opportunities



1. Introduction
2. International Objectives and Markets
3. Strengths of German Environmental Technology
4. Opportunities
5. Summary

# 1. Introduction



## From Additive to Integrated Approaches: Dairy Branch



Water demand:  
< 5 l/kg to < 2 l/kg

- 80s:  
Central waste water treatment in the municipal sewage plant
- 90s: Internal additive pre-treatment before discharge
- Currently: Integrated approach with
  - Reduction of energy consumption
  - Reduction of sewage amount
  - Reduction of COD content in the sewage
  - Increase of product yields and product purity
  - Recovery of reusable/recyclable substances

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## 2. International Objectives and Markets

## Global Objectives



### United Nations Framework Convention on Climate Change (UNFCCC)

- Reduction of six GHGs by about 5,2 % in comparison to 1990 obliged (Kyoto Protocol)
- Countries with emerging markets have to develop national action plans:
  - The reduction of greenhouse gas emissions
  - The protection of oceans and conservation of forests and afforestation
- Providing funds and technical assistance to enable developing countries to reduce their emissions
- Development of sustainable env. technologies / appropriate know-how
- Implementation of technological renovation in developing countries
- Planning of joint measures against the impacts of coastal waters, water resources and agriculture

Source: [www.bmu.de](http://www.bmu.de); [www.atmosphere.mpg](http://www.atmosphere.mpg), 2008

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## EU Objectives



The EU is committed to contribute to achieving the following international goals:

- Reduction of GHG emissions of 20-30 % by 2020 and 60-80% by 2050
- Reduction of CO<sub>2</sub> emissions from motor vehicles on average to 120 g CO<sub>2</sub>/km by 2012
- Implementation of concepts to increase energy efficiency in the sectors transport, end-use devices, energy conversion equipment, buildings and to rise awareness of consumers and their consumer behaviour
- Increasing the share of renewable Energies to 20 % by 2020 and biofuels to 10 %

Source: [www.bmu.de](http://www.bmu.de); [www.ec.europa.eu](http://www.ec.europa.eu), 2008

Source: BMU-2005, translated

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## EU Objectives



- Replacement of hazardous products with safer alternative products; Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
- Sustainable water management and protection of the aquatic environment (EU Water Framework Directive WFD)
- Prevention or reduction of waste production and its harmfulness and Recirculation, reuse, re-use of waste
- Reuse and recycling of paper, metal and glass from household and similar waste streams by 50% by 2020
- Reuse or recycling of non-hazardous deconstruction and demolition waste by 70% by 2020 (Waste Framework Directive)
- Measures to prevent uncontrolled deposits, discharges and disposal of waste (EEC Landfill Directive)

Source: [www.bmu.de](http://www.bmu.de); [www.europarl.de](http://www.europarl.de), 2008

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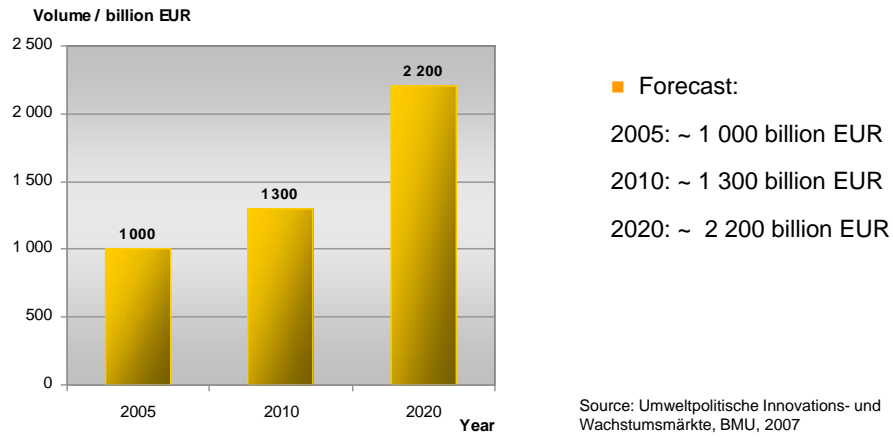
## Objectives of Selected Countries

