



# **Biodiesel: The German experience**

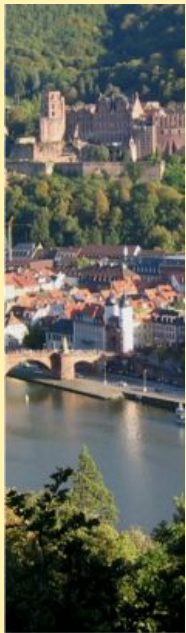
**Dr Guido Reinhardt**

Seminar: Information Initiative Concerning  
Biodiesel Experience from EU Countries “

Bukarest, Romania, 28 June 2007

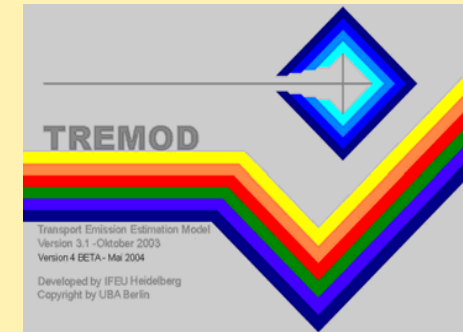
## **IFEU - Institute for Energy and Environmental Research Heidelberg, since 1978**

- **Independent scientific research institute**
- **organised as a private non profit company with currently about 40 employees**
- **Research / consulting on environmental aspects of**
  - **Energy (including Renewable Energy)**
  - **Transport**
  - **Waste Management**
  - **Life-Cycle-Analyses**
  - **Environmental-Impact- Assessment**
  - **Renewable Resources**
  - **Environmental Education**



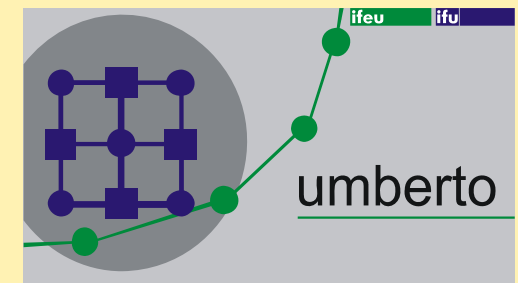
## TREMOD: Transport Emission Model

- Modelling emissions of road vehicles, trains, ships and airplanes
- Official database of the German Ministries for emission reporting



## Life cycle analyses (LCA) and technology impact assessments since 1990:

- Biofuels (all biofuels, all applications)
- Alternative transportation modes
- Renewable Energy



## IFEU - Institute for Energy and Environmental Research Heidelberg, since 1978

- **Our clients (on biofuel studies)**

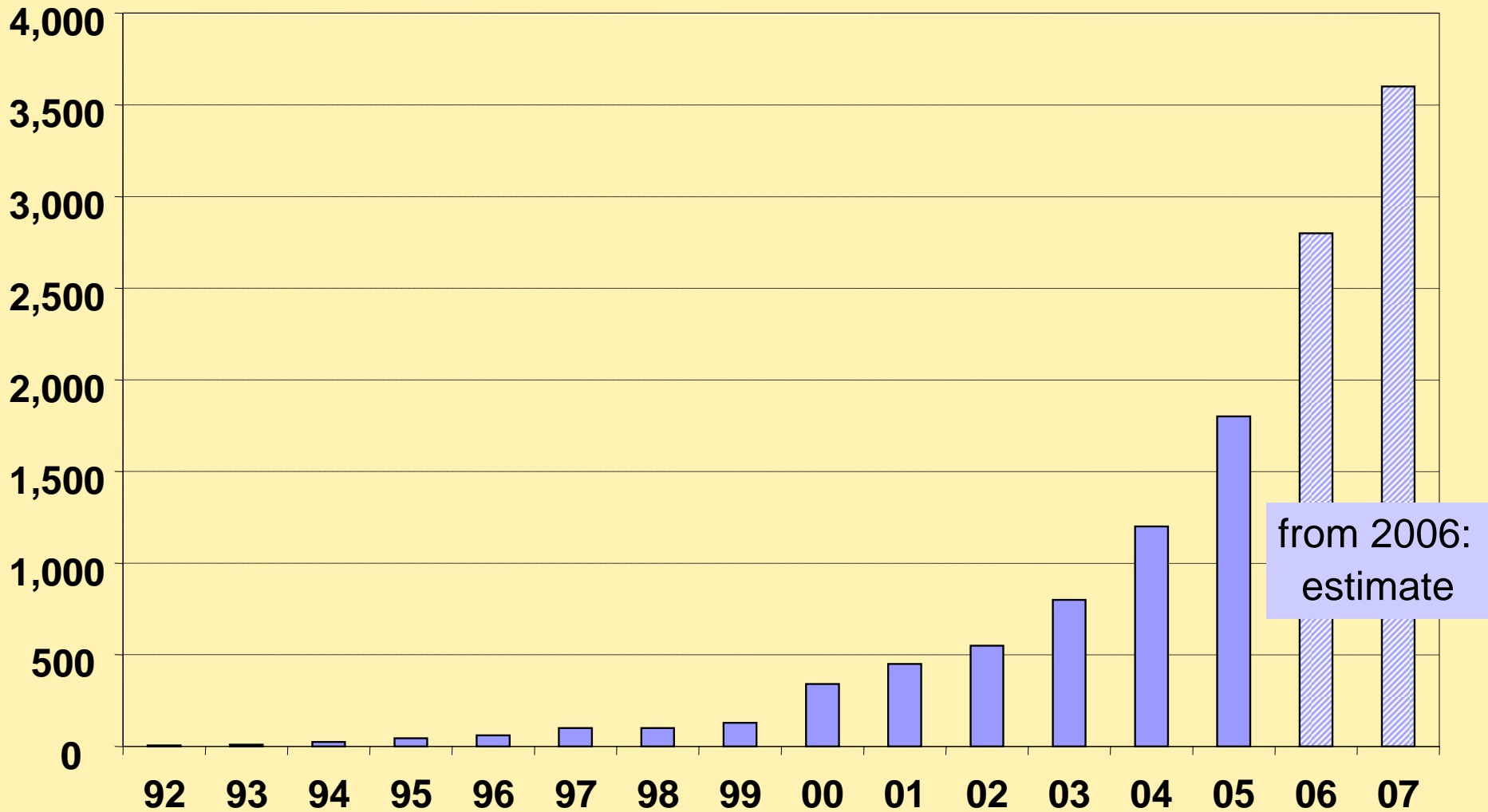
- World Bank
- UNEP, GTZ etc.
- European Commission
- National and regional Ministries
- Associations (industrial, Life-Cycle-Analyses)
- Local authorities
- WWF, Greenpeace etc.
- Companies (DaimlerChrysler, German Telekom, etc.)
- Foundations (German Foundation on Environment, British Foundation on Transport etc.)



