The Role of Biomass within the Portfolio of Renewable Energy Sources

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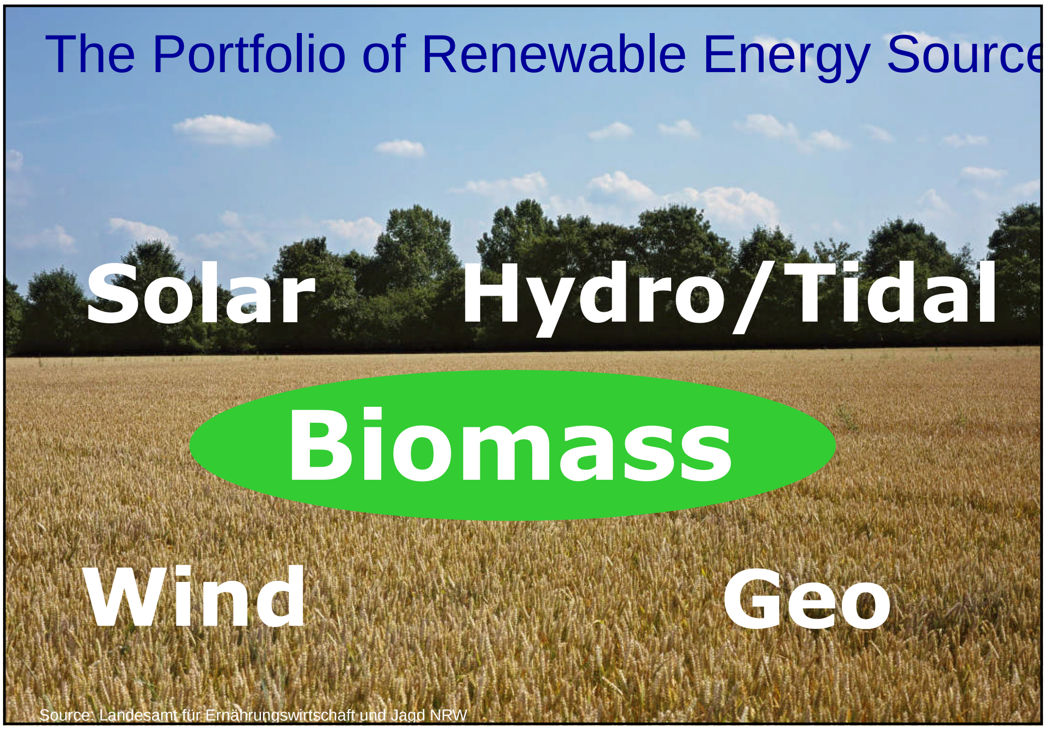
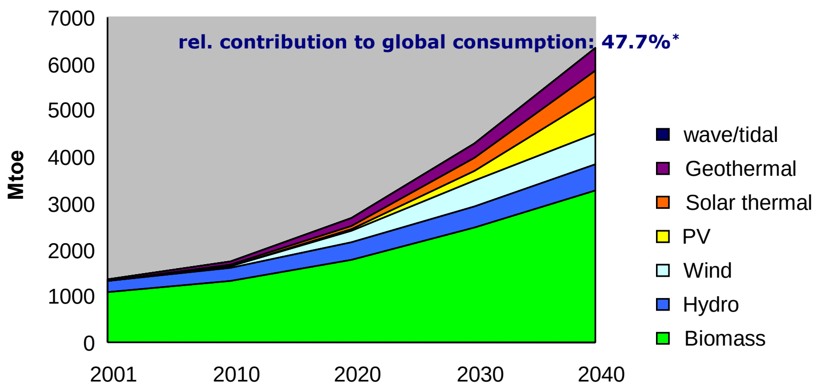
Kurt Döhmel
Vorsitzender der Geschäftsführung
Deutsche Shell Holding GmbH, Hamburg



