Fuels of The Future Competence Network

Mülheim, April 23rd, 2007

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Energy Trends World-Wide 2000…2020

- Fossil fuels remain the main source of energy and cover more than 90% of the growth in demand (2000…2030: 1.7 % p.a.)
- The world-wide demand for crude oil is rising at 1.6 % p.a.. Nearly three quarters of the rise come from the transport sector. (97% dependence on mineral oil products in transport)
- Renewable energies will have growing significance in primary energy production
- Vision: Renewable raw materials will account for approx. 20% of the chemicals, materials, fuels and propellants used
- Technical options for realization
  - improving the energy efficiency of 'clean' energy conversion systems like fuel cells
  - Introducing alternative vehicle fuels onto the market, including hydrogen, with adequate economic availability and with the option of reducing climate gases and external costs for energy use

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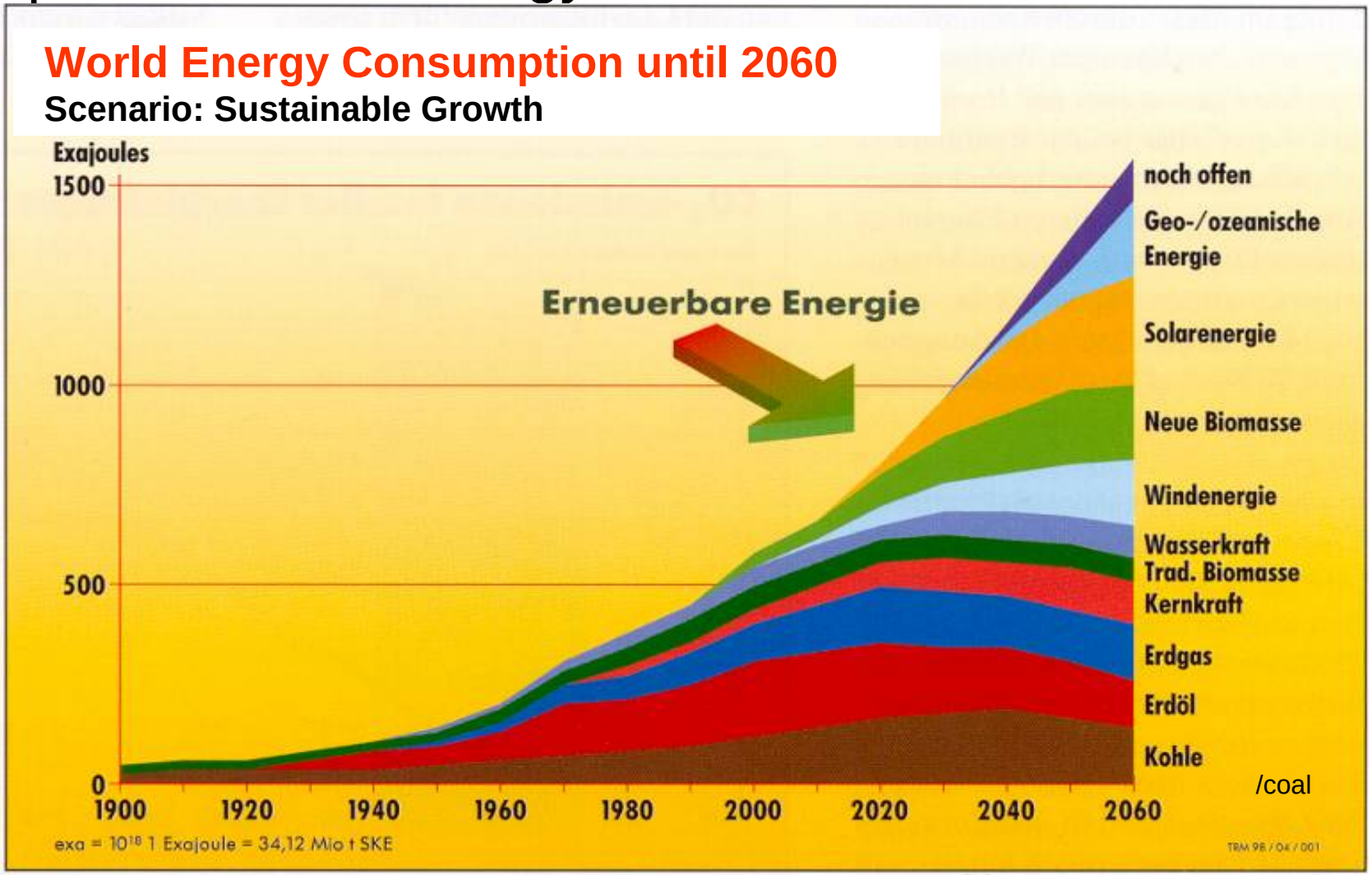
Shell-Scenario Describes the Necessary Replacement of Energy Sources



What Future Tasks Will North Rhine-Westphalia (NRW) Have To Tackle?

Definition of an overall vehicle fuel policy on the basis of the German Federal Government's Fuel Strategy

How can the vehicle fuel mix be more diversified?

What role will renewable and fossil fuels play in future?

What concepts will have to take effect in the short/medium/long term?

How can the economy of NRW as the "Fuel Region No.1" profit from this?