National Action Plans	Energy Production	Climate Protection	Waste	Water	Efficient use of Energy	Biodiversity
China	x	x				
India	x	x				
Russia	x	x		x	x	
Vietnam	x					x
Chile	x		x	x		x

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### World Market Volume for Environmental Technologies

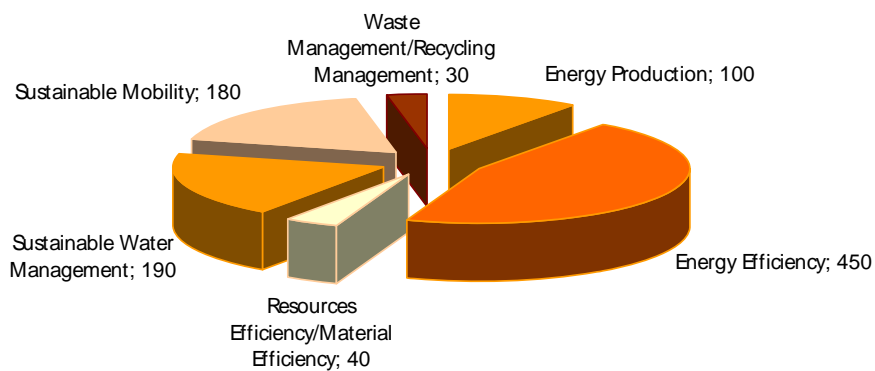


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### World Market Volume for Environmental Technologies (990 billion € 2005)



**2020: 2 200 billion €**

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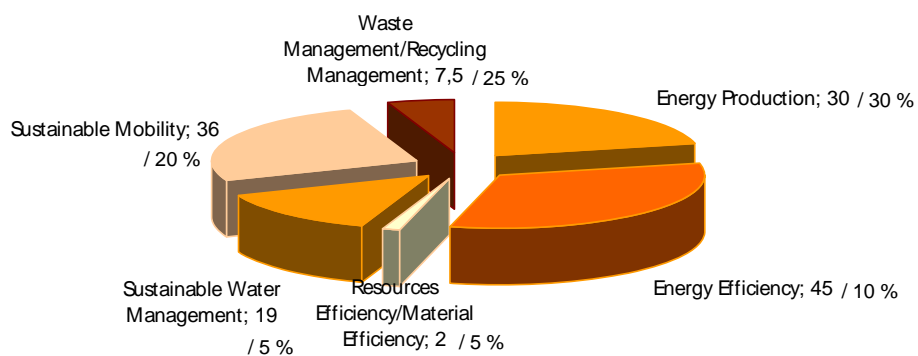
Source: Greentech made in Germany, BMU, 2007

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### 3. Strengths of German Environmental Technology

**German Share in World Market Volume for Environmental Technologies (139,5 billion € 2005)**



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Source: Greentech made in Germany, BMU, 2007

## Strengths of German Environmental Technologies

### Technologies for Sustainable Energy Production (30%)

Solar, Wind, Biomass

### Technologies for Sustainable Waste Treatment (25 %)

Waste sorting, Waste Incineration, Recycling

### Mobility (20 %)

Biofuels, Fuel Cells, Energy Storage

### Efficient Energy Use (10 %)

High Quality in all Engineering and Construction Sectors

A good Engineer is always a Sustainable Engineer

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## Wind Energy – Current State & Markets



Sources: BMU/ Oed; BMU/ Müller

- Installed capacity world wide:
  - 94 GW (2007, cumulative)
- Installed capacity EU:
  - 57 GW (2007, cumulative)
- Installed capacity Germany:
  - 22 GW (2007, cumulative)
- Market:
  - Global Market (Technology) >15 billion €
  - German Market Share 38%, 4 billion €
  - Germany: 7,1 billion € turnover
  - Proportion of Export appr. 70% (2006)
  - 14 % growth of EU capacity in 2007

