

# European Biofuels Technology Platform

## Working Group 3

### “Product Distribution and Use”

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**Stakeholder Plenary Meeting**

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# Outline

- 1. Introduction**
- 2. Powertrain and Fuel Roadmaps**
- 3. Areas with R&D Need**
- 4. Examples for Industry Activities**

## Introduction

- Future increase of biofuel shares in road transportation fuels driven by the European legislation requires intensive progress to be made in biofuel development and introduction:

2010: 5,75 % indicative target

2020: 10 % mandatory target proposed in the SET plan initiative

2030: 25 % vision expressed in BIOFRAC report

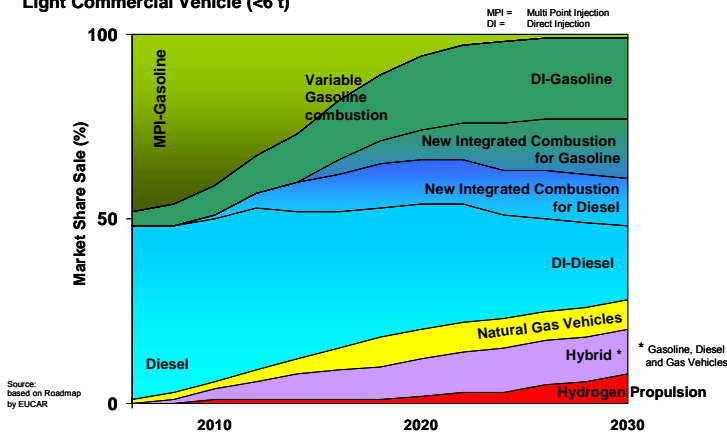
- At the same time vehicle emission standards will become more stringent in the future (Euro V, Euro VI and further) which requires great efforts in the development of compatible vehicle technology.

R&D efforts with respect to fuel distribution and end use in vehicles are required for reaching future biofuel share targets.

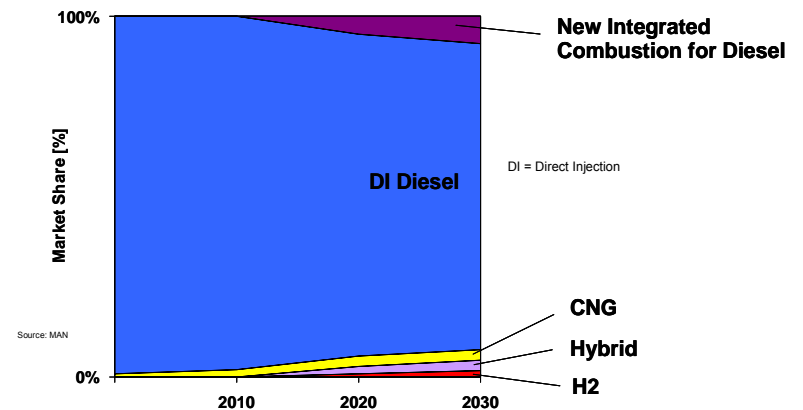
## Powertrain Roadmap

Roadmaps for powertrain technology and fuel demand were viewed as a basis for R&D identification

New Passenger Cars & Light Commercial Vehicle (<6 t)