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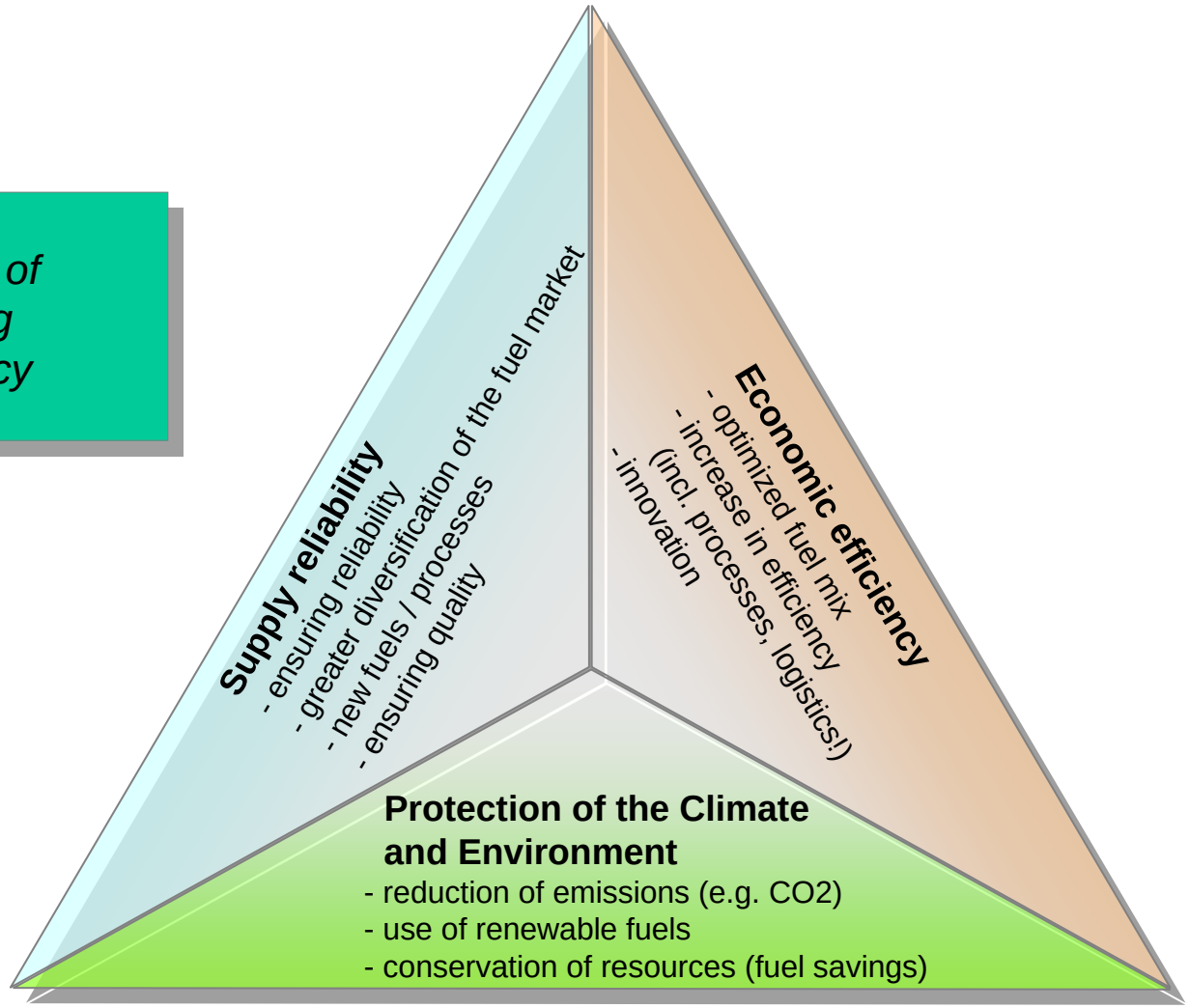
Objectives Pyramid

Overall objectives of a forward-looking vehicle fuels policy



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Objectives of the Network

- Establishment of North Rhine-Westphalia (NRW) as an attractive and leading location for all activities in the field of sustainable vehicle fuels and corresponding drive systems
- Identification of potential Network partners, their strategies and development paths
- Acquisition and combination of all relevant competences in the value added process from fuel production through to the consumer
- Creation of a sound basis for expanding, settling and founding companies in NRW
- Creation of sustainable jobs in the area of sustainable fuel technologies
- Enhancement of the acceptance of sustainable vehicle fuels in cross-border transport (international co-operation, especially with BeNeLux, FR)

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Tasks

Development of a basis for the co-operation between science and industry in order to develop, execute and support projects

Information and communication platform for players from research, production and the service sector

Internationalisation by means of trade fair presentations and networking with related initiatives at home and abroad

Public relations via internet presentation and publications in the specialist media

Settlement consultancy in collaboration with regional industrial funding bodies, support in settling companies

Qualification by means of workshops, courses of training and on-site visits to companies