# Consumption of biodiesel in Germany



thousand tonnes



from 2006:  
estimate

Source: IFEU 2006

# What happened yesterday in Germany ?

## Bottlenecks in Germany

- Taxation issues
- **Technical issues**
- Biodiesel quality
- Life cycle assessment



# What happened yesterday in Germany ?

## Bottlenecks in Germany

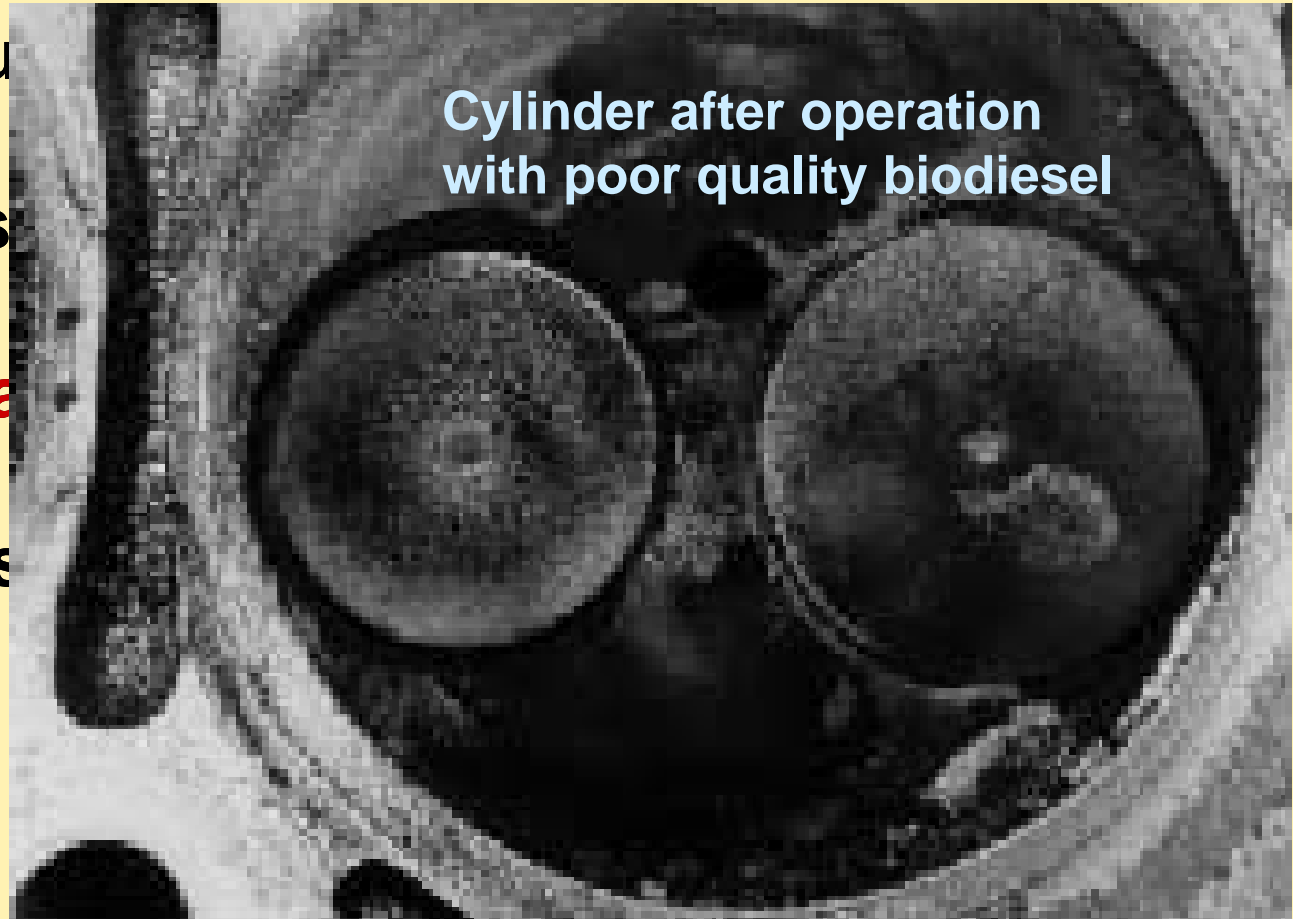
- Taxation issues
- **Technical issues**
- Biodiesel quality
- Life cycle assessment