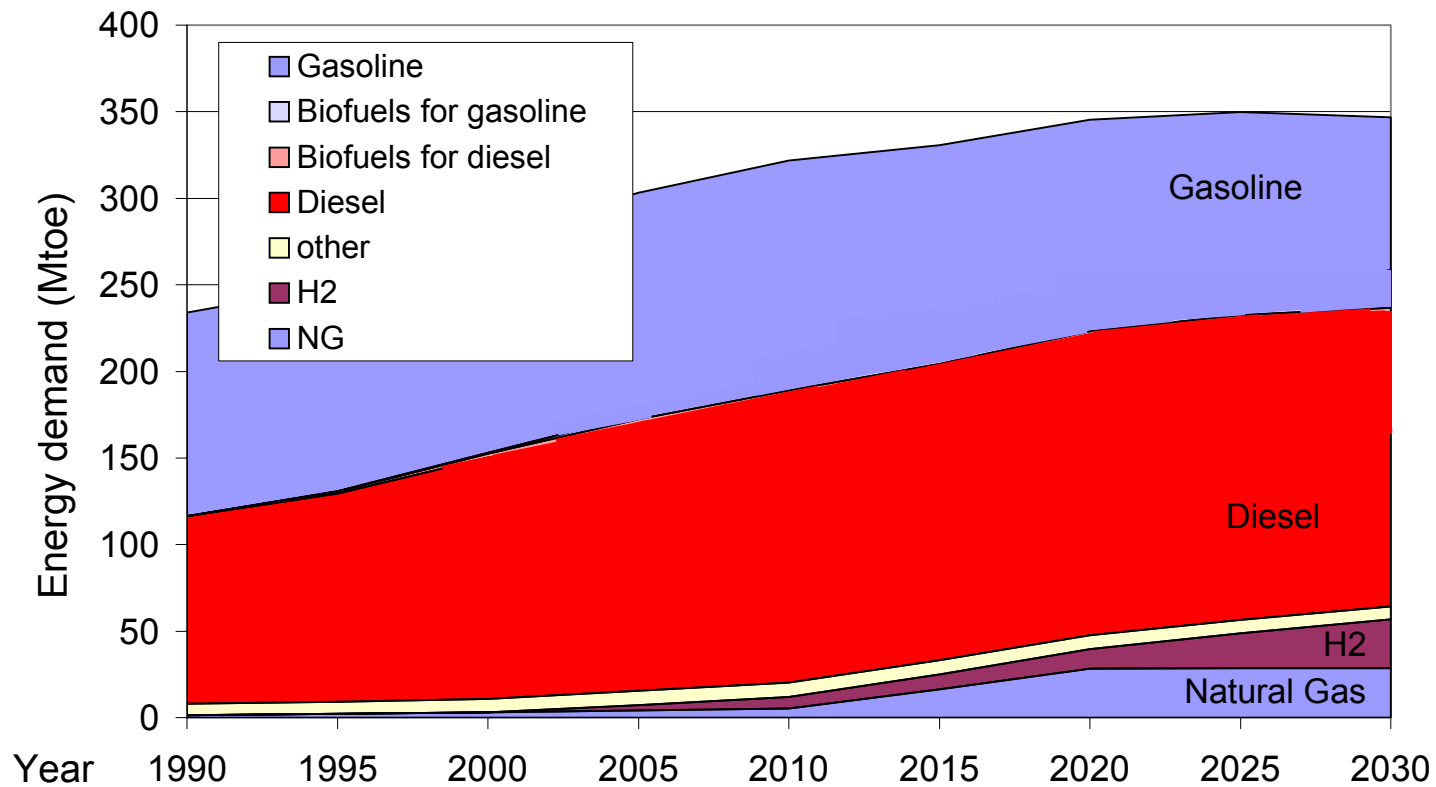
New Commercial Vehicles > 6 t (Trucks and Buses)



- Gasoline and diesel engines will remain dominating powertrains until 2030 in the segment of passenger car and light duty CV
- Diesel engines will remain the dominating powertrain for commercial vehicles.
- New combustion schemes (e.g. HCCI) will be introduced with increasing share
- Market share of hybrid, gas and hydrogen propulsion vehicles will remain significantly lower compared to diesel and gasoline vehicles until 2030