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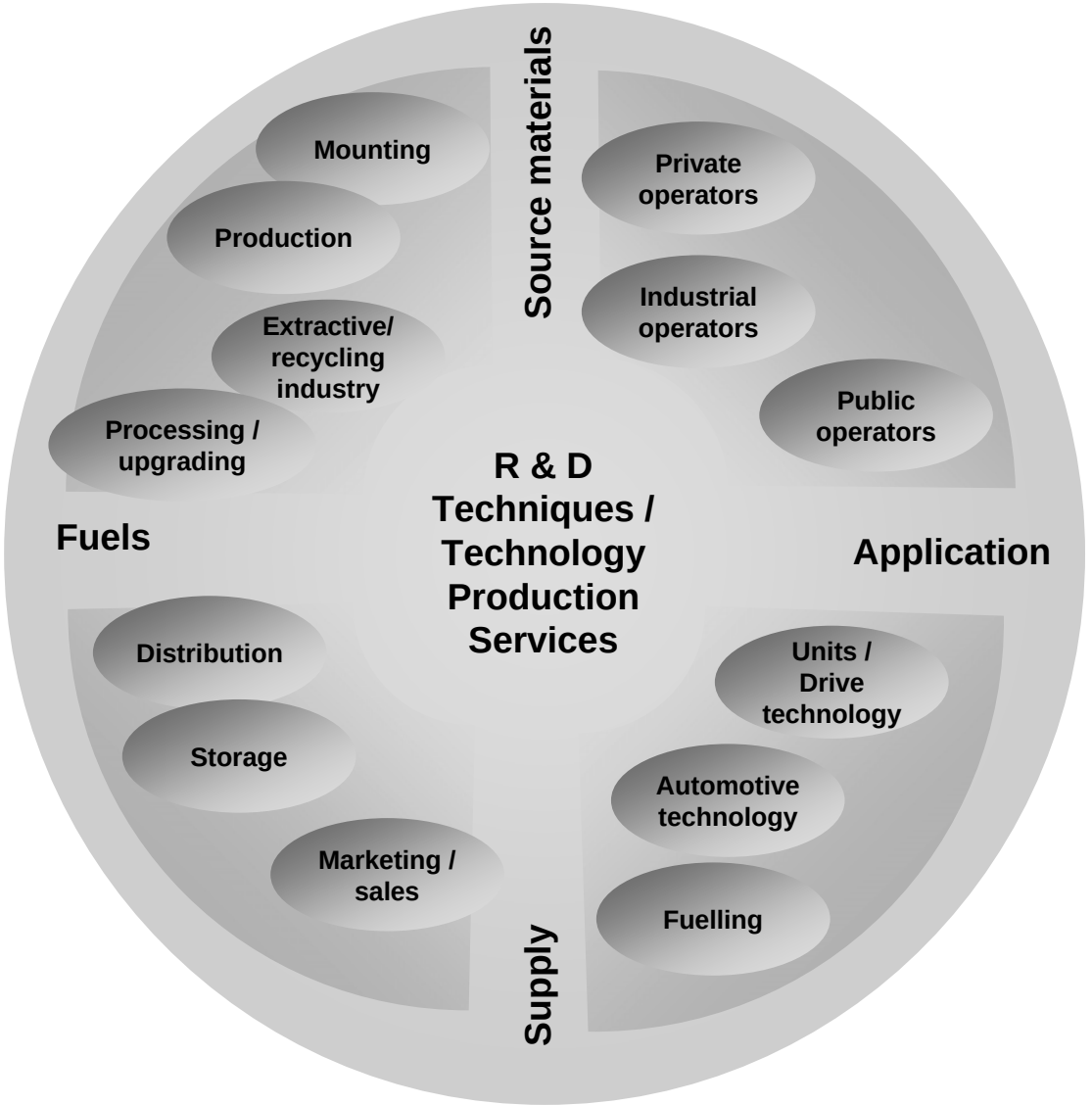
Involvement of Players Along the Value Added Chain

Relevant work areas on the Fuels of the Future map



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Determination of Relevant Work Areas

Interviews of key players:

Vehicles (manufacturers)

Drive and fuel systems (suppliers)

Production plant technologies (engineering companies)

Producers and dealers (producers, manufacturers, dealers, sellers)

Private, public and industrial operators (households, transport companies, forwarders)

Research (basis and application)

Associations (representation of interests)

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WORK AREAS

Interview results have shown the need to tackle the following main questions

What raw materials can be considered for use as a fuel?

How must a future "fuel production system" look like?

Can the users' performance requirements for a specific fuel be fulfilled?

How must the use of a fuel be rated with respect to logistical considerations?

- Fuel logistics
- Raw material logistics

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Work Areas of the Competence Network

Fuel Products

- Natural gas
- Hydrogen
- Mineral oil products
- Biodiesel (admixture / B100)
- Ethanol (admixture / E 85)
- Synthetic fuels (designer fuels)
  - GTL
  - CTL
  - BTL

Engine and Drive Technology

Regional Development

- Development / assessment of fuel scenarios from the producer to the filling station
- Regional aspects of fuel supply (e.g. vegetable oil / biogas)
- Possibilities of marketing the new concept in the region

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Work Areas of the Competence Network

Logistics

- Assessment of logistical questions
  - competition between raw materials
  - logistics
- Requirements of logistics service providers

Recycling Economy

- Processes for converting plastic waste to diesel
- Use of greases, old timber etc.

Marketing / Market Penetration

- Marketing of "new fuels”
- Sales markets for by-products (e.g. swillings in the case of bioethanol)

