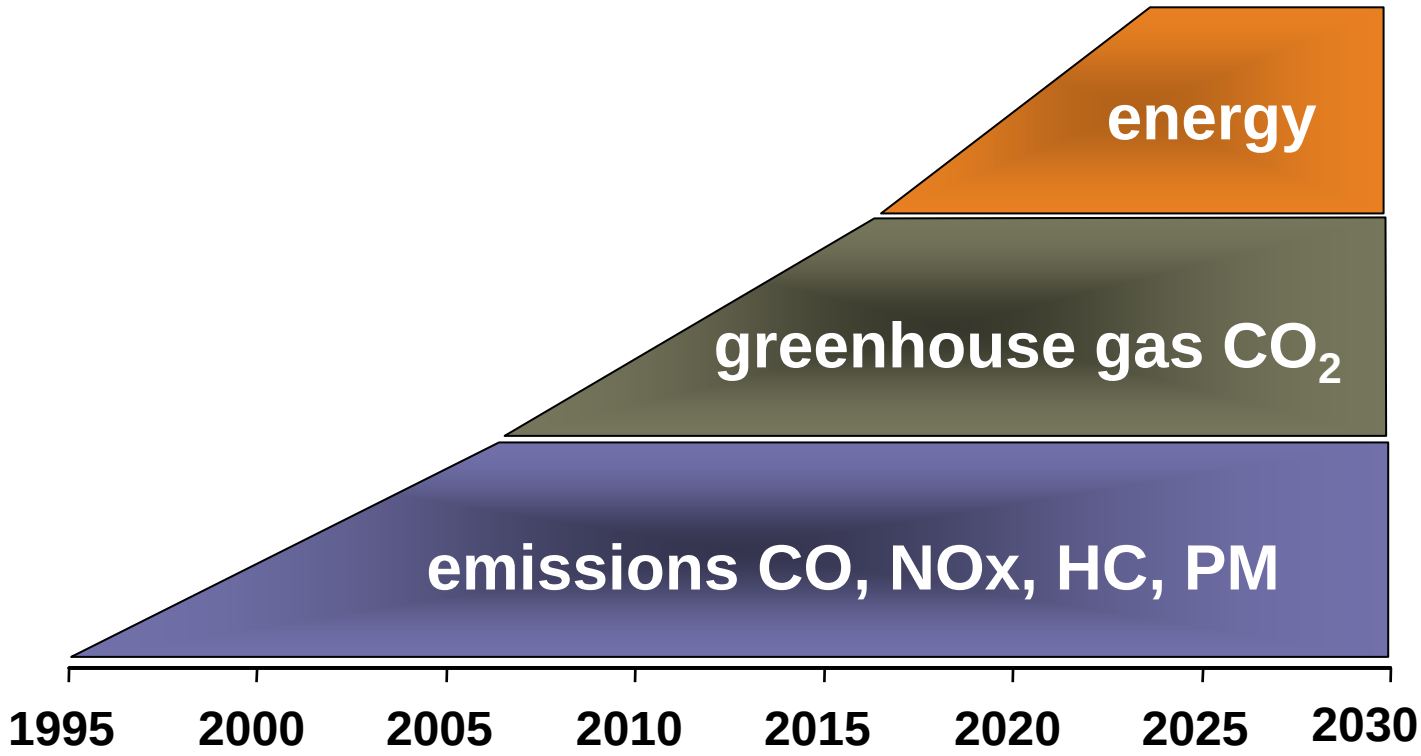
Synthetic Fuels for Sustainable Mobility

