



Biodiesel in Germany: History and Perspectives

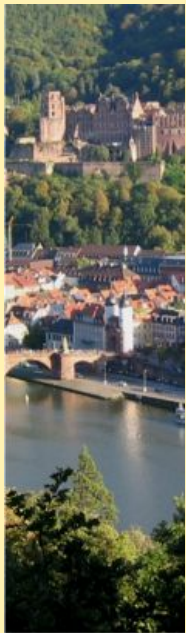
Dr Guido Reinhardt

National Workshop on
Business Opportunities for Biodiesel

Warsaw, Poland, 25 September 2007

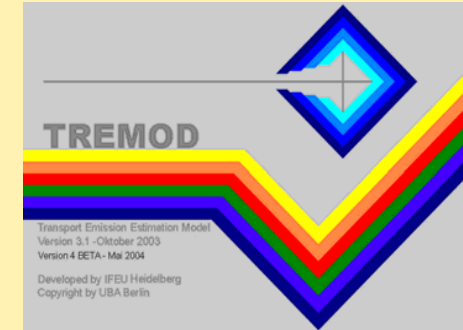
IFEU - Institute for Energy and Environmental Research Heidelberg, since 1978

- **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**



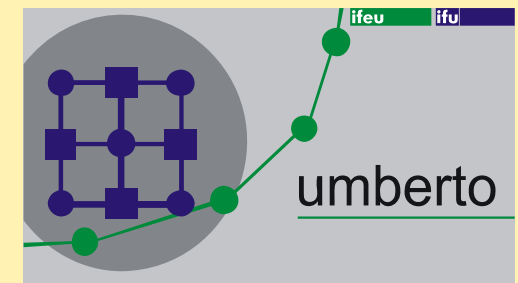
TREMOD: Transport Emission Model

- 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:

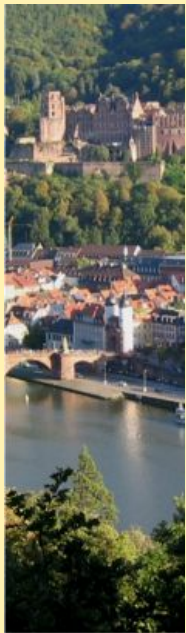
- Biofuels (all biofuels, all applications)
- Alternative transportation modes
- Renewable Energy