Source: EUobserver, 2008

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## Success Factors

- High Developed Technology  
R&D and Knowledge on all Levels
  - Production  
(first) Production Facilities in Germany
  - System Integration  
Technologies, Business Models, Cooperation
  - Application in Germany  
Demonstration
- 

**Successful R&D is always coupled to  
Production and Demonstration!**

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## 5. Opportunities

## Glance into the Future - Demands of Man



In the future people want to satisfy their needs of

- Nutrition
- Raw materials
- Energy
- Mobility and
- Information

Today:  
Fossil / Oil based Economy  
  
Sustainable?

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## Fossil / Oil based Economy

- 1.) Today: 87 Mio b/d, Peak Oil: 2016 – 2020  
Reach approx. 50 Years  
Increasing demand (China, India)  
„asymmetrical geographical distribution“
- 2.) Long-term alternatives for energy and fuels (sun, H<sub>2</sub>, ...)  
Problem: Chemical raw materials
- 3.) Costs of petrochemical products (fuels, chemicals, agrochemicals) are strongly oil price dependent  
90% Oil – Energy  
10% Oil - Chemistry



24. September 2008

Source: APA No. 20

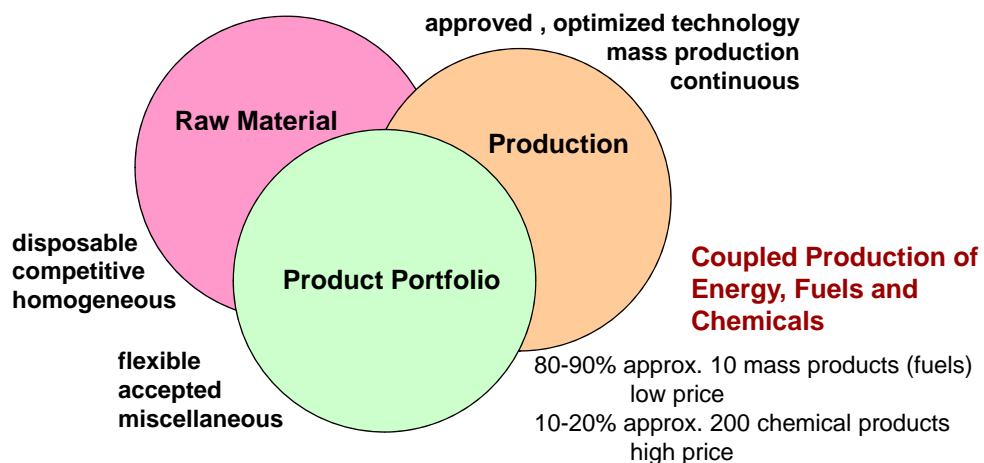
## Alternative: Bio Based Economy

- Biomass feedstocks are converted and extracted into a spectrum of products  
food, feed, energy, fuels, chemicals, materials, fertilizer
- Farmers are the oil sheiks of the future
- Biomass can cover part of the demand
- A Biorefinery is the production system