# What happened yesterday in Germany ?

## Bottlenecks in Germany

- Taxation issues
- Technical issues
- **Biodiesel quality**
- Life cycle assessment





# What happened yesterday in Germany ?

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## Bottlenecks in Germany

- Taxation issues
- Technical issues
- ➔ **Biodiesel quality**
- Life cycle assessment

## Measures

- Tax exemption
- Biodiesel approvals (partly)
- Norm EN 14214
- Assoc. for quality management

## Association for the Quality Management of Biodiesel (AGQM)



- Founded in 1999
- Guaranteeing quality requirements for biodiesel in the whole production/consumption chain
- Members: producers, traders, filling stations, constructors, etc.

# Biodiesel quality in Germany



## Important differences between the Norm and AGQM standard

<b>Property</b>	<b>EN 14214</b>	<b>AGQM</b>
<b>Water content (mass ratio)</b>	max. 500 mg/kg	Producers: max. 220 mg/kg, all members: max. 300 mg/kg
<b>Total contamination (mass ratio)</b>	max. 24 mg/kg	max. 20 mg/kg
<b>Oxidation stability (induction time)</b>	min. 6 h	min. 6 h (check point: final user) Biodiesel sold at public filling stations requires addition of oxidation stabilisers.
<b>Period for production of winter quality biodiesel</b>	16/11 until 28/02	19/10 until 28/02
<b>Fatty acid profile</b>	–	like rapeseed (for selling at public filling stations)

- **What happened yesterday?**

**→ The situation of today**

- **What will come tomorrow?**

## Biodiesel consumption 2005:

- **Fleets**
  - 53 % via companies' and public filling stations
- **Private consumers**
  - 14 % via public filling stations
- **Blending**
  - 33 % are used for blends

# Driving forces

## ➤ Costs

### Beispielrechnung für Ihren Fuhrpark :

Ermitteln Sie selbst das Sparpotential für Ihren Fuhrpark!

In den weißen Feldern haben wir typische Werte für den Ölwechsel - wie sie Mercedes und MAN vorschreiben.

Alle Ausgangswerte können Sie individuell anpassen. Für Fragen zu diesem Vergleich stehen wir Ihnen gerne zur Verfügung.

Für eine korrekte Berechnung geben Sie bitte die Werte mit einem Punkt (.) als Trenner an und verwenden Sie die richtige Einheit.



Anzahl der Fahrzeuge :

jährliche Laufleistung :

Kraftstoffverbrauch min. Diesel :

Ölwechsel nach km (normal) :

Ölwechsel nach km (verkürzt) :

Menge Öl pro Ölwechsel :

Tages-Einstandspreis min. Diesel (30.000 l)\* :

Tages-Einstandspreis Biodiesel (30.000 l)\* :

Einstandspreis Motoröl :

Einstandspreis Ölfilter :

Arbeitszeit für einen Ölwechsel :

Arbeitskosten für eine Werkstattstunde :

worst-case Mehrverbrauch :

<input type="text" value="120000"/>	km / Fahrzeug
<input type="text" value="32"/>	Liter / 100 km
<input type="text" value="100000"/>	km
<input type="text" value="30000"/>	km
<input type="text" value="34"/>	Liter
<input type="text" value="85"/>	cent / Liter *
<input type="text" value="73"/>	cent / Liter *
<input type="text" value="2.50"/>	Euro / Liter
<input type="text" value="15.00"/>	Euro / Stück
<input type="text" value="1"/>	Stunde(n)
<input type="text" value="35.00"/>	Euro
<input type="text" value="6.0"/>	%

Endergebnis ausgeben !

\* Die angegebenen Preise dienen lediglich zur Verdeutlichung der Preisdifferenz und stellen kein Angebot dar.

# Driving forces

➤ Costs



Courtesy of IWR

➤ Image



Courtesy of RWZ Rhein-Main



Courtesy of energieroute.de

# GUINNESS BUCH DER REKORDE U R K U N D E

Das GUINNESS BUCH DER REKORDE bestätigt nach sorgfältiger Prüfung die Rekordleistung:

Europas erster Rapsöl-Brummi fährt seit 1990 mit Biodiesel (100 Prozent Rapsölmethylester) für Willi Heineking aus Landesbergen (D). Am 26. März 1999 hatte der 360 PS starke MAN-Büssing-Lkw Typ 19360 exakt 1.333.333 km hinter sich.