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

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

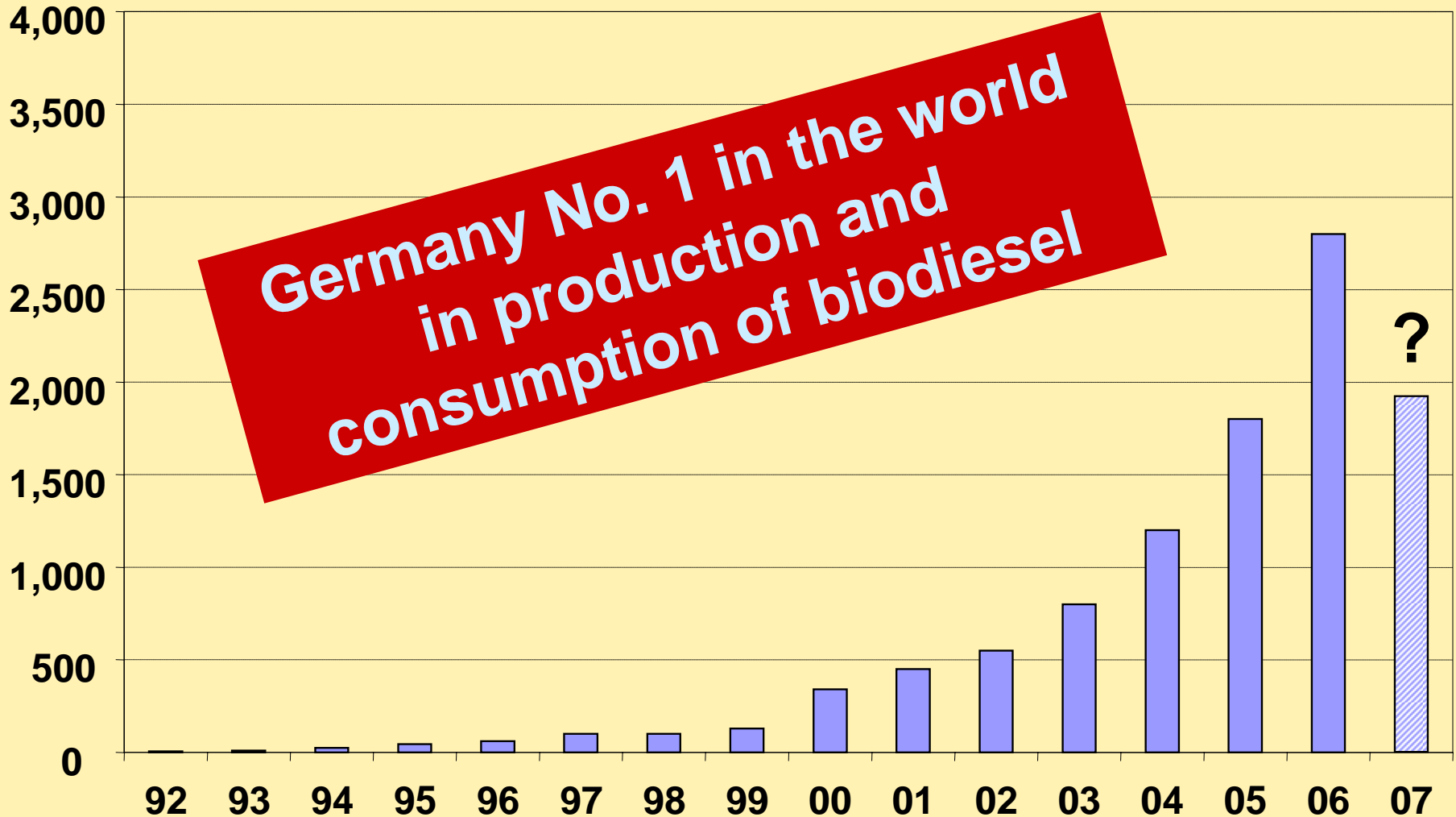
- World Bank
- UNEP, GTZ etc.
- European Commission
- National and regional Ministries
- Associations (industrial, Life-Cycle-Analyses
- Local authorities
- WWF, Greenpeace etc.
- Companies (DaimlerChrysler, German Telekom, etc.)
- Foundations (German Foundation on Environment, British Foundation on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



Consumption of biodiesel in Germany



thousand tonnes



Source: IFEU 2007

What happened yesterday in Germany ?