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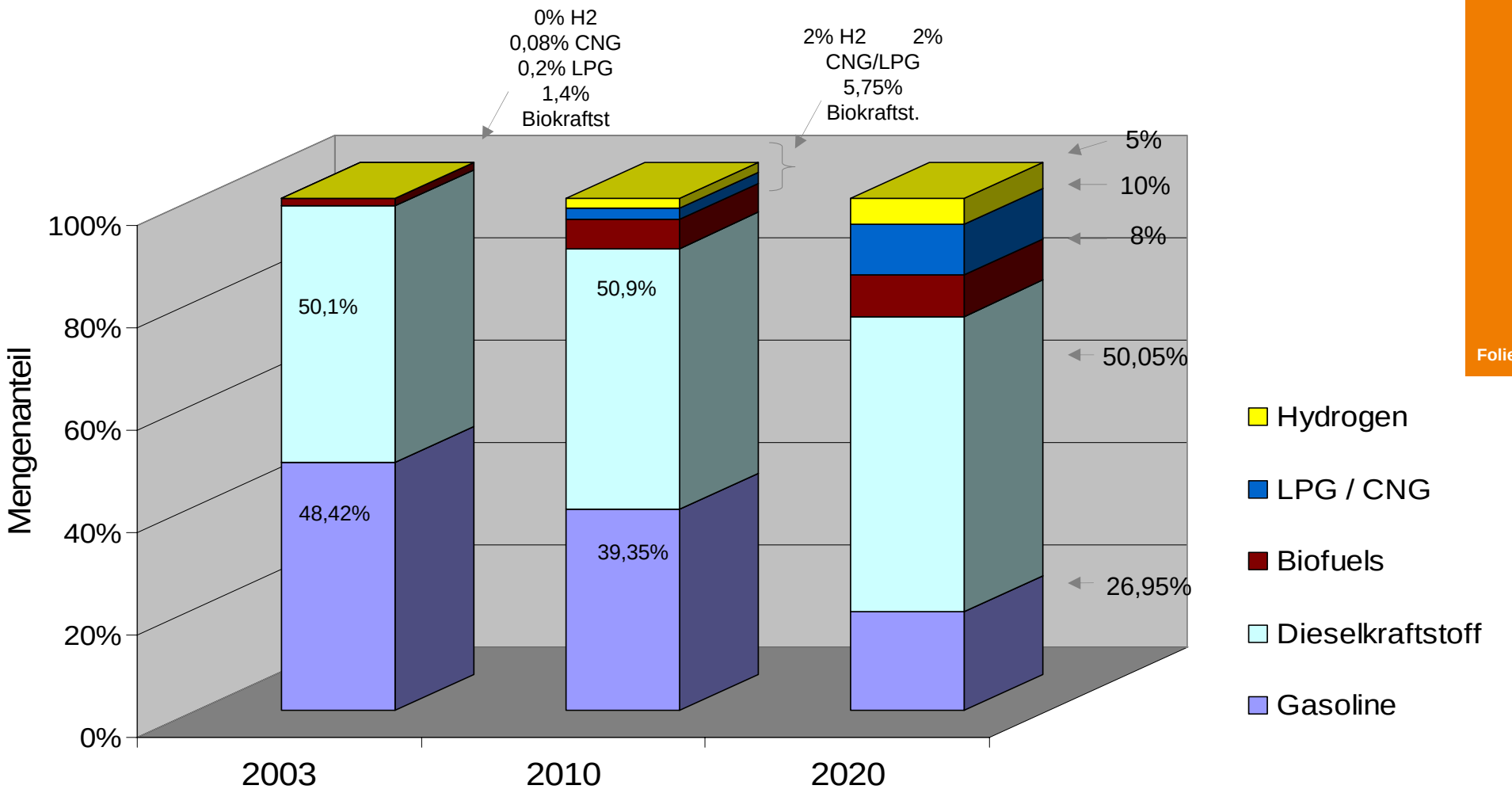
WORK BASIS

Specified Targets of the German Federal Government



Source: NHS Fortschrittsbericht 2004 -Perspektiven für Deutschland-, S.175f.

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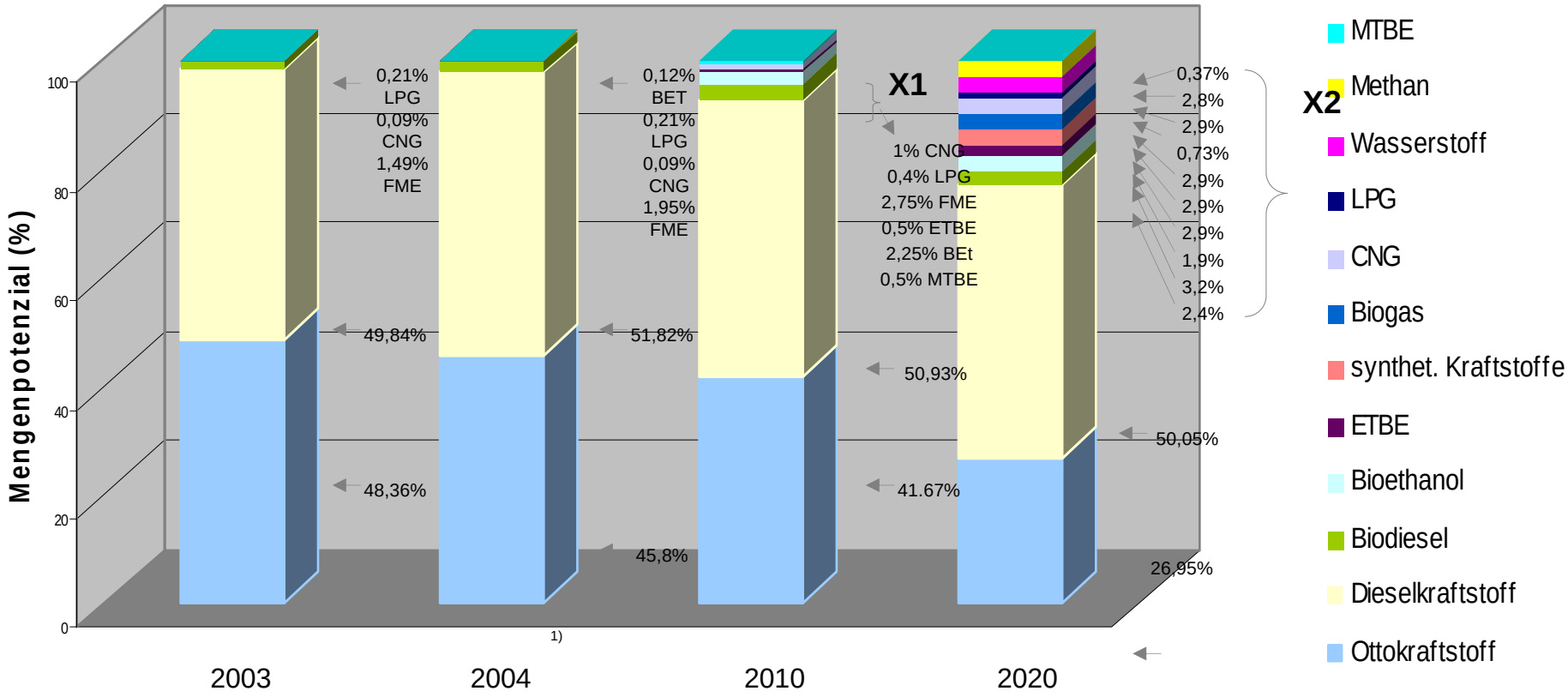
Related Potentials for the Fuels Market as per the Government's Expert Group