Hamburg, den 09.08.1999

  
REDAKTION  
GUINNESS BUCH DER REKORDE



## Guinness Book of Records

### Certificate

GUINNESS BOOK OF RECORDS confirms after thorough examination the record:

**Europe's first rapeseed lorry is running on biodiesel (100% rapeseed oil methyl ester) for Willi Heineking from Landesbergen (D). On 26 March 1999 the 360 HP MAN-Büssing lorry (type 19360) had travelled exactly 1,333,333 km.**

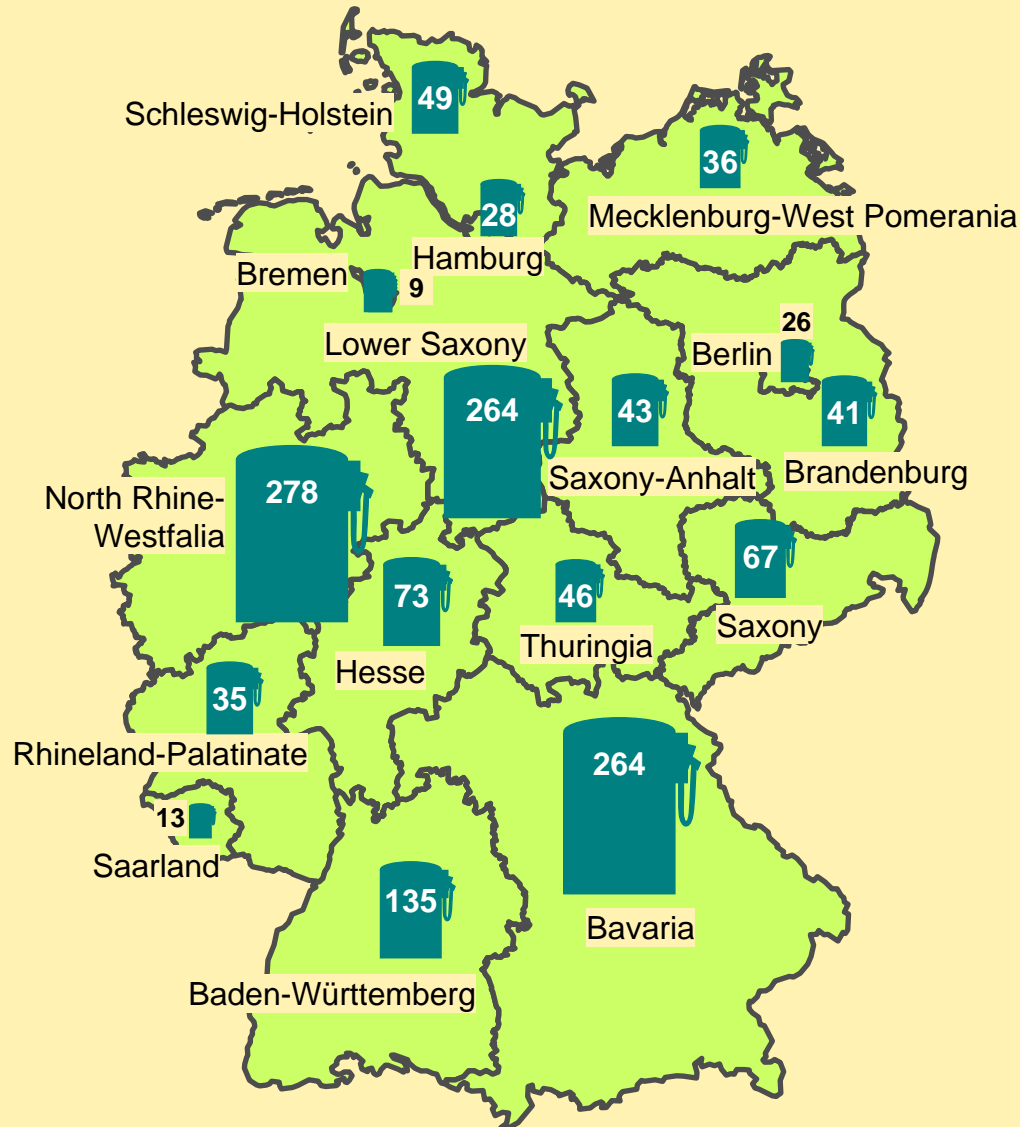
Hamburg, 09/08/1999





# The situation of today

## AGQM-Biodiesel filling stations in Germany



**Status 2005:**

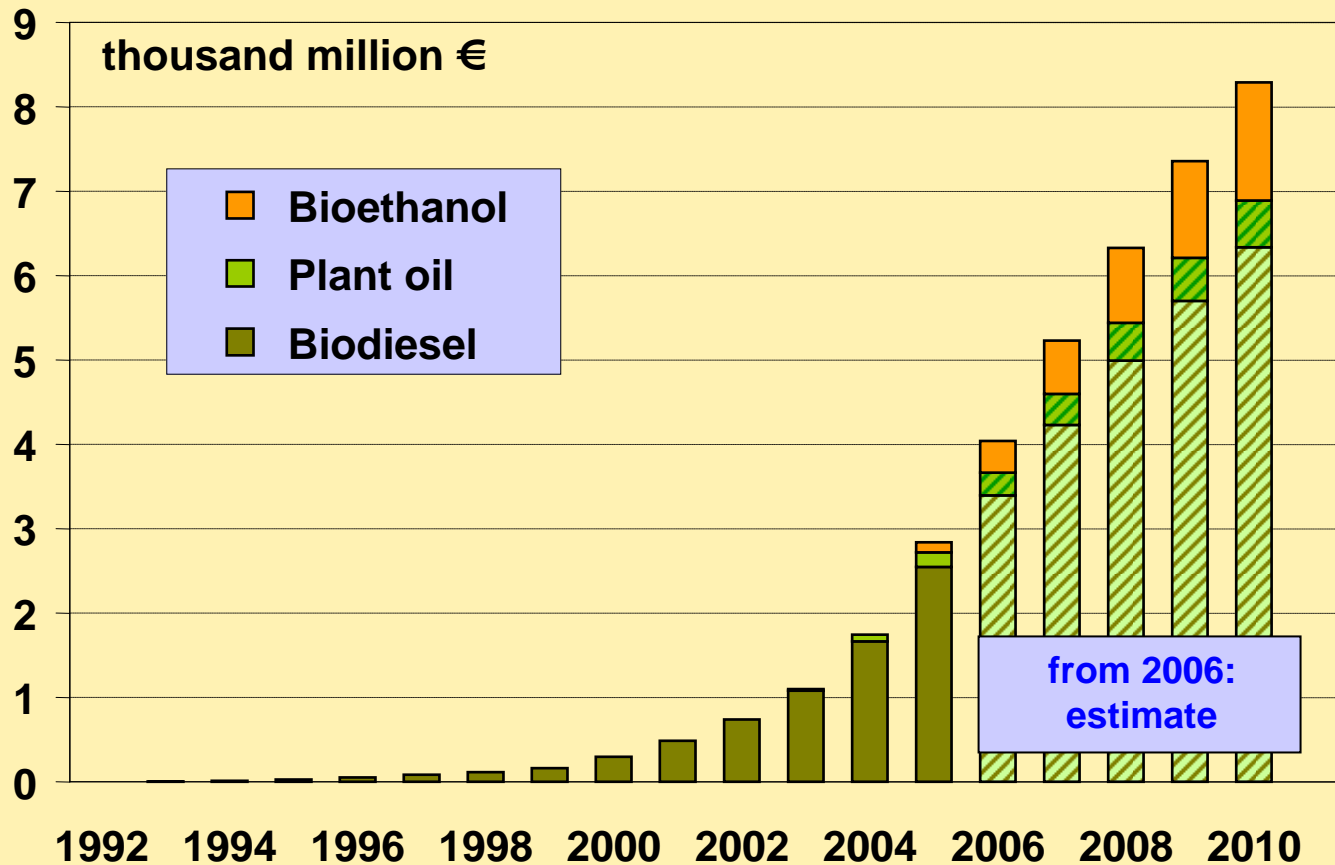
**about 1,900 (i.e. 12%)  
public filling stations  
offer biodiesel**

**1,406 offer AGQM-  
biodiesel**

# Cumulated revenue loss in Germany



... by 100 % mineral oil tax exemption



## Dual concept for biofuels

**Tax on biofuels  
from 08/2006**