Bottlenecks in Germany

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

Measures

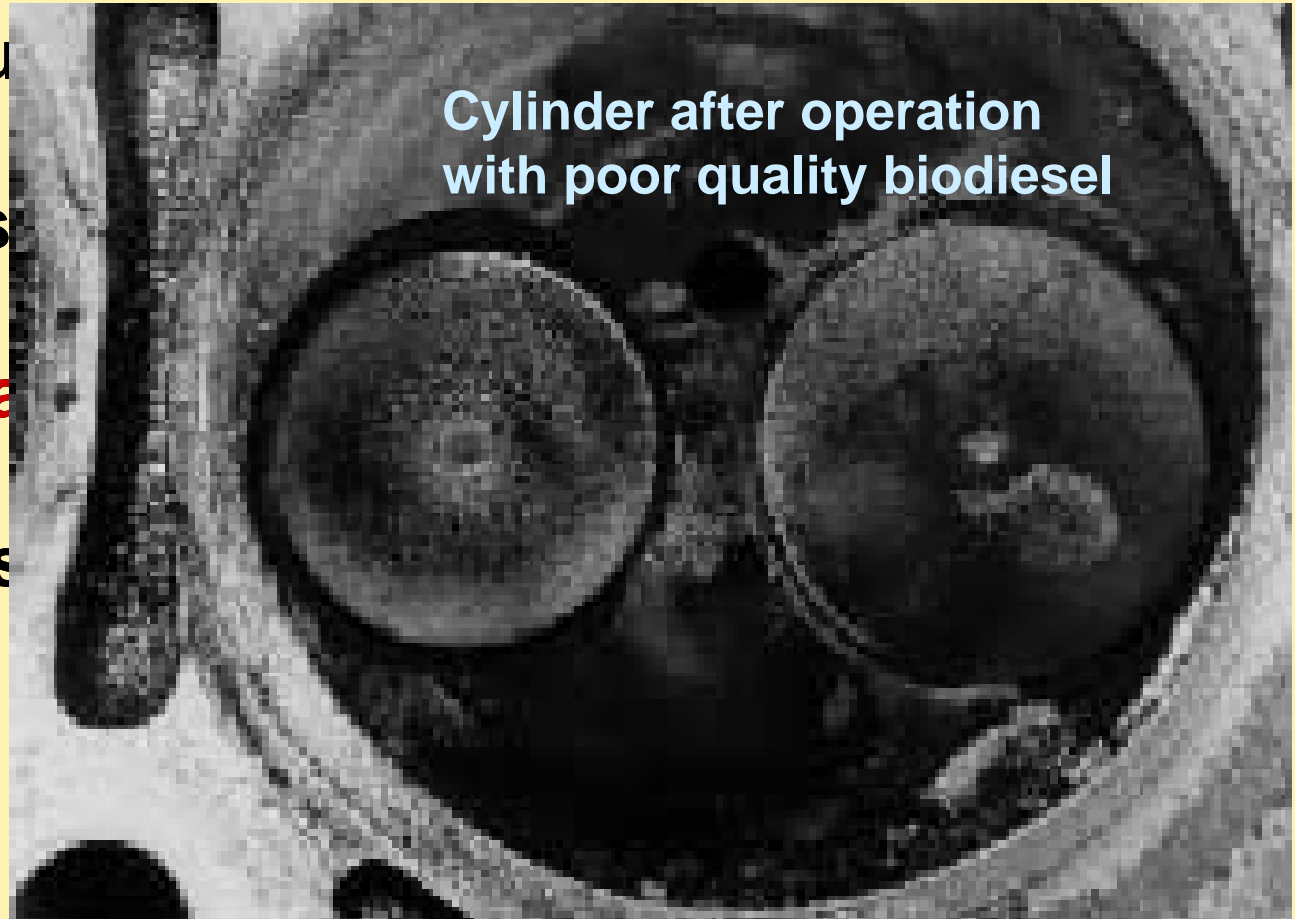


What happened yesterday in Germany ?

Bottlenecks in Germany

Measures

- 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

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

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



120000	km / Fahrzeug
32	Liter / 100 km
100000	km
30000	km
34	Liter
85	cent / Liter *
73	cent / Liter *
2.50	Euro / Liter
15.00	Euro / Stück
1	Stunde(n)
35.00	Euro
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