Henning Nannen

FAV Clean Energy Forum, Berlin 13.10.2005

General Conditions

Change of the Priority of Environmental Research



Hydrogen

if produced from renewables

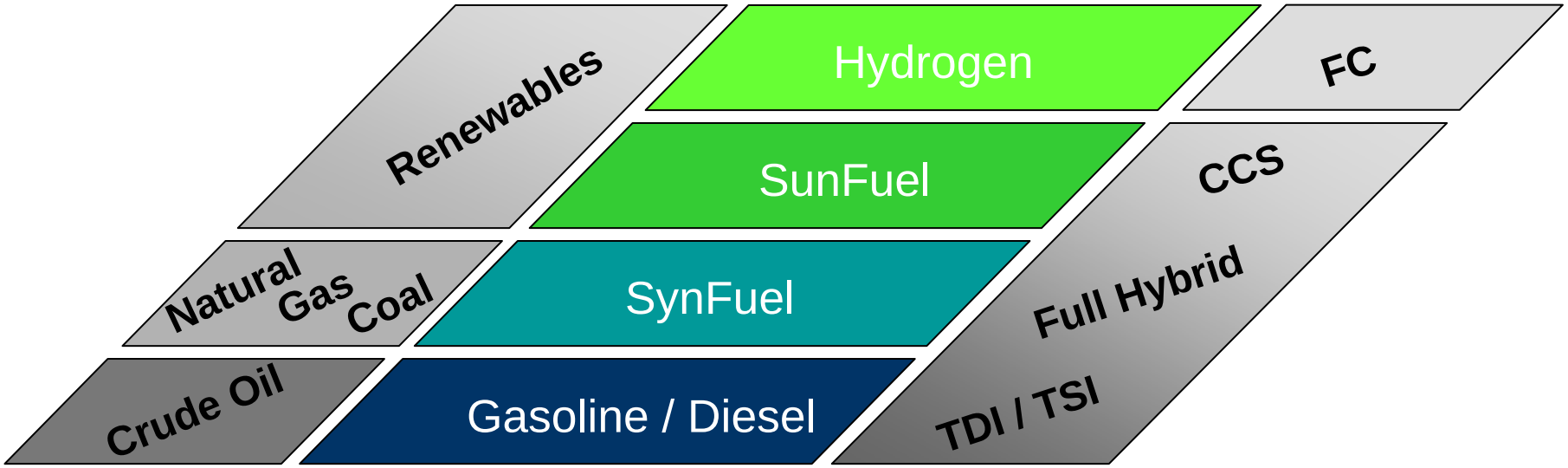
⊕
- sustainable
- significant CO_2 reduction potential
- infinite energy sources