Source: Expertengruppe „Kraftstoffmatrix“ in: NHS Fortschrittsbericht 2004 -Perspektiven für Deutschland-, S.185. 1): Wegweiser Nachhaltigkeit 2005 -Bilanz und Perspektiven- der Bundesreg., S.26.

X1: According to the report "Matrixprozess" there is a theoretical potential for bio fuels of up to 9%.

X2: According to the report "Matrixprozess" there is a theoretical potential for bio fuels of up to 1/3 of the present fuels market.

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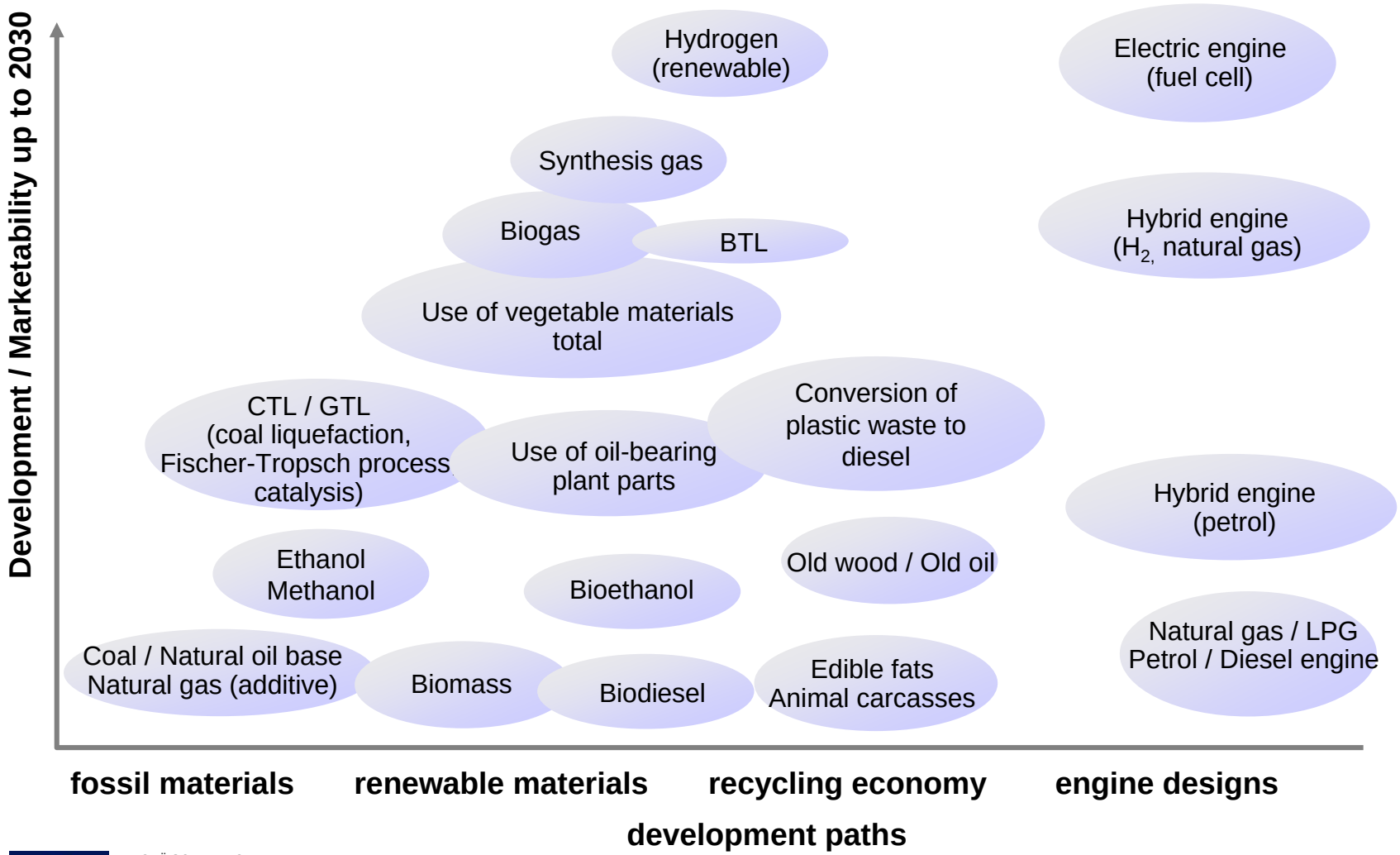
Development Paths for New Fuel Concepts