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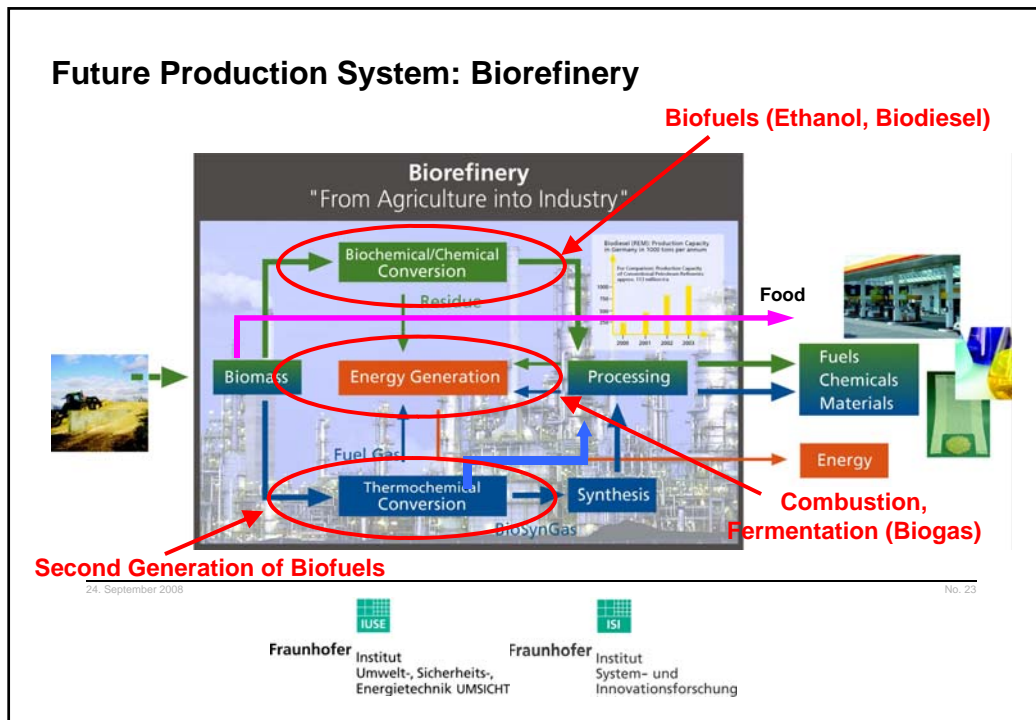
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## Success Factors of Petroleum Refineries



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## Chance and Challenge

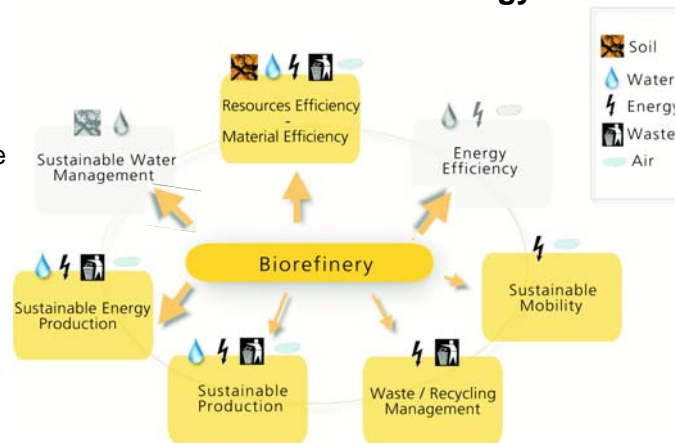
- The Problem is global, solutions are not yet available
- Developing countries are interested to establish biomass production
- Germany can supply countries with high biomass resources with sustainable technology
- The market is not occupied
- For the development of an efficient sustainable biorefinery cooperation is needed:

Biology, Agriculture, Chemistry, Chemical Engineering, Plant Engineering and Construction, Plastics Engineering, Automotive Industry etc.

- Demonstration is needed in Germany

## Biorefinery – Relation to Environmental Technology

Most of the national and global environmental related objectives are addressed



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## Summary

- Strength of German Environmental Technologies:  
R&D, Production and Demonstration in Germany
- Interesting Markets (short and mid term):  
Sustainable Energy Production, Mobility, Sustainable Water Management
- Interesting Market, long term: Bio Based Economy - Biorefinery  
Biomass Production, Biomass Conversion, Biobased Products  
Germany as Leader of Biorefinery Technology

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## Closing Remark

Biorefining is  
not a theme for Lonely Wolves



but  
Cooperation is needed  
to merge existing Strengths  
to a new Field and Market



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## German Environmental Technology Strengths and Opportunities

THANK YOU FOR YOUR ATTENTION

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