Approvals for biodiesel use

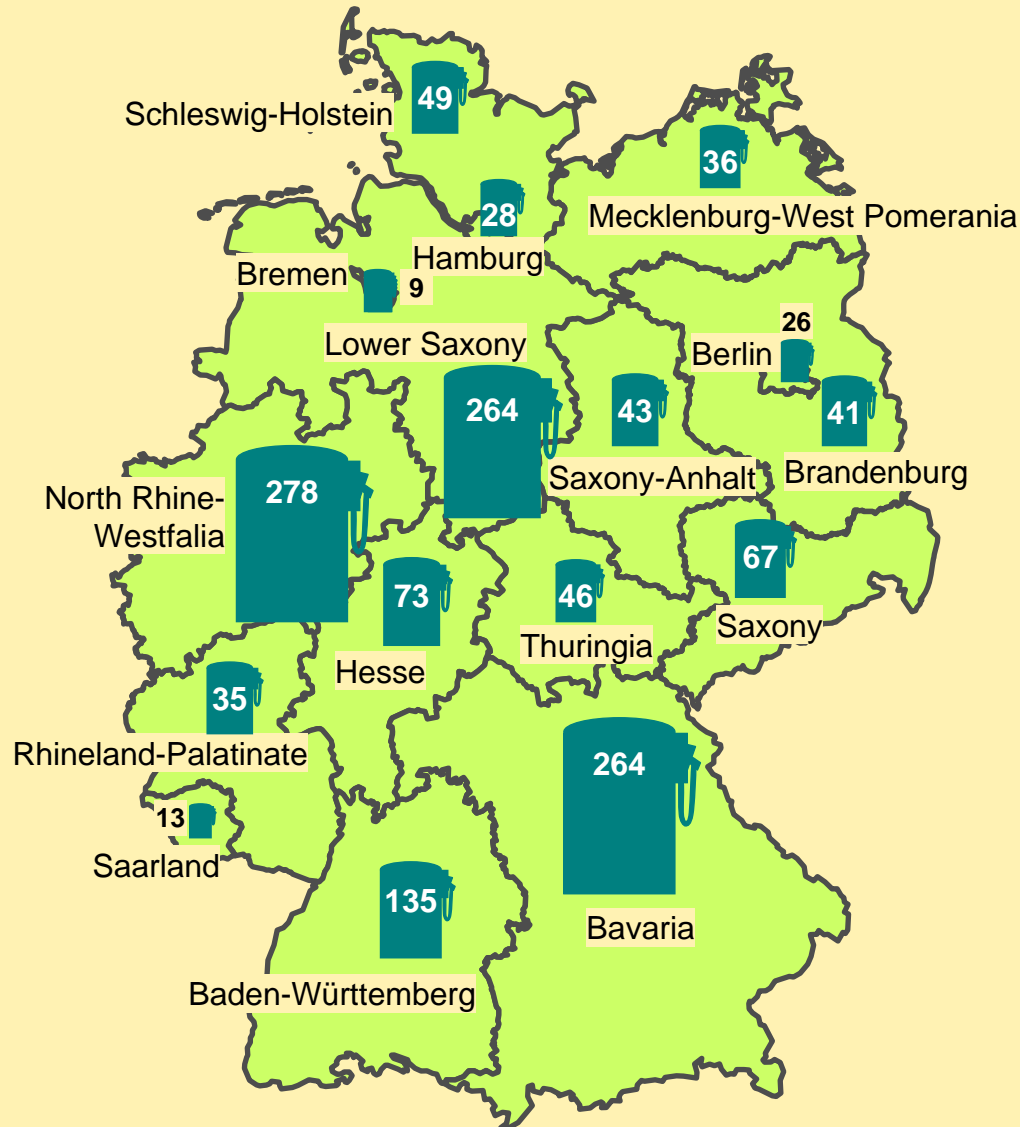


Manufacturer Model	Biodiesel approval
Audi A2 (8Z), A3 (8L), A4 (8E, 8E2, 8E5) except 85 kW, A4 Cabriolet (8H), A6 (4B), Allroad (4B)	approval for RME, possible malfunctioning of the auxiliary heating system or exclusion of its use
Audi A3 (8P)	no general approval (only specific models)
Audi A4 (8E) 85 KW; A4 (8EC, 8ED); A6 (4F); A8 (4E)	no approval
BMW	no approval
DaimlerChrysler	no approval ex works
Deutz all engines except for 909, 910, 1015, 2015	approval if biodiesel according to EN 14214
Fendt all tractors	approval , compliance with EN 14214
EvoBus Setra OM 457HLA/LA, OM 501/502 LA, OM 906 LA buses	approval
Linde all forklifts from 1.2 to 8 t load	
MAN engines with Common-Rail system	
MAN others	approval according to EN 14214
Neoplan Bus engines with Common-Rail system	
Neoplan Bus other engines	no general approval, only biodiesel according to EN 14214
Opel	no general approval
Still (different loads)	approval
VW Golf (A03) (except Post Polo), Golf Vento (A3), Golf Ecomatic (A3), Passat (B4), Passat (B5) without particulate filter, Sharan, T4, T5, LT – 2, Caddy II Wirbelkammer and SDI, TDI, Polo Classic, Lupo, Bora, Beetle, Phaeton V10 TDI, Touareg R5 TDI and V10 TDI	approval if RME according to EN 14214
VW Golf (A5)	approval only if ordering optional RME version
VW Touran	no approval

But.....: no approvals at all for all new models of passenger cars

The situation of today

AGQM-Biodiesel filling stations in Germany



Status 2005:

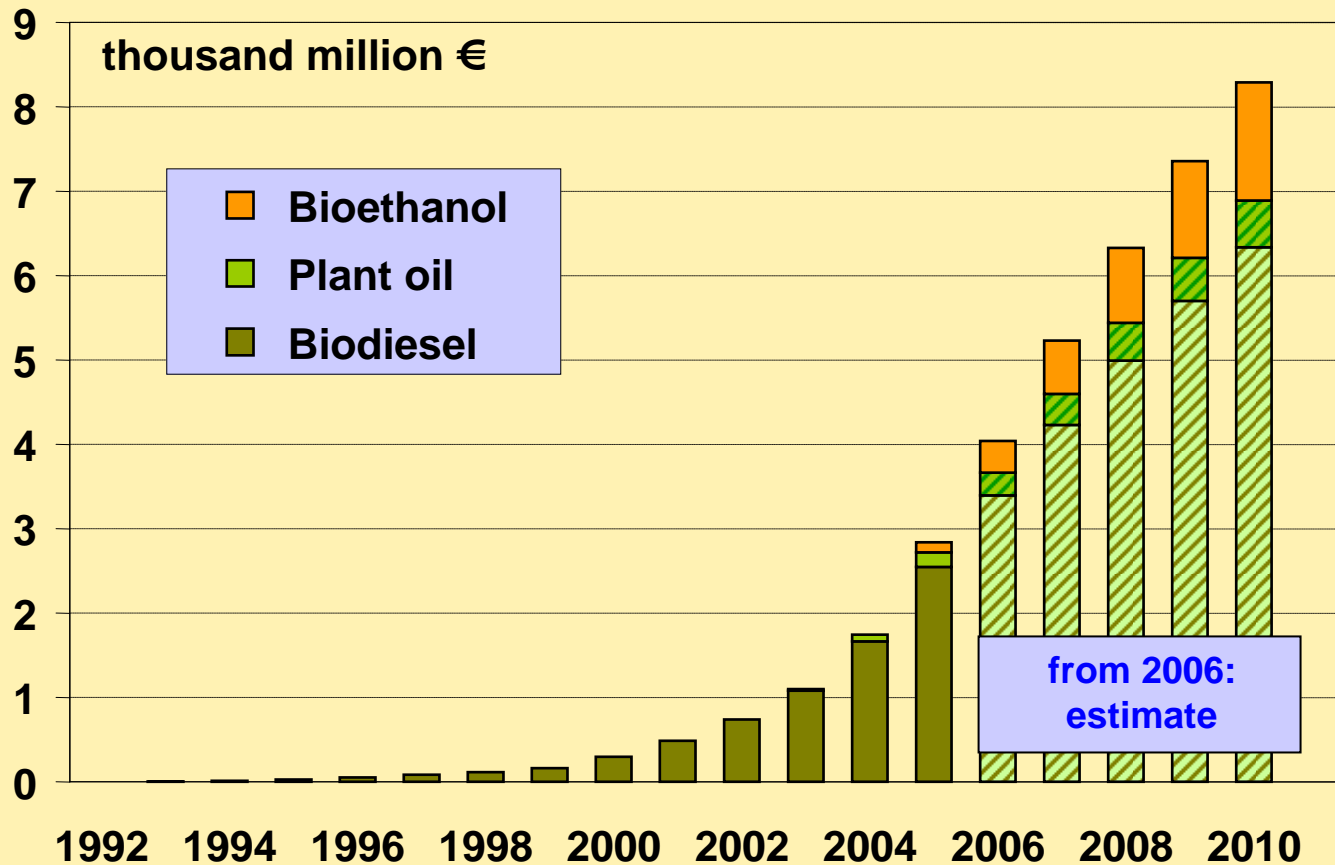
**about 1,900 (i.e. 12%)
public filling stations
offer biodiesel**