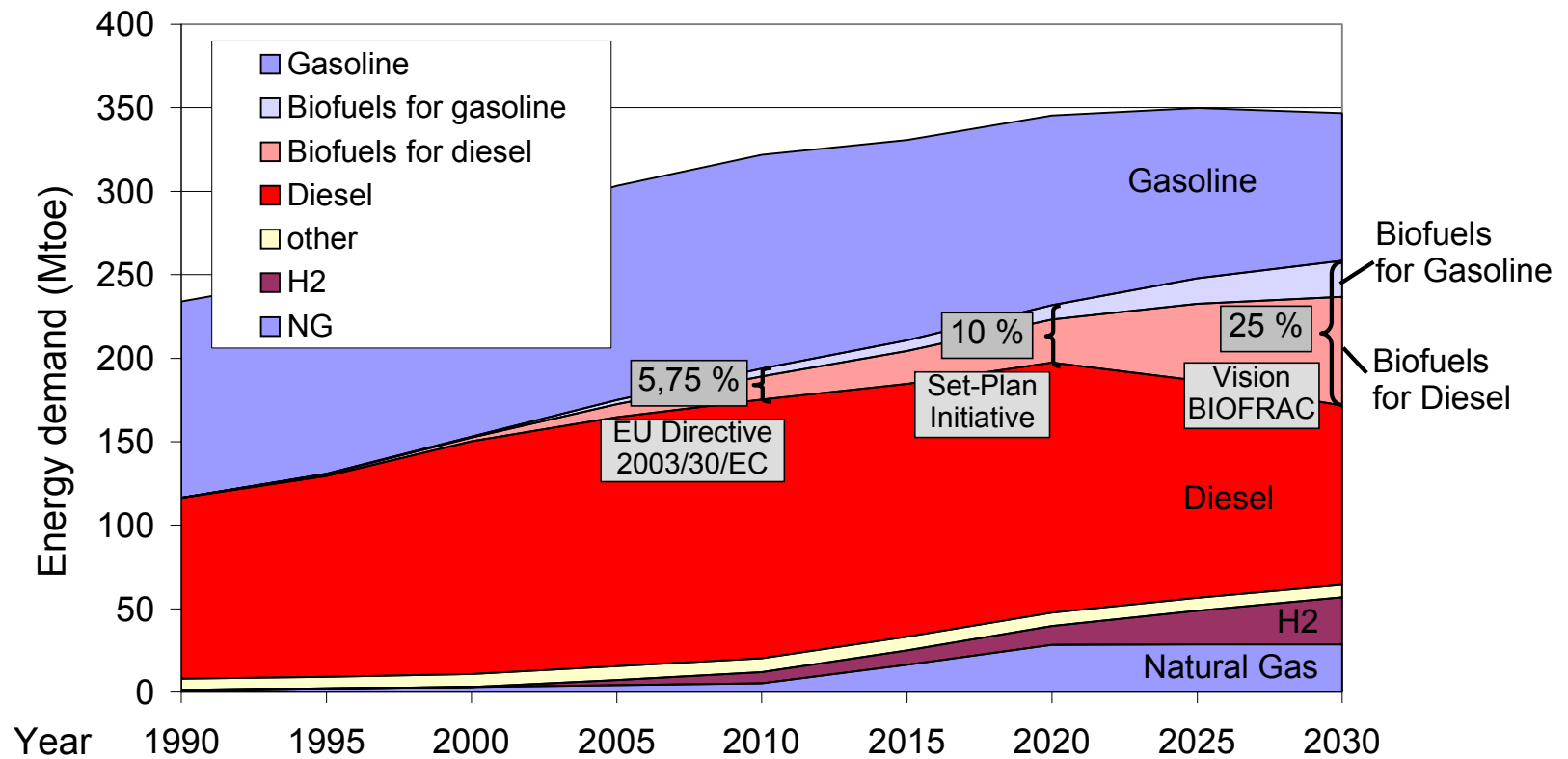
# Fuel Roadmap

The fuel roadmap until 2030 was viewed for learning which types of fuels will be demanded in future on the european market.



## Fuel Roadmap

Reasonable potential biofuel shares were worked out by WG3.



## Key Statements for the Fuel Demand until 2030

- The demand for liquid fuels will be dominating until 2030.
- The demand for diesel fuel will increase significantly due to increase of freight transport activity by trucks
- The demand for gasoline fuel will remain nearly constant.
- In Europe there is a surplus production of gasoline. Gasoline is currently exported to the USA. In future the USA is expected to cover their gasoline demand by own local production. This will lead to an increased surplus gasoline production in Europe.

**Main share of biofuels should be targeted for use in Diesel Engines (CI) to help covering the increasing demand of diesel fuel and reducing surplus production of gasoline fuel**

## R&D Demand for «Fuel Distribution»

### Present Status

Fuel supply and distribution system are expected to be more sensitive to current biofuels than to later Gens due to better quality of future biofuels.

- Chemistry of today's bio-components like biodiesel and ethanol increases the potential for materials incompatibility, contamination in manufacturing and transport, especially when blended with higher concentrations.
- Future biofuels (BTL, HVO) are expected to have less impact on distribution system

Solutions to these system sensitivities are generally known, however, and may not require major research initiatives

- Proper materials selection and quality control will become increasingly important.