- **Energy tax law  
15/07/2006:**
  - Stepwise increasing tax on biodiesel, biodiesel blends and plant oil
  - Other biofuels tax-free
  - Tax exemption for agriculture and forestry

**Biofuels quota  
from 01/2007**

- **Biofuel quota law  
18/12/2006:**
  - Fixed quota for biodiesel
  - Stepwise increasing quota for bioethanol
  - Stepwise increasing quota for sum of biofuels

## Tax on biofuels from 08/2006:

### ■ Pure biodiesel:

- 7 ct/L 01/08/06 – 2007
- 13 ct/L in 2008
- 20 ct/L in 2009
- 26 ct/L in 2010
- 32 ct/L in 2011
- 45 ct/L in 2012

### ■ Biodiesel blends:

- 15 ct/L until 31/12/06
- 47,04 ct/L from 2007

### ■ Pure plant oil:

- 0 ct/L in 2006 & 2007
- 8 ct/L in 2008
- 17 ct/L in 2009
- 25 ct/L in 2010
- 32 ct/L in 2011
- 45 ct/L in 2012

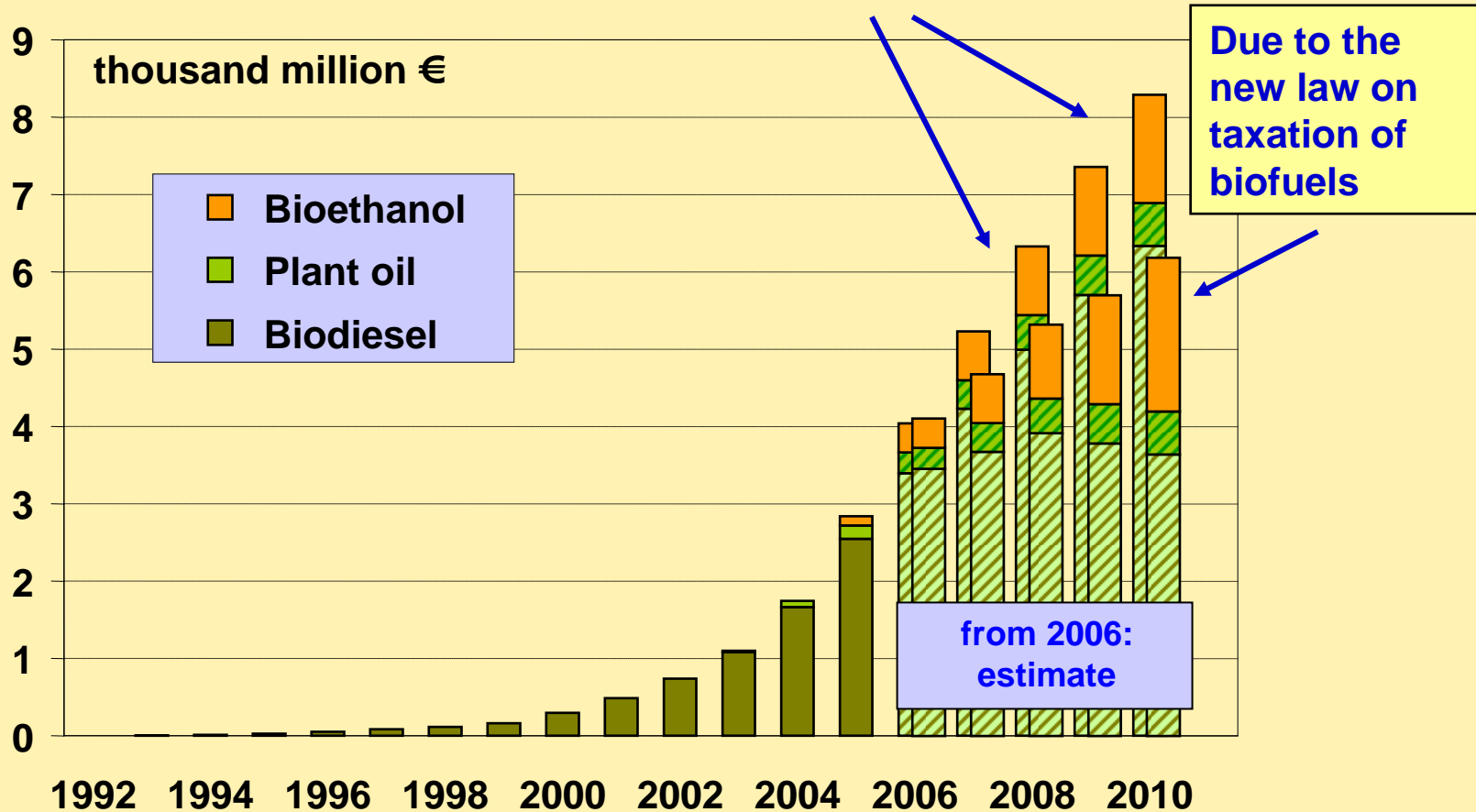
### ■ Tax exemption for agriculture & forestry