**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

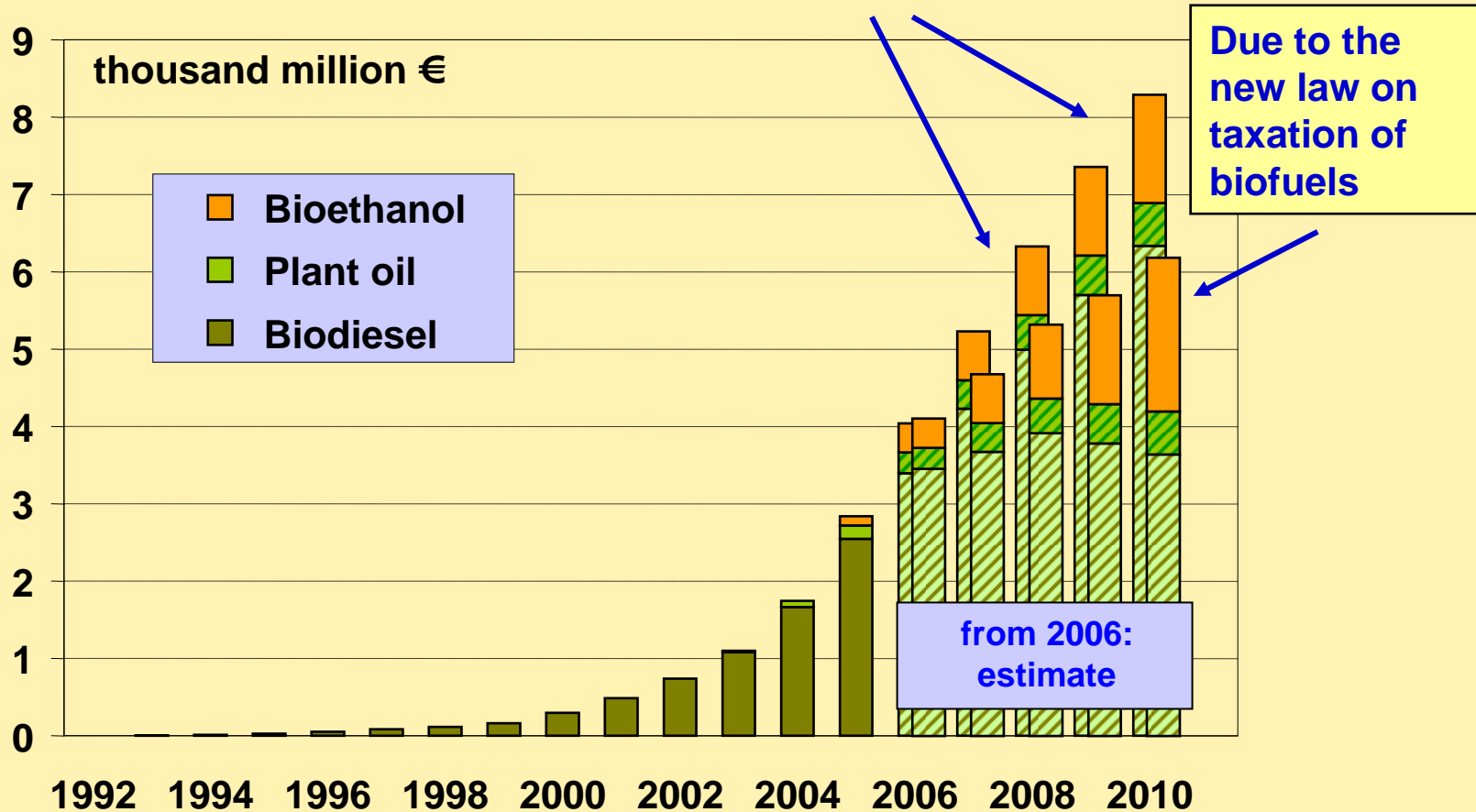
■ Tax exemption for agriculture & forestry

■ Ethanol/ETBE tax-free!