main drawbacks

⊖
- on board storage
- infrastructure
- economical and ecological production

⇒ **long-term solution (>2020)**

Fuel- and Powertrain Strategy
Evolution instead of Revolution

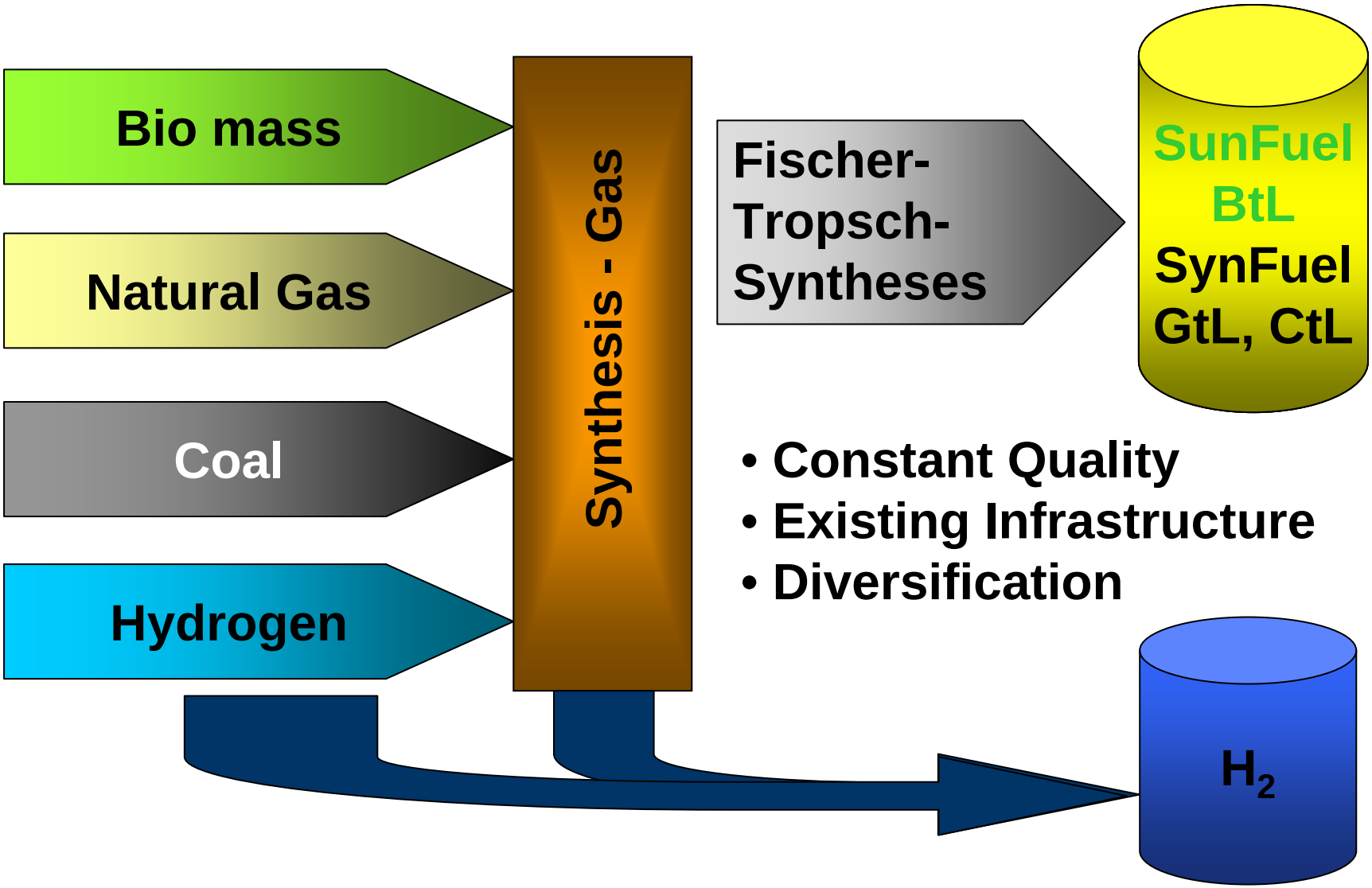


Objectives:

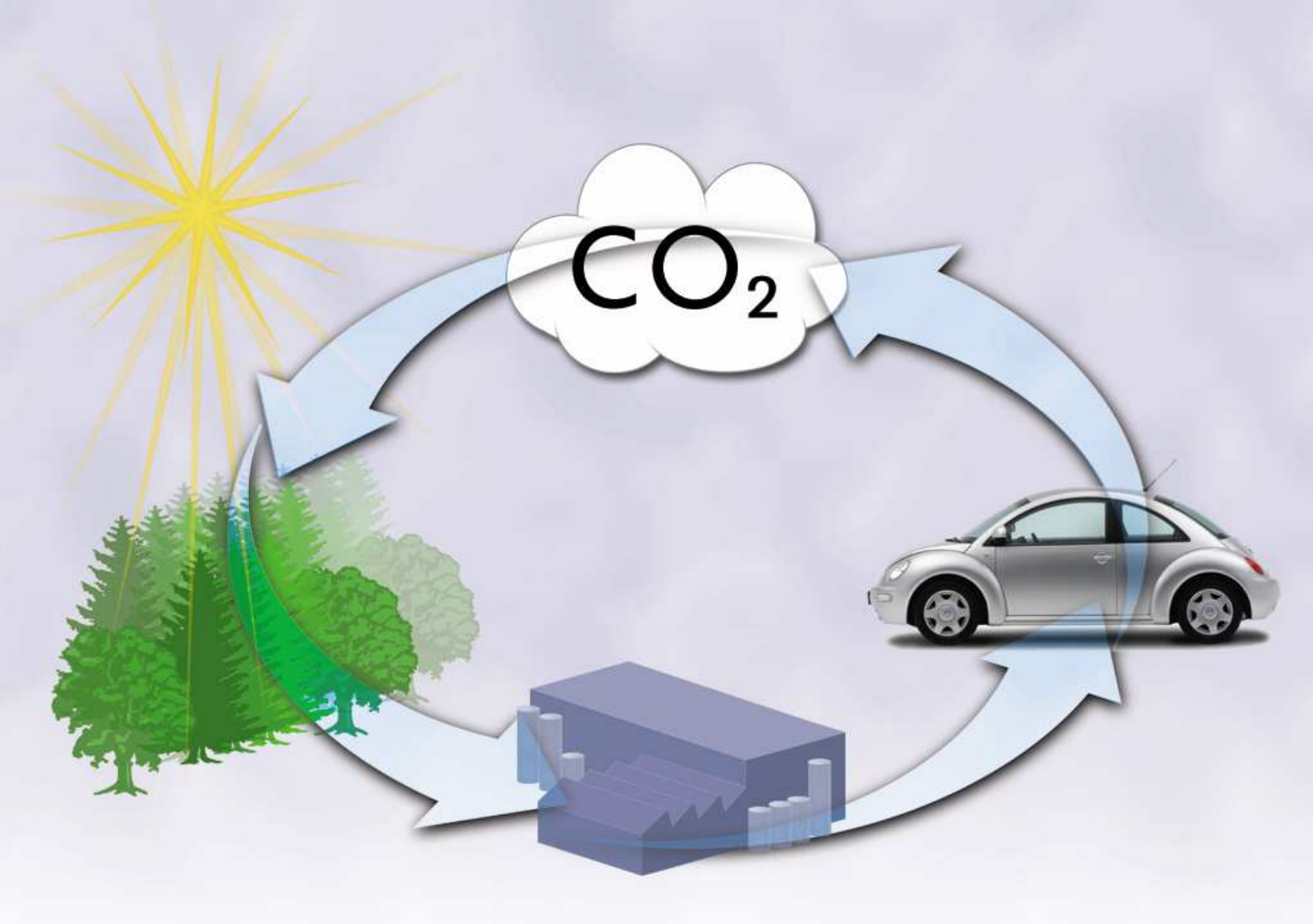
- **Sustainability**
- **Diversification of Energy Sources**
- **Use of Existing Infrastructure**