### ■ Ethanol/ETBE tax-free!

# Cumulated revenue loss in Germany



... by 100 % mineral oil tax exemption



## Dual concept for biofuels

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## Biofuels quota from 01/2007:

- **Quota for biodiesel:**
  - 4,40 % from 2007 - 2015
- **Quota for bioethanol:**
  - 1,20 % in 2007
  - 2,00 % in 2008
  - 2,80 % in 2009
  - 3,60 % from 2010 - 2015
- **Quota for all biofuels:**
  - 6,25 % in 2009
  - 6,75 % in 2010
  - 7,00 % in 2011
  - 7,25 % in 2012
  - 7,50 % in 2013
  - 7,75 % in 2014
  - 8,00 % in 2015

**Note:** Quota means minimum quota,  
% relates to energy content

Source: Federal Government 2006



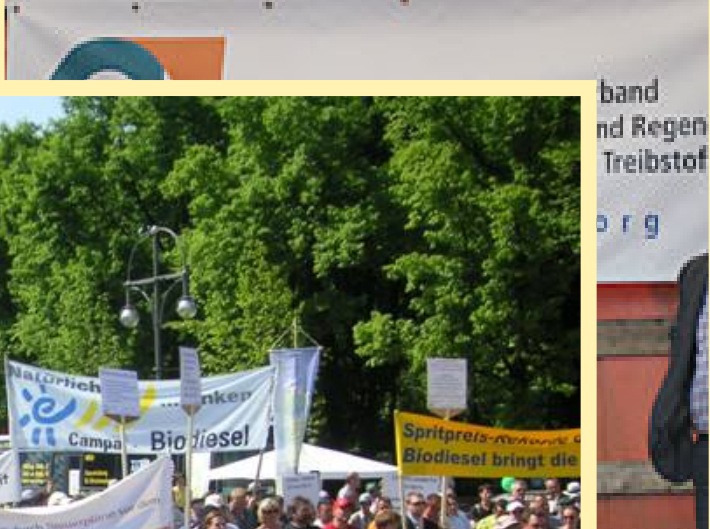
## Biofuels quota from 01/2007

### ■ Remarks and conclusions:

- Overall biofuels quota higher than EU Biofuels Directive (2003/30/EC) goal (5,75%)
- Biofuels quota, i.e. no obligatory blending !
- Trading of quota possible
- Fine for non-compliance with quota:
  - 60 ct/L for biodiesel and overall quota
  - 90 ct/L for bioethanol quota
- Yearly check: none (in contrast to biofuel tax law)

- **What happened yesterday?**
- **The situation of today**
- ➔ **What will come tomorrow?**

# Biofuels demonstration in Berlin



## Pending challenges

- **Biofuel quota legislation leads to short term close-downs of production facilities.**
- **Not all biofuels seem to be sustainable: Certification is on its run but takes its time.**



# Biodiesel crisis in Germany

Erneuerbare Energien / Biokraftstoffe

## SOS Biodiesel

Die deutsche Biodieselbranche ist in Not geraten. Verantwortlich für den schweren Seegang ist die Politik, die den jungen Wirtschaftszweig mit einer misslungenen Steuergesetzgebung zum Kentern bringt.