Cumulated revenue loss in Germany



... by 100 % mineral oil tax exemption



Dual concept for biofuels

**Tax on 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.

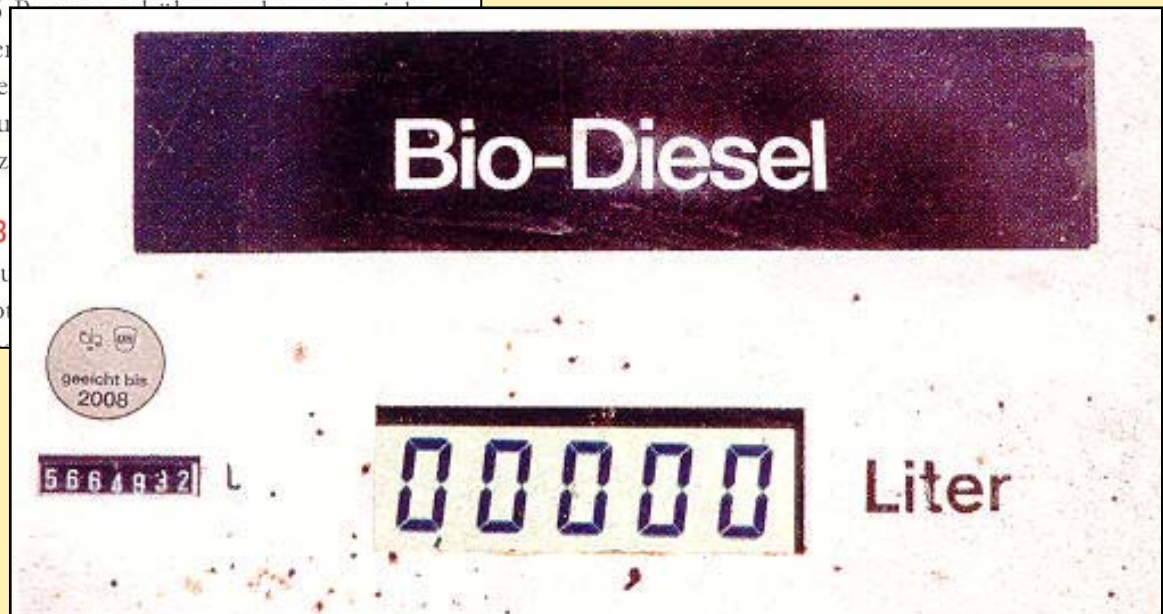
Text: Martin Bensmann, Fotos: Paul Langrock

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” ...