Contribution of Renewable Energy Sources to the World Energy Supply

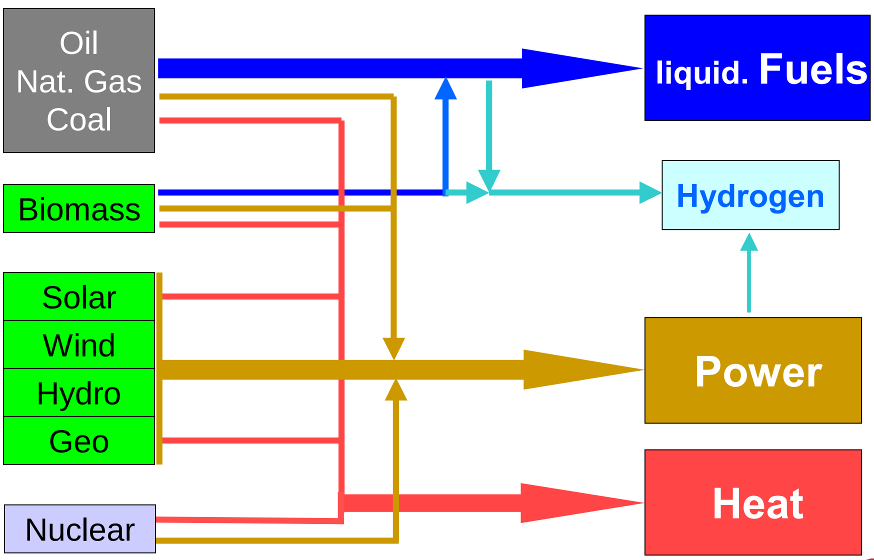
EREC, Advanced International Policies Scenario, 2006



*Dynamic Current Policy Scenario: 27.4%

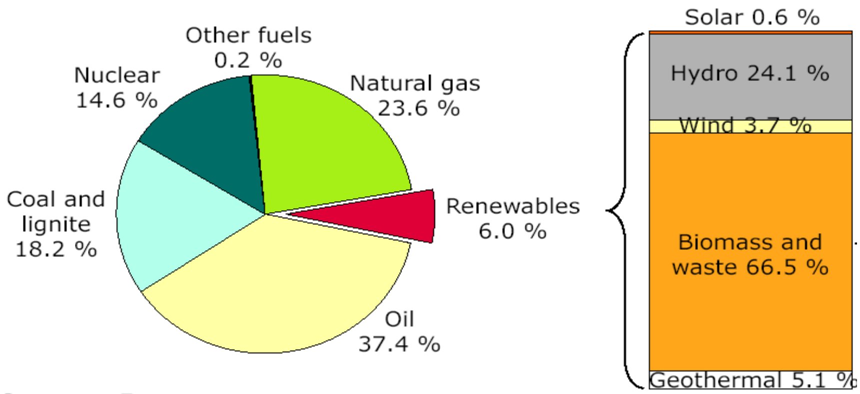
Source: EREC, Renewable Energy Scenario to 2040

Energy sources – energy carriers



EU policy context

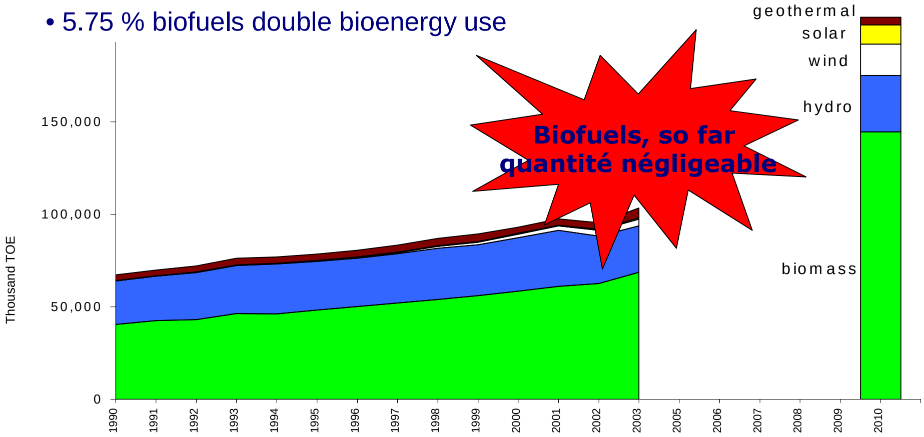
Total energy consumption in the EU-25, 2003



Source: Eurostat.