SynFuel
Diversification of the Energy Sources

Dr. Drescher / IFP Paris / 15.09.05



Fuel- and Powertrain Strategy
CO_2 Cycle of SunFuel



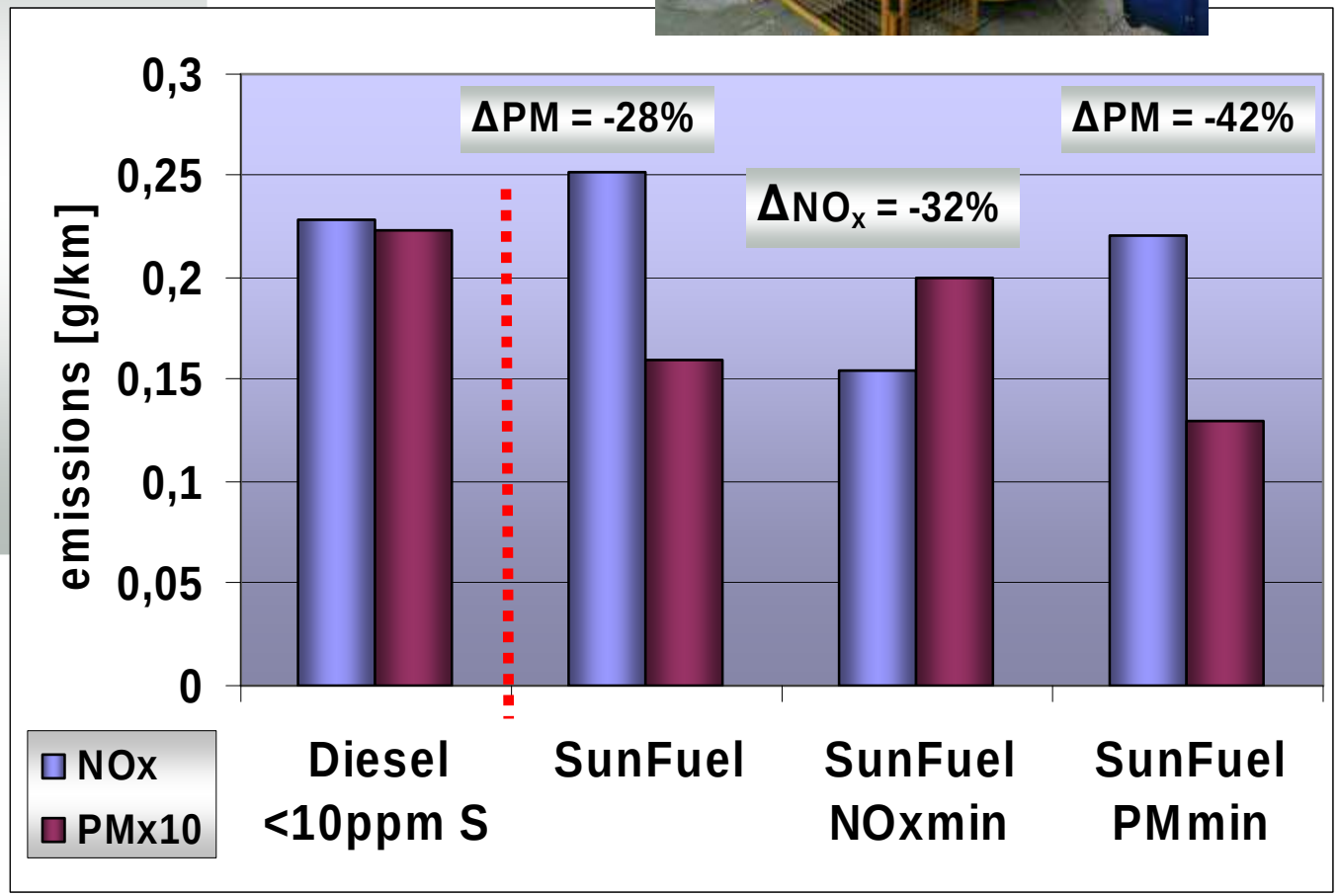
SunFuel
Emission Results with BtL

Golf V, 2.0 TDI 4V 103kW, MVEG / NEFZ

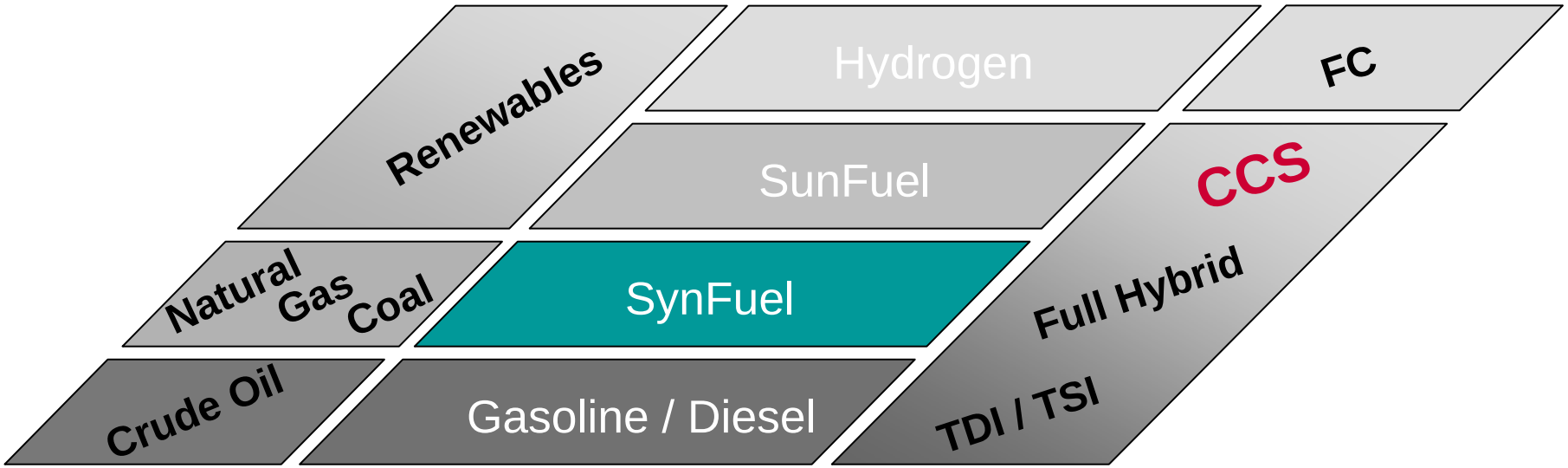
2 measurements:

- **Diesel application**

+ **2 applicationen**
- **minimum NO_x**
- **minimum particle**



Fuel- and Powertrain Strategy
Evolution instead of Revolution



Objectives:

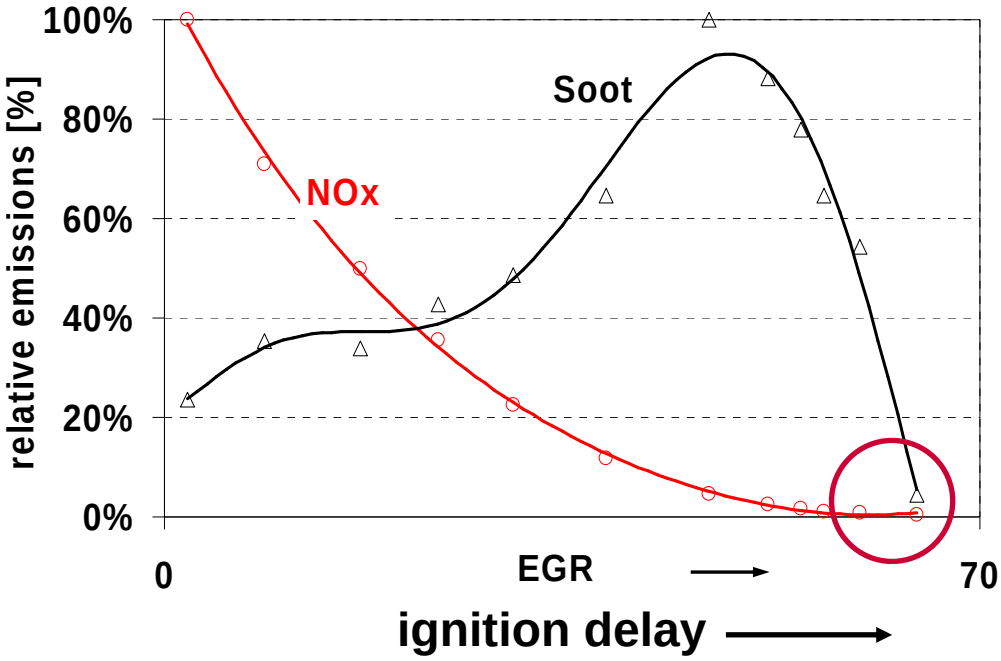
- **Sustainability**
- **Diversification of Energy Sources**
- **Use of Existing Infrastructure**

CCS: Combined Combustion System
(Partial-) Homogeneous Combustion

Objective:
emission reduction through
(partial-) homogeneous combustion

Promote Homogeneous Mixture:
⇒ retard self ignition
⇒ increase ignition delay

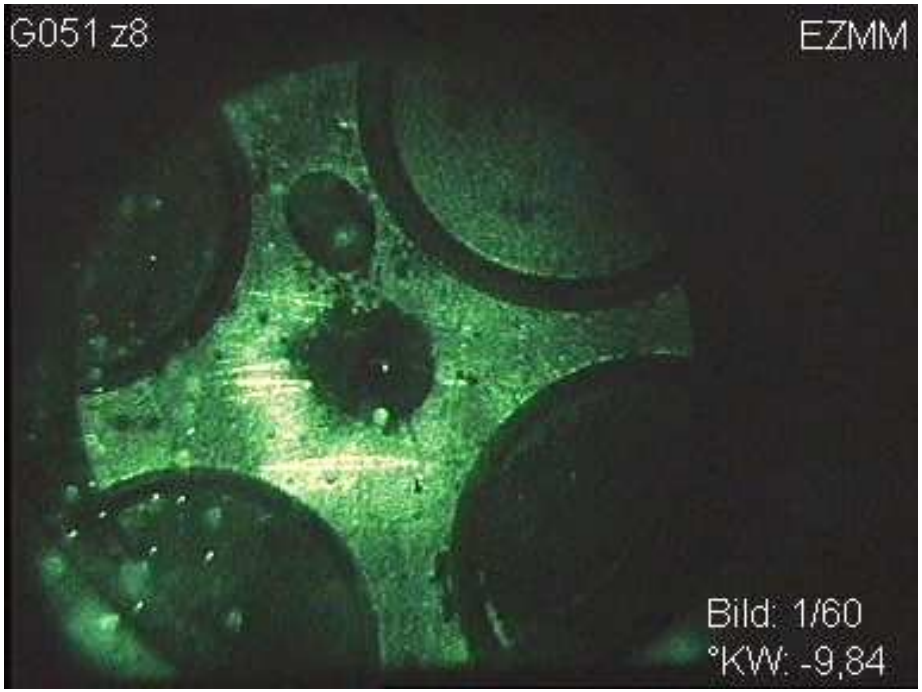
Start of Ignition definite by:
- ~~spark / injection timing~~
- charge (temperature, pressure, EGR)
- fuel air mixture
- fuel