### R&D Demand

Research issues may arise with penetration of new fuel types

- SI Engine Fuels: Pipeline distribution of very high biocontent fuels
- CI and Gas Engine Fuels: Supply and distribution of biogas and H<sub>2</sub>



## End-Use in Vehicles - Issues Impacted by Fuel Property

A number of vehicle issues are affected by the property and quality of the fuel applied. These issues require special attention and should be addressed in future R&D investigations when studying fuel property impacts on engine and vehicle operation.

Fuel Supply System	Engine		Exhaust Gas Aftertreatment	Vehicle
	Combustion	Mechanics		
<ul style="list-style-type: none"> <li>• Long-term fuel storage</li> <li>• Material compatibility with fuel tank</li> <li>• Material compatibility with seals/gaskets</li> <li>• Material compatibility with hoses/pipes</li> <li>• Compatibility with fuel filters</li> <li>• Compatibility with fuel pumps</li> <li>• Compatibility with fuel reformer</li> </ul>	<ul style="list-style-type: none"> <li>• Engine Power</li> <li>• Fuel efficiency</li> <li>• CO2 efficiency (TTW)</li> <li>• Emissions</li> <li>• Cold startability</li> <li>• Hot driving performance</li> <li>• Noise</li> <li>• Compatibility with existing engine technology</li> <li>• Potential for improved technology</li> <li>• Potential for late homogenisation (diesel engine)</li> </ul>	<ul style="list-style-type: none"> <li>• Injector Cleanliness</li> <li>• Combustion Chamber Cleanliness</li> <li>• Friction</li> <li>• Engine Oil Compatibility</li> <li>• Overall reliability</li> <li>• Overall durability</li> </ul>	<ul style="list-style-type: none"> <li>• Oxidation Catalyst</li> <li>• DPF Performance</li> <li>• DPF Regeneration</li> <li>• Three-Way Catalyst</li> <li>• Advanced TWC</li> <li>• SCR catalyst</li> <li>• NOx storage catalyst</li> <li>• Sensors (<math>\lambda</math>, NOx)</li> </ul>	<ul style="list-style-type: none"> <li>• Driving Range</li> <li>• Health</li> <li>• Safety</li> </ul>

## R&D Demand for « End-Use in Vehicles »

### 1. Determination of Future Fuel Requirements

The impact of fuel properties of CI and SI engine fuels and vehicle issues as described before is not yet fully known and understood. Fundamental research is essential for expanding the basic knowledge on this field to provide a basis for the definition of future fuel requirements.

### 2. Verification of Future Biofuel Options

The suitability of biofuels (neat or as blend) with respect to future fuel requirements according to the previous item has to be investigated.

- Investigations have to be conducted on currently known potential biofuels, like biodiesel, HVO and BTL. Compliance of these biofuels with future requirements has to be checked. Studies should consider the biofuels as neat fuel or blended to fossil diesel.
- Furthermore, focus should be set on the development of new types of biofuels with improved fuel properties.

## Examples for OEM 's Activities on Biofuels / Daimler



### Biodiesel (FAME)

- EU4 and EU5 Mercedes Benz Trucks are approved for B100 (FAME according to EN14214)

### BTL - SunDiesel

- Cooperation with Choren Industries:
  - Daimler contributing with engine and vehicle tests
  - Since October 2007: minority stake together with VW
- Participation in RENEW-Project



## Examples for OEM's Activities on Biofuels / Volkswagen

### Long experience with 1st generation biofuels:

- Ethanol (E100, E22 and Flex.-Fuel) in Brazil since 1980
- Biodiesel (B100 and B5) in Germany and Europe since 1992

### Today focus on 2nd generation biofuels:



#### BTL – Sundiesel

- cooperation with Choren since 2002
- engine and vehicle testing
- minor stake together with Daimler since October 2007



#### Cellulosic Ethanol

- cooperation with IOGEN and Shell since 2006
- teasibility study for production of cellulosic ethanol in Germany
- target E10

## Examples for OEM's Activities on Biofuels / GM

Monovalent<sup>plus</sup> Concept for  
CNG and Bio-Methane:  
Opel Zafira and Opel Combo



E85 FlexFuel Technology:  
Saab 9-3 BioPower and  
Saab 9-5 BioPower

**Thank you  
for your  
Attention !**