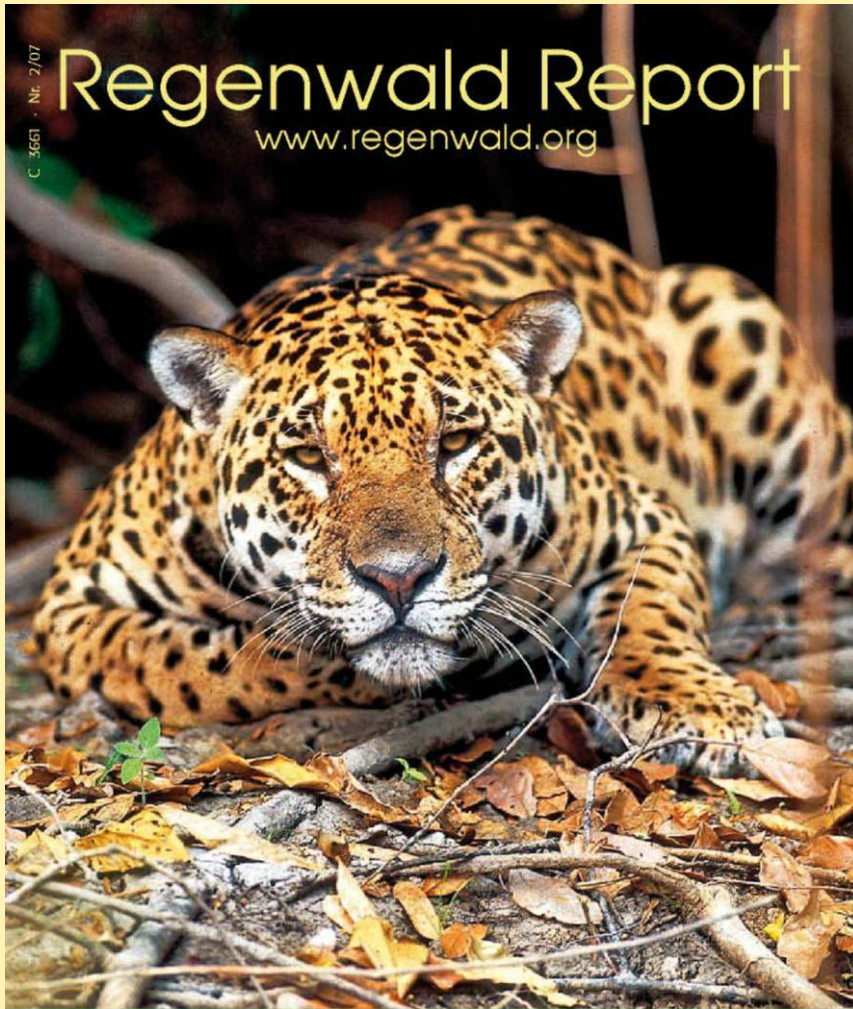


Taken from:
M. Bensmann: SOS Biodiesel. In:
neue energie 04/2007, pp. 57-60.

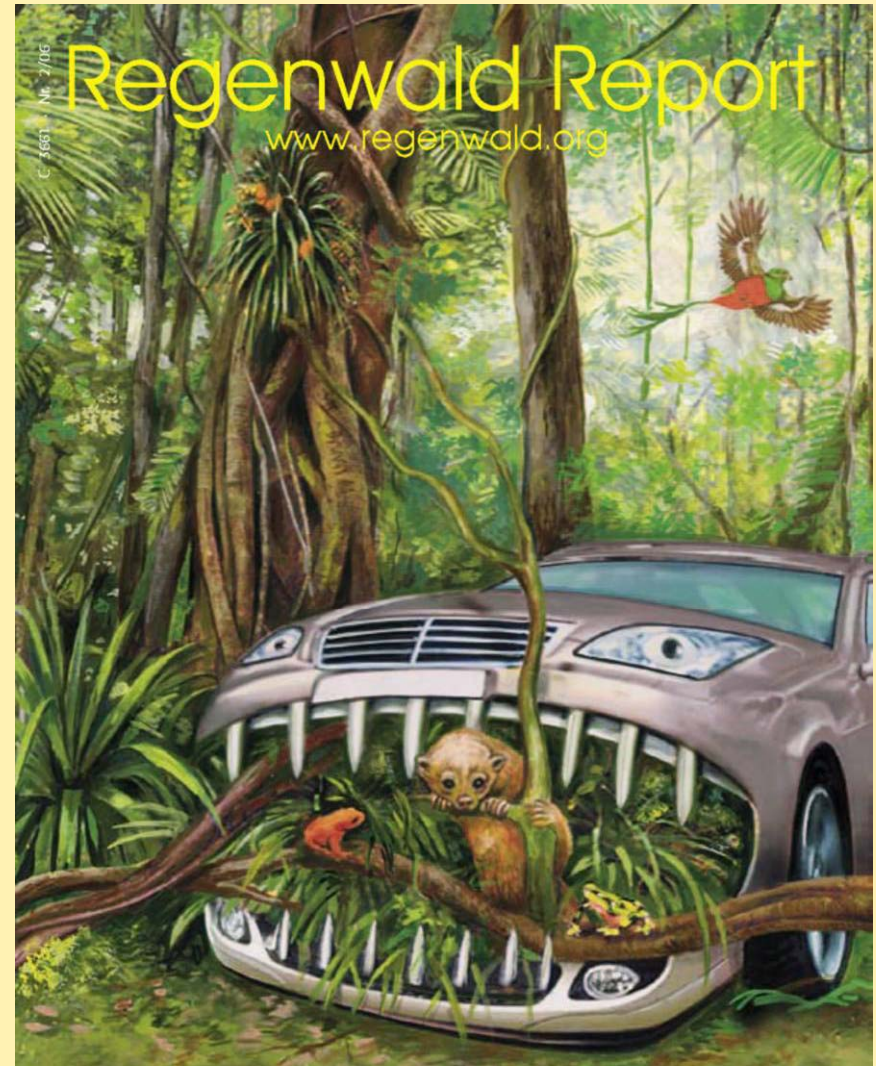
Pending challenges

- **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



Source: IFEU 2007

Last but not least



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

Dr. Guido Reinhardt



Contact details:

guido.reinhardt@ifeu.de

+ 49 – 6221 – 4767 – 0 / - 31

www.ifeu.de