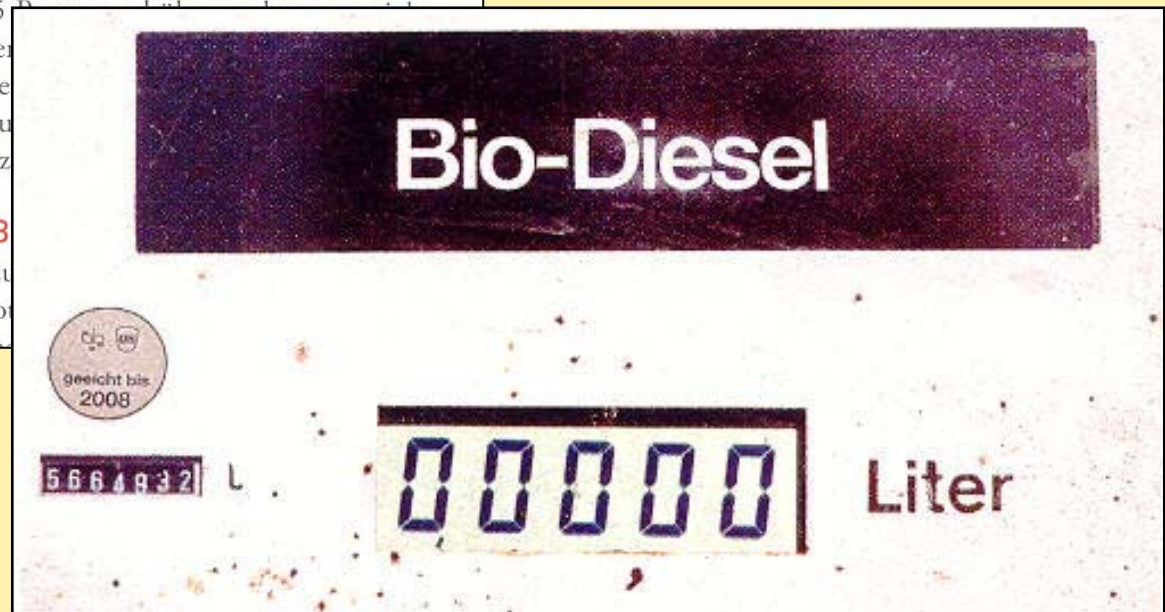
Text: Martin Bensmann, Fotos: Paul Langrock

Thomas Vahle will sich nicht unterkriegen lassen, obwohl er seit Mitte Januar keinen einzigen Tropfen Biodiesel mehr produziert hat. „Wir mussten die Produktion einstellen und sechs Mitarbeiter entlassen, weil unsere Kunden jetzt statt Biodiesel wieder fossilen Diesel tanken“, klagt der Geschäftsführer der Biowerk Kleisthöhe GmbH aus der Uckermark.

auf 15 D...  
nur de...  
annähe...  
die neu...  
lasten z...  
**Das B**  
Aber zu...  
Bankro...

Die Schuld an dieser Entwicklung gibt Mitsch...

“The German bio-diesel industry is in trouble. Politics [...] carries the responsibility” ...



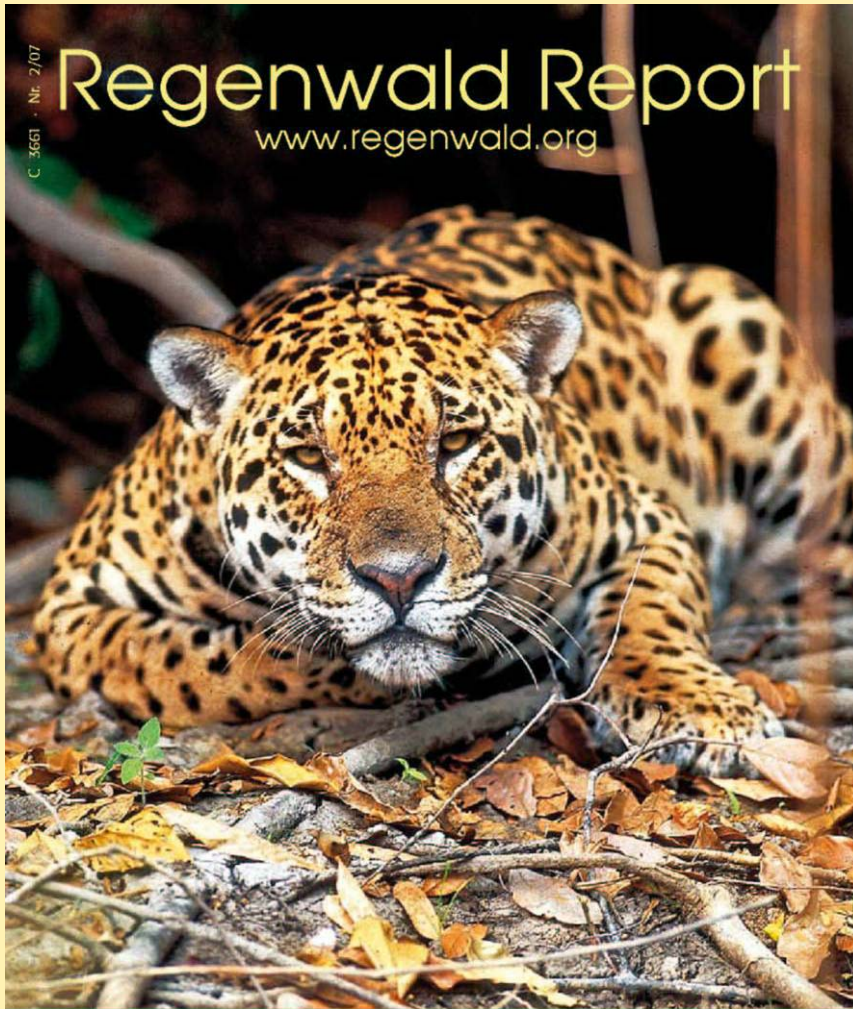
Taken from:  
M. Bensmann: SOS Biodiesel. In:  
neue energie 04/2007, pp. 57-60.