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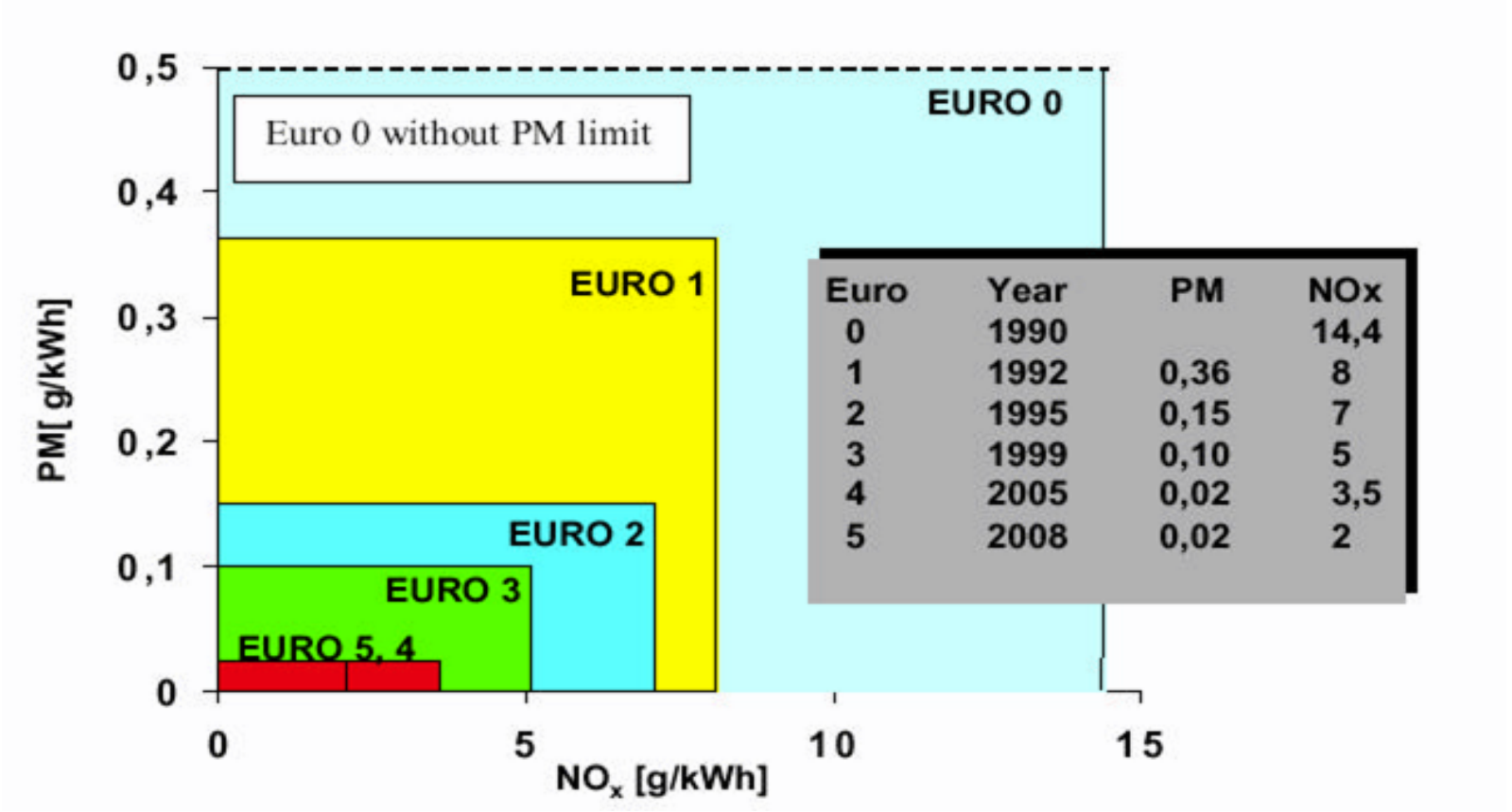
EU-Regulations for Emissions of Exhaust Gases



Euro	Year	PM	NOx
0	1990		14,4
1	1992	0,36	8
2	1995	0,15	7
3	1999	0,10	5
4	2005	0,02	3,5
5	2008	0,02	2

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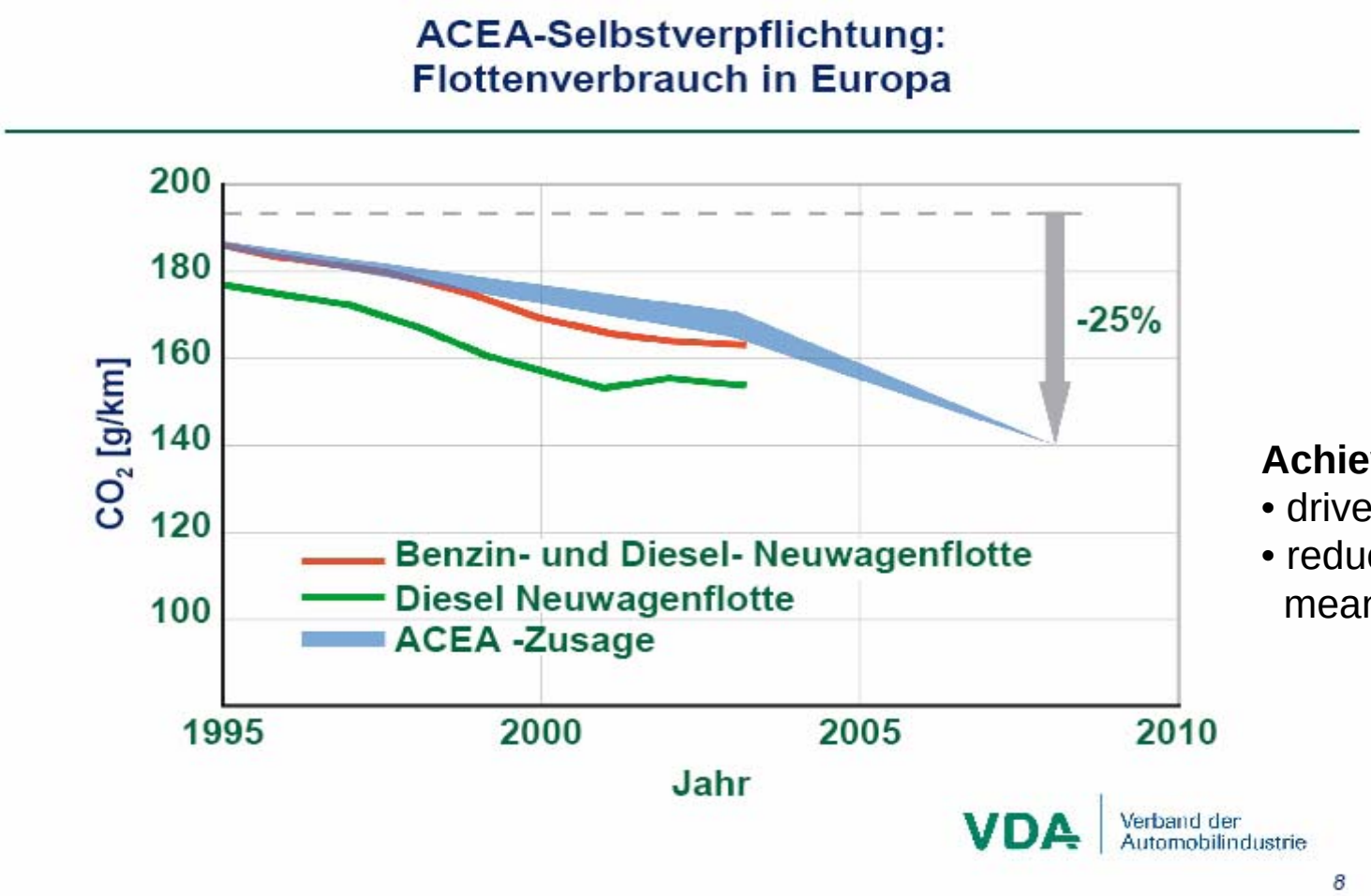
Example – Automobile Industry: Global Committment to Reduce Fuel Consumption