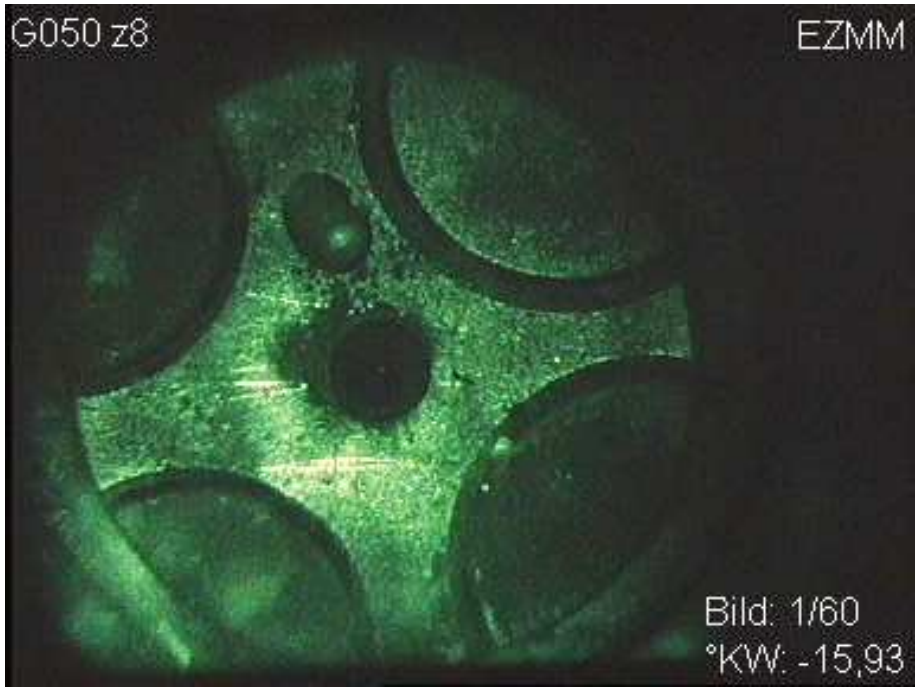
Need of high and constant quality fuels: GtL with kerosene like boiling range