## Pending challenges

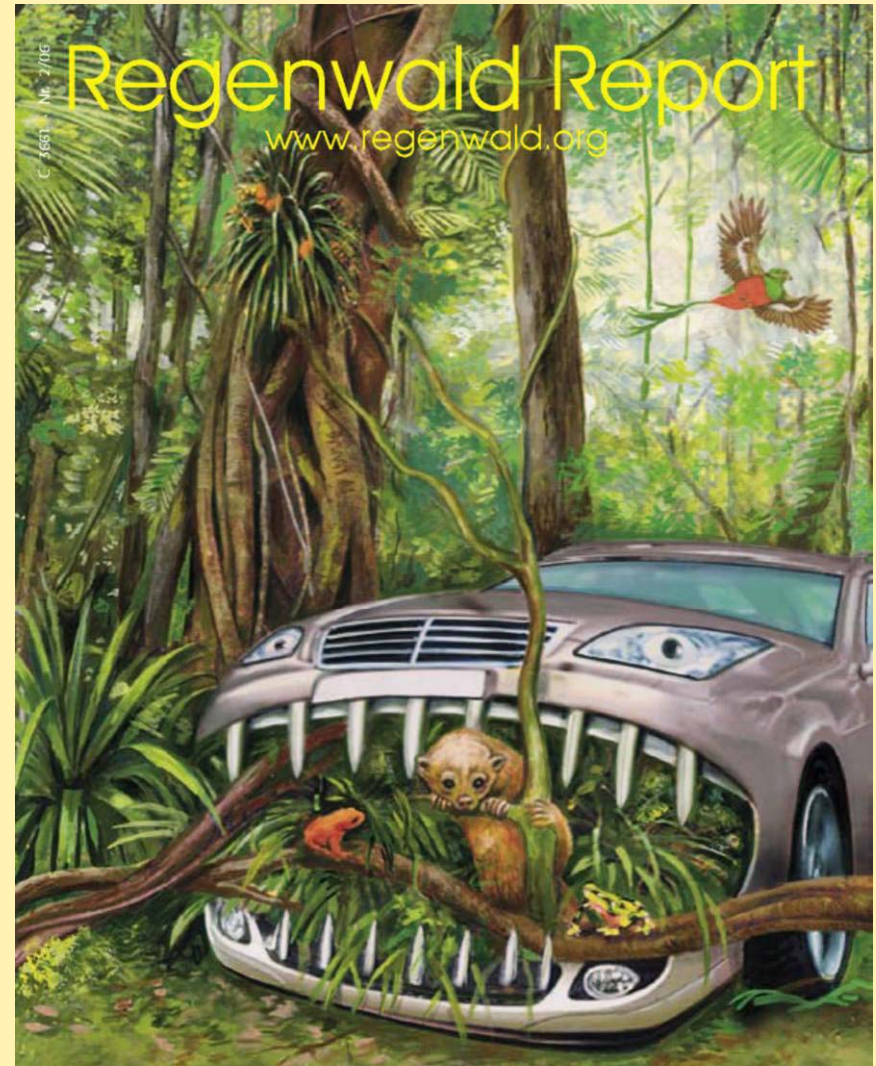
- **Biofuel quota legislation leads to short term close-downs of production facilities.**
- **Not all biofuels seem to be sustainable: Certification is on its run but takes its time.**



# Biofuels vs. Nature conservation



**Sweet Danger for Wilderness  
Ethanol from Sugarcane**



**Clear-cutting for Biodiesel**

# WWF Study on palm oil



WWF for a living planet®

## Rain Forest for Biodiesel?

*Ecological effects of using palm oil as a source of energy*



## Rain Forest for Biodiesel ?

Ecological effects of using palm oil as a source of energy

**Project coordinator (WWF)**

Imke Lübbecke

**Project leader (IFEU)**

Dr. Guido Reinhardt

**Publication**

2007



# Oil palm plantation and fruits















**Oil palm plantation through cutting of tropical forests**











- **Criteria for a Sustainable Use of Bioenergy on a Global Scale:** IFEU, FSC, Lanje: commissioned by the Federal Agency of Environment, **Germany**
- **Certification of biomass & biomass conversion to biofuels:** meo Consulting Team, supported by FNR, **Germany**
- **Criteria for sustainable biomass production:** Project Group "Sustainable Production of Biomass,, commissioned by Energy Transition Task Force, Netherlands
- **Analysing of sustainability criteria and certification systems for biomass:** commissioned by DG-TREN /D2/428-2006
- **Technical Assistance for certification aspects related to the promotion of the use of biofuels in the European Union:** WIP, IFEU, IC, commissioned by DG-TREN

## Pending challenges

- **Biofuel quota legislation leads to short term close-downs of production facilities.**  
**→ national challenge**
- **Not all biofuels seem to be sustainable: Certification is on its run but takes its time.**  
**→ international challenge**



# Consumption of biodiesel in Germany



thousand tonnes



**We had many problems, most of them are solved, two are pending ...**  
**→ But the success story might go on ...**

from 2006:  
estimate

Source: IFEU 2007

# Last but not least

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→ **Thank you very much for your attention and I'm happy to answer your questions**

**Dr. Guido Reinhardt**



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