A3PS

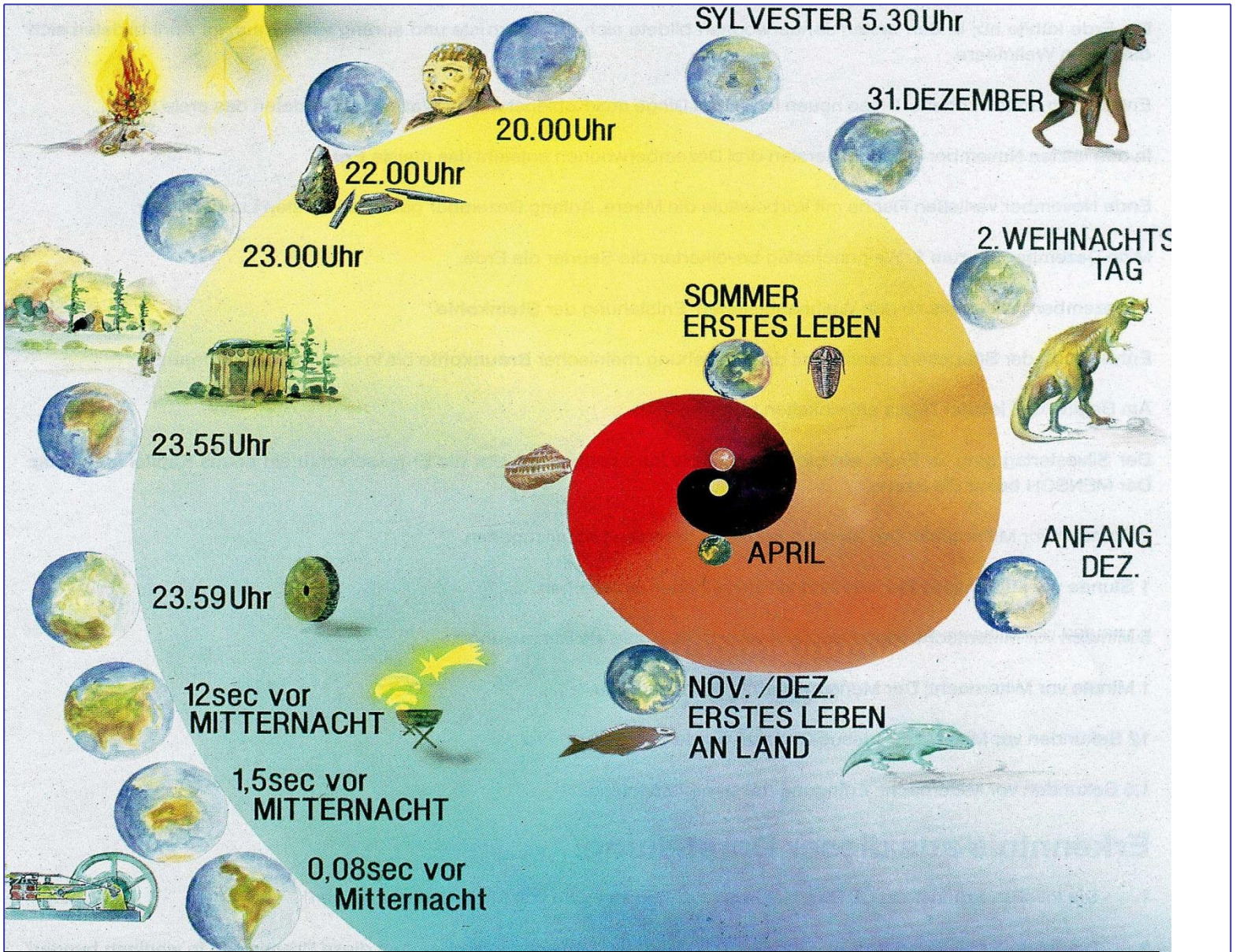
Wien, November, 9th 2015

DWV
Deutscher Wasserstoff- und Brennstoffzellen-Verband

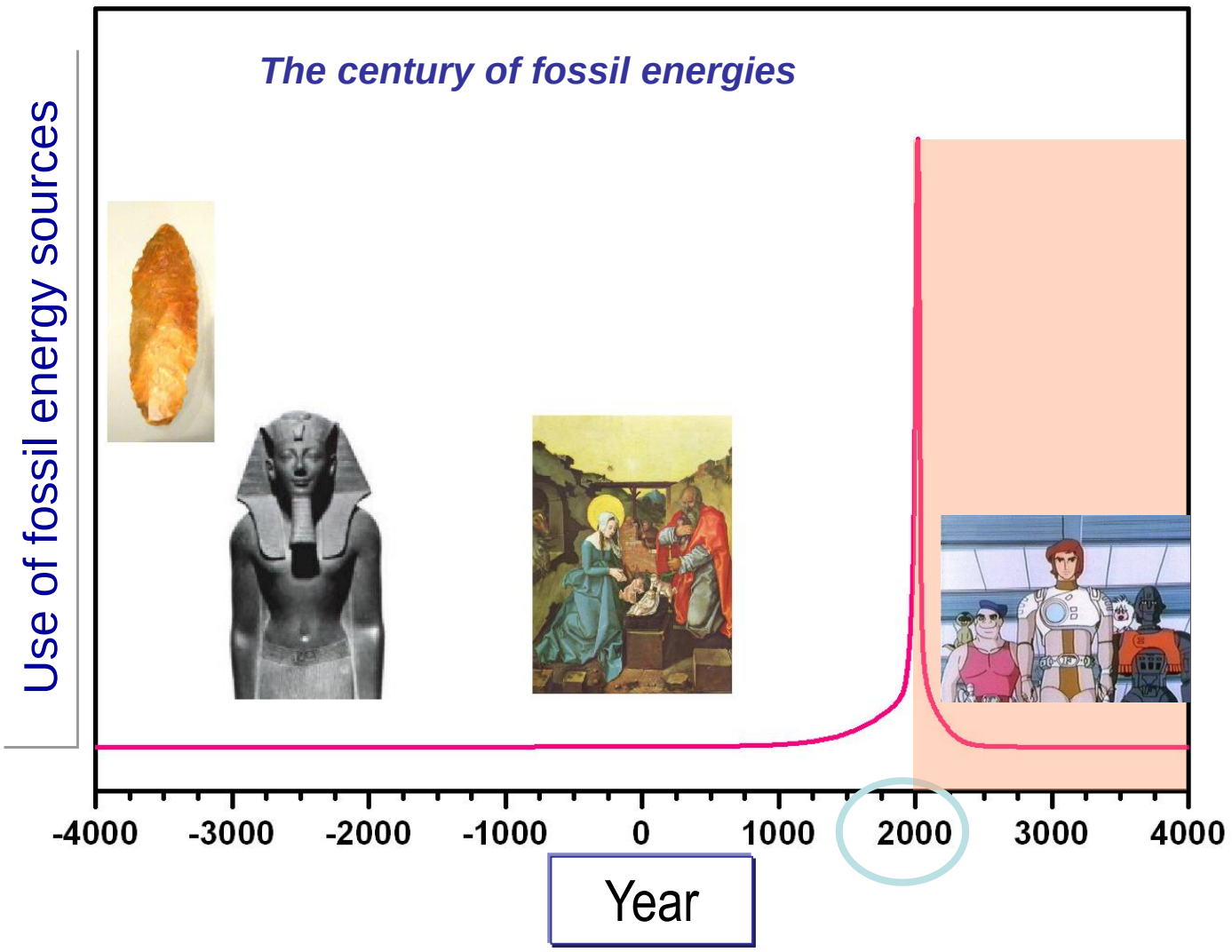
A3PS Conference 2015

„Hydrogen and Fuel Cell Technologies – Elements of a sustainable Energy Economy“

Dr. Johannes Töpler
German Hydrogen- and Fuel-Cell-Association, (DWV)