CCS: Combined Combustion System
Diesel fuel

„Heterogeneous“ Combustion



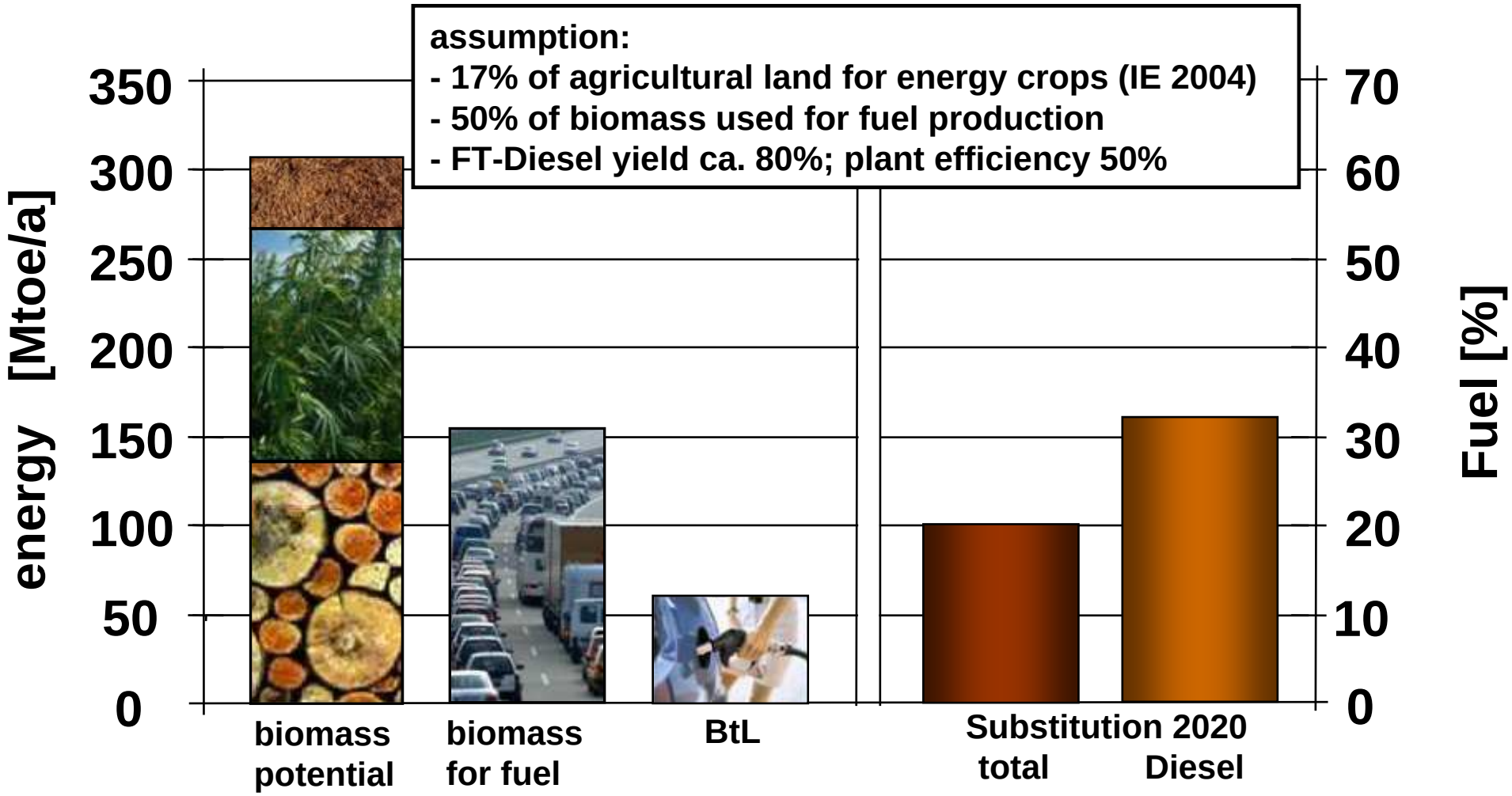
„Partial homogeneous“ Combustion



Fuel Specification: CCS-fuel

Unit		Diesel EN 590	CCS - Fuel	Motivation
IBP	℃	*≈ 180*	> 150	Evaporation
FBP	℃	360	< 220	Evaporation, Ignition Delay
Cetan - Number	-	> 52	45	Ignition Delay
Vol. Energy Content	MJ/l	*35 - 36*	33 - 34	Compatibility
Sulfur	mg/kg	< 10	< 10	Particles, Poisoning
Aromatics	Vol %	*≈ 20%*	< 2	Particles, NOx
Poly. Aromatics	Mass %	< 11	< 0,5	Particles, NOx

BtL Substitution Potential
EU 30 in 2020



Quelle: IE/LBST/VW

Fuel- and Powertrain Strategy
Summary: Evolution instead of Revolution

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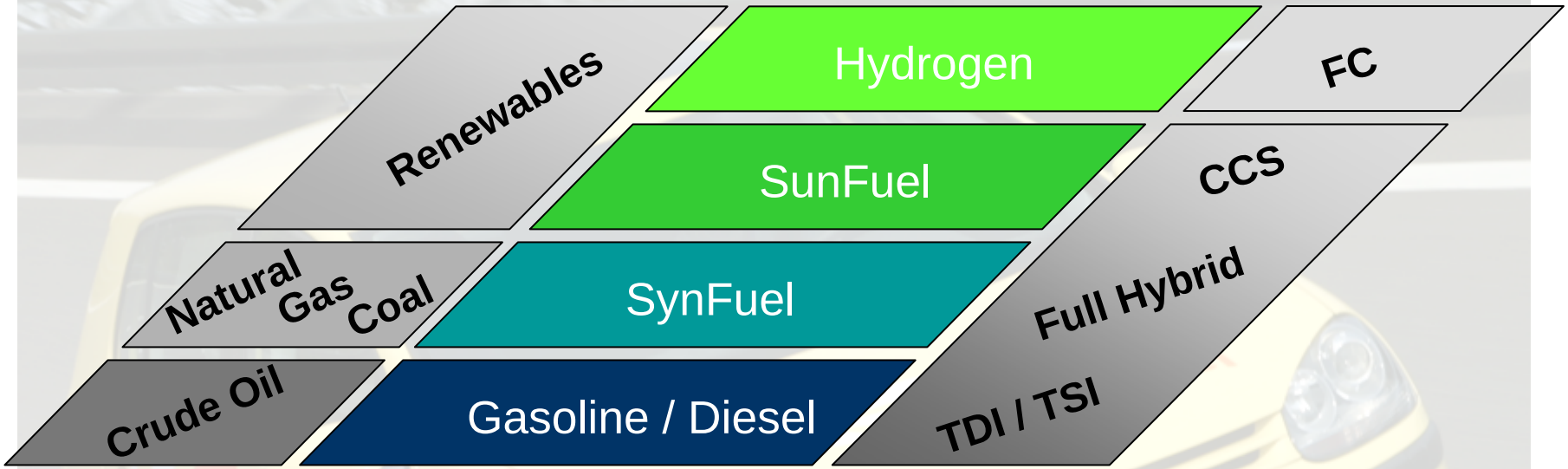

- **Sustainability**
  - **Significant Greenhouse Gas Reduction**
  - **Potential for New Engine Generation (CCS / HCCI)**
- **Diversification of Energy Sources**
  - **more Independence from Crude Oil**
- **Use of Existing Infrastructure**
  - **Combine Economy and Ecology**

www.sunfuel.de