Achievable by:

- drive effectiveness
- reduction of CO_2 by means of (bio)fuels

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Main Directions in the German Fuels Strategy to Reduce the Proportion of Fossil Fuels

Efficiency increase in petrol and diesel engines

Synthetic fuels from biomass

Combined drive systems (hybrid)

Hydrogen (engine and fuel cell)

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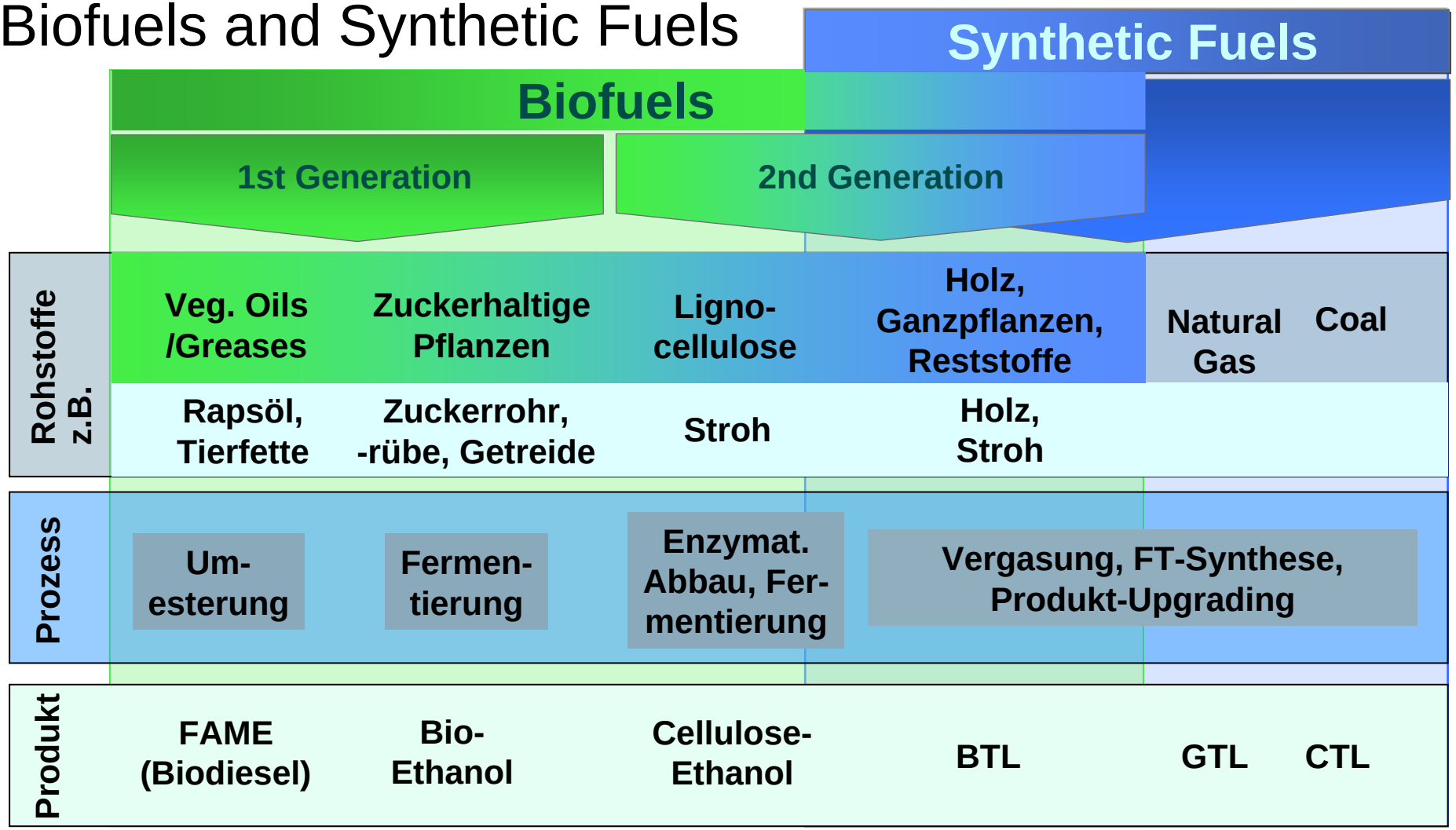
Raw Material Basis for the Production of Biofuels and Synthetic Fuels