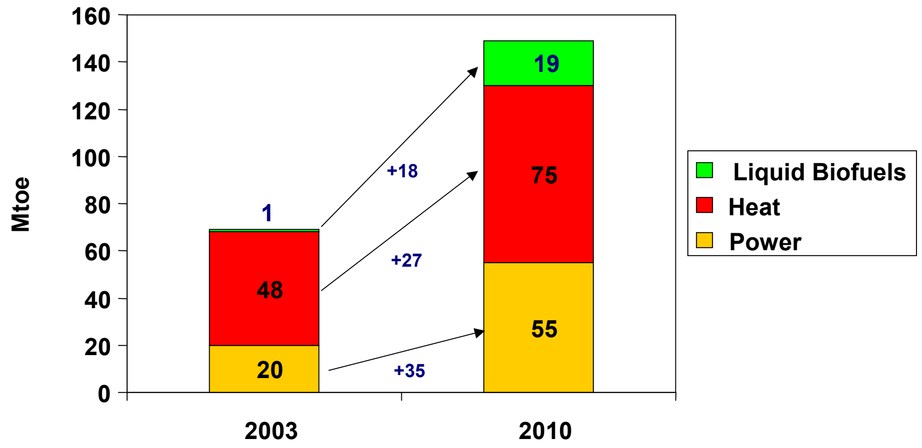
Relevant EU policy targets for 2010

- 12 % renewable heat
- 21 % renewables electricity
- 5.75 % biofuels double bioenergy use



Source: Eurostat for past data: EEA for projections: Eurostat , EEA Please note: 2010 are modelled data, not policy targets!

EU 25 Biomass Action Plan



Source:EREC

Routes to biofuels from biomass

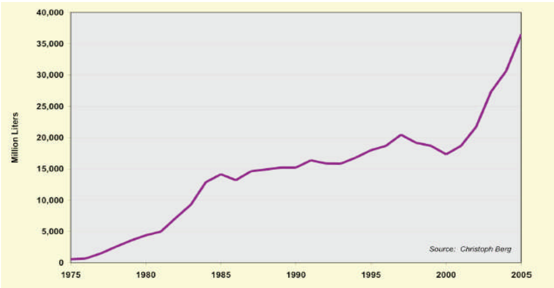
Feedstock	Process	Products
Starch / Sugar	Fermentation (classical routes)	Bio-Ethanol
Vegetable Oils	Transesterification	FAME
	Hydrogenation	NExBTL
Ligno-cellulosic biomass e.g. wood, straw	Gasification and FT-synthesis	BTL
	Gasification and MeOH-synthesis	MtD,MtG
	Enzymatic hydrolysis & fermentation	Cellulose-Ethanol
	Thermochemical Conversion	Advanced biofuel components

Shell is engaged in 2nd generation biofuels:

CHOREN INDUSTRIES

IOGEN CORPORATION

World Fuel Ethanol Production, 1975 - 2005

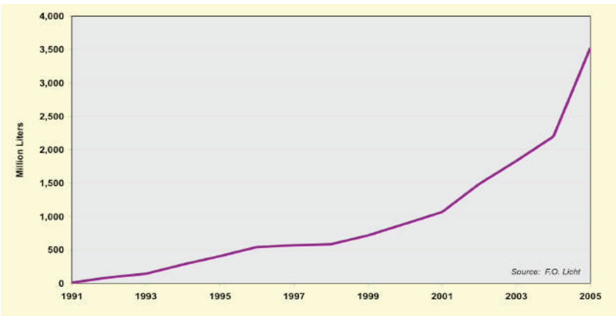


Top 5 Producers 2005:
(production in mln l/a)