Quelle: Shell **Darstellung vereinfacht; weitere Prozess/Produktkombinationen möglich**

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Next Project Stages

- Evaluation of the settlement enquiries with economic assistance and project body
- Study on "Synthetic Fuels" from biomass in NRW
- Use of alternative fuels or drive system in a vehicle fleet
- Preparation of a workshop together with IML, Dortmund, on the subject of "Requirements of Fleet Operators"
- Project on the use of alternative fuels and drive systems at a chemical logistics service provider
- Preparation of a "Biogas" work package
- Preparation of a "Bioethanol" work package
- Preparation of a "Recycling Economy" work package
- Preparation of publications, DGMK conference, April 2006
- Chances for "renewable fuels" for special regions
- Projects under German-Dutch Collaboration („SenterNovem“, Utrecht)

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List of Network and Interview Partners (1 / 2)

AGQM (AG Qualitätsmanagement Biodiesel)

BEW, Bildungszentrum für die Entsorgungs- u. Wasserwirtschaft

Bigatec, Ingenieurbüro für Bioenergie, Rheinberg

Bundesministerium für Verkehr, Bau- und Wohnungswesen (Kraftstoffmatrix)

Bundesverband Sekundärrohstoffe und Entsorgung – bvse

Chemion Logistics GmbH

CLAAS, Harsewinkel

CNG Fahrzeugtechnik, Mainz

Cutec, Clausthal-Zellerfeld

Deutsche BP AG, Hamburg / Bochum

Deutz AG

Deutscher Verband Flüssiggas, Berlin

DGMK

E.ON Ruhrgas

Fachhochschule Münster

FEV Motorentechnik

Fraunhofer Institut für Materialfluss u. Logistik, Dortmund

Fraunhofer Institut für Umwelt, Sicherheit und Energietechnik (UMSICHT), Oberhausen

Prof. Dr. Höhlein

IUTA Institut für Energie- und Umwelttechnik e.V., Duisburg

Kreis Wesel

Landwirtschaftskammer NRW, Haus Düsse

LUAT Lehrstuhl für Umweltverfahrenstechnik und Anlagentechnik, Essen

MWV e.V., Hamburg

Öl-Wärme-Institut, Herzogenrath

Petrotec, Borken

Process Design Center, Dortmund

Pro e.V., Regioöl

Progas GmbH, Dortmund

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List of Network and Interview Partners (2 / 2)

Uhde GmbH, Dortmund

VER, Verfahrensingenieure

Westfalen AG, Münster

WIN Emscher-Lippe GmbH

Wuppertalinstitut für Klima, Umwelt, Energie

Further Contacts:

BFT

Choren Industries

Daimler Chrysler

DENARO, Unna

Deutsche Montantechnologie

Ford Werke, Köln

Ford Forschungszentrum

Albert Hiby GmbH (Tanktechnik)

Lurgi Lentjes

MAN Nutzfahrzeuge

Opel Special Vehicles

Toyota

RWTH Aachen, Fachgruppe für Kokereiwesen, Brikettierung u. therm. Abfallbehandlung

RWTH Aachen, Institut für Kraftfahrwesen, ika

Saria Bio Industries

Shell Deutschland Oil GmbH, Hamburg

TÜV Nord, Institut für Fahrzeugtechnik und Mobilität, Essen

UNITI e.V., Hamburg

Union Technik Tankstellenbau

Universität Bonn, Institut für Agrarpolititik, Marktforschung u. Wirtschaftssoziologie

Universität Duisburg, Technologietransferstelle

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Timetable for Network / Preview of Further Events (1/3)

March / April 2006	Workshops on the chances of renewable energies for the EU region, Jülich, Aachen
March 2006	Workshop on the „Estimation of Potential“ Fuel Paths
March 28th, 2006	IHK Koblenz: Roadtransport and Energy Efficiency
April 5th –11th, 2006	Visit of Chinese delegation in line with the German-Chinese Sustainable Fuel Partnership (GCSFP)
April 24th-26th, 2006	DGMK-Conference „Energy-related Use of Biomasses“
May 17th, 2006	Duisburg: 4th Union „Technik Fachforum“

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Timetable for Network / Preview of Further Events (2/3)

May 29th, 2006	Umweltamt Düsseldorf: Alternative Drive Systems and Fuels
June 7th, 2006	Bad Neuenahr: 9th International Altkunststofftag by bvse
August 22nd-23rd, 2006	Duisburg: BEW fuels meeting
August 31st, 2006	Expert Discussion: Fuels on the basis of Biomass Gasification, Wuppertal
2nd Quarter, 2006	2nd meeting of the steering committees, possibly with SenterNovem / EU topics
2nd Quarter, 2006	1st Experts Discussion „Alternative Drive Systems“, requirements for the fuels of the future by the OEM

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Timetable for Network / Preview of Further Events (3/3)

2nd Quarter, 2006	Experts Discussion: Iogene processes for the production of bioethanol
2nd Quarter, 2006	Presentation of the study „Biogas Feed“
September 7th – 8th	UMSICHT-Days, Oberhausen
October 26th – 29th	Aachener Energy Days 2006
Autumn 2006	NRW Presentation in Brussels

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