Brazil	16.500
US	16.230
China	2.000
EU	950
India	300

Source: Worldwatch Institute, Biofuels for Transportation, 2006

World Biodiesel Production, 1975 - 2005



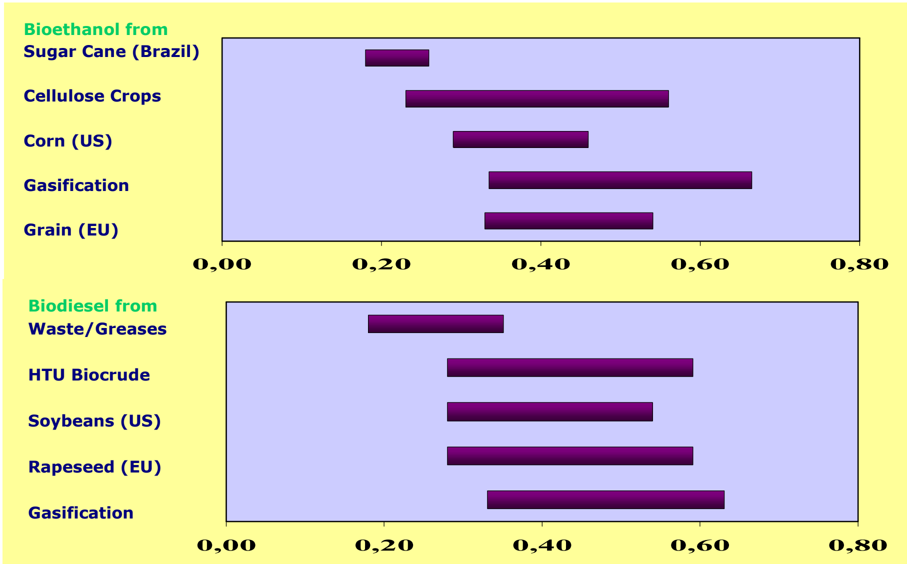
Top 5 Producers 2005:
(production in mln l/a)

Germany	1.920
France	511
US	290
Italy	227
Austria	83

Source: Worldwatch Institute, Biofuels for Transportation, 2006

Cost Ranges for Biofuel Production after 2010

(in €/l Gasoline/Diesel Equivalent)



Source:Worldwatch Institute, Biofuels for Transportation, 2006

What are the options to offset the price-gap to conventional fuels ?

Customers accept to pay a premium

Fuels are incentivised

Bio-fuel components are mandated

Consumers like the bio-fuels concept but they are <u>not</u> prepared to pay a premium.
Instead due to tax exemptions consumers' experience is that alternative fuels come at a discount.
Also only compatible solutions will be accepted.

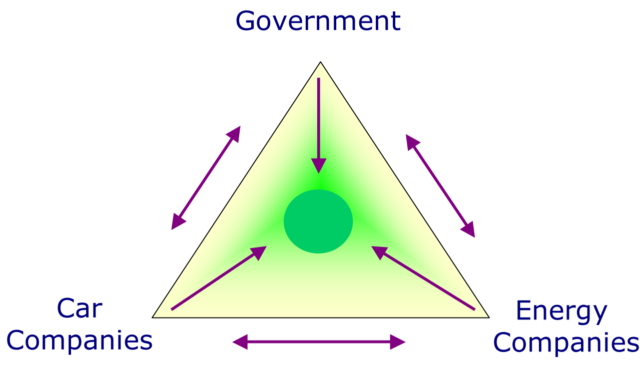
Bio-fuels must meet customer expectations

The solution is the energy & policy mix...

- There is **no single solution**
  - diversity of primary energy sources will increase
- **Renewables will be part of the solution**
  - pace of competitiveness driven or inhibited by government policy
- There is **significant potential for public, consumer & business benefit**
- All choices need time to build, but

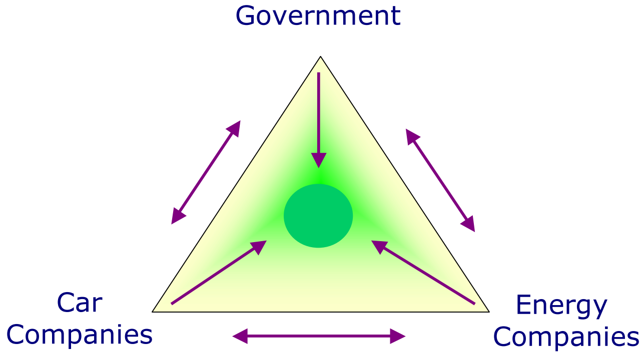
with the right policies in place
there can be a rapid impact

Cooperation of car- and energy companies



Cooperation is essential to ensure most cost/effective introduction of biofuels. Parties need to
focus on
the right things to do, at the right time, at the right place.

Role of Governments



A rapid and sustainable scaling-up in biofuel production can be facilitated by
a coordinated set of policies that are consistent, long-term, market force orientated and informed by broad stakeholder participation.

Summary

The most cost effective utilisation of biomass will depend on local/regional conditions and depends on policy objectives

Biomass can be converted into liquid automotive fuels.
All other renewable energy sources yield power/heat only.

Biofuels are the only short- to medium-term option to substantially reduce CO_2 emissions from transportation.

Biofuels need political support to become economically viable.

Thank you for your attention!