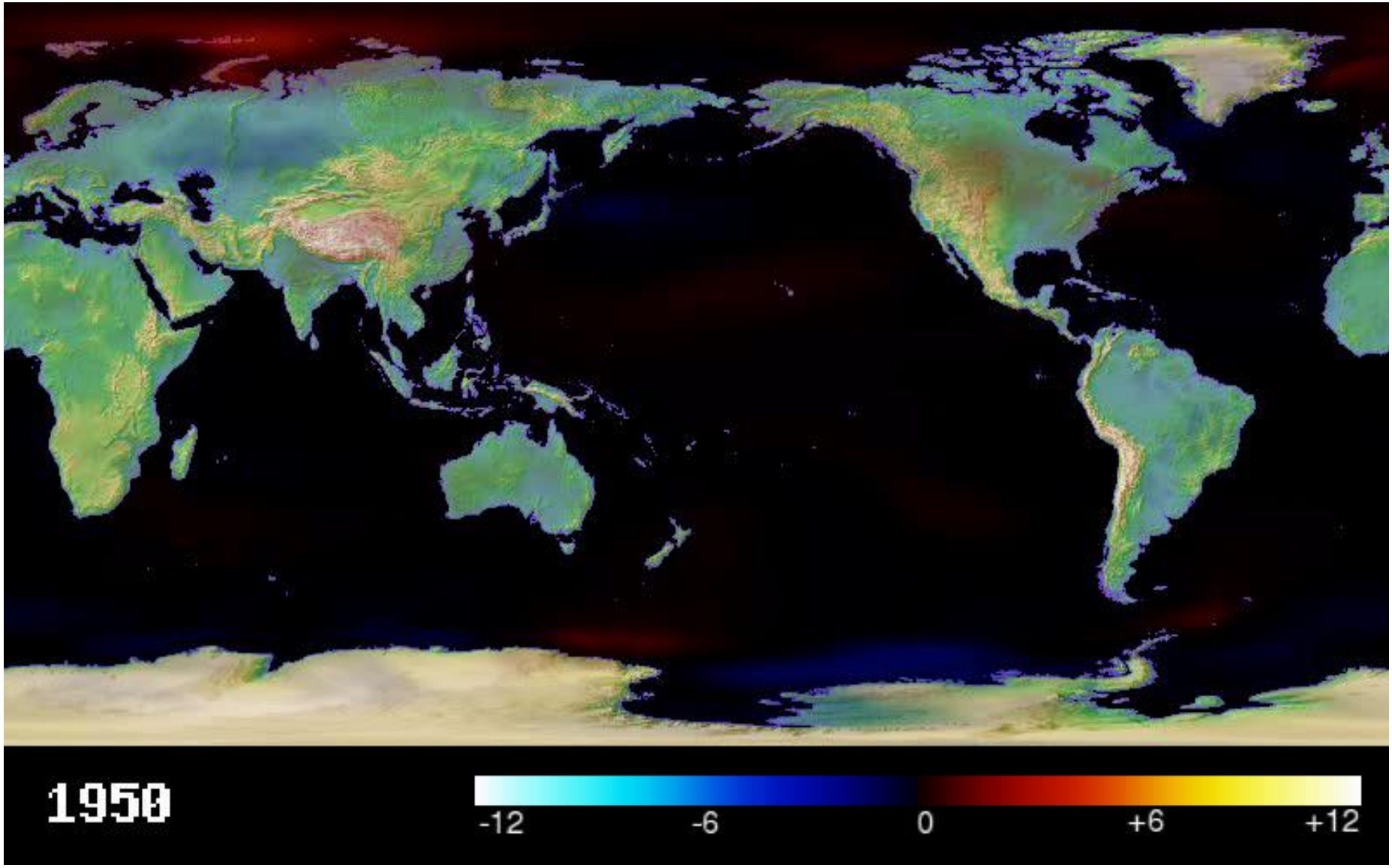

SYLVESTER 5.30 Uhr
31. DEZEMBER
20.00 Uhr
22.00 Uhr
23.00 Uhr
2. WEIHNACHTS TAG
SOMMER
ERSTES LEBEN
23.55 Uhr
APRIL
ANFANG DEZ.
23.59 Uhr
12sec vor MITTERNACHT
NOV. /DEZ.
ERSTES LEBEN
AN LAND
1,5sec vor MITTERNACHT
0,08sec vor Mitternacht

Climate change and energy



Source: Fichtner, KIT

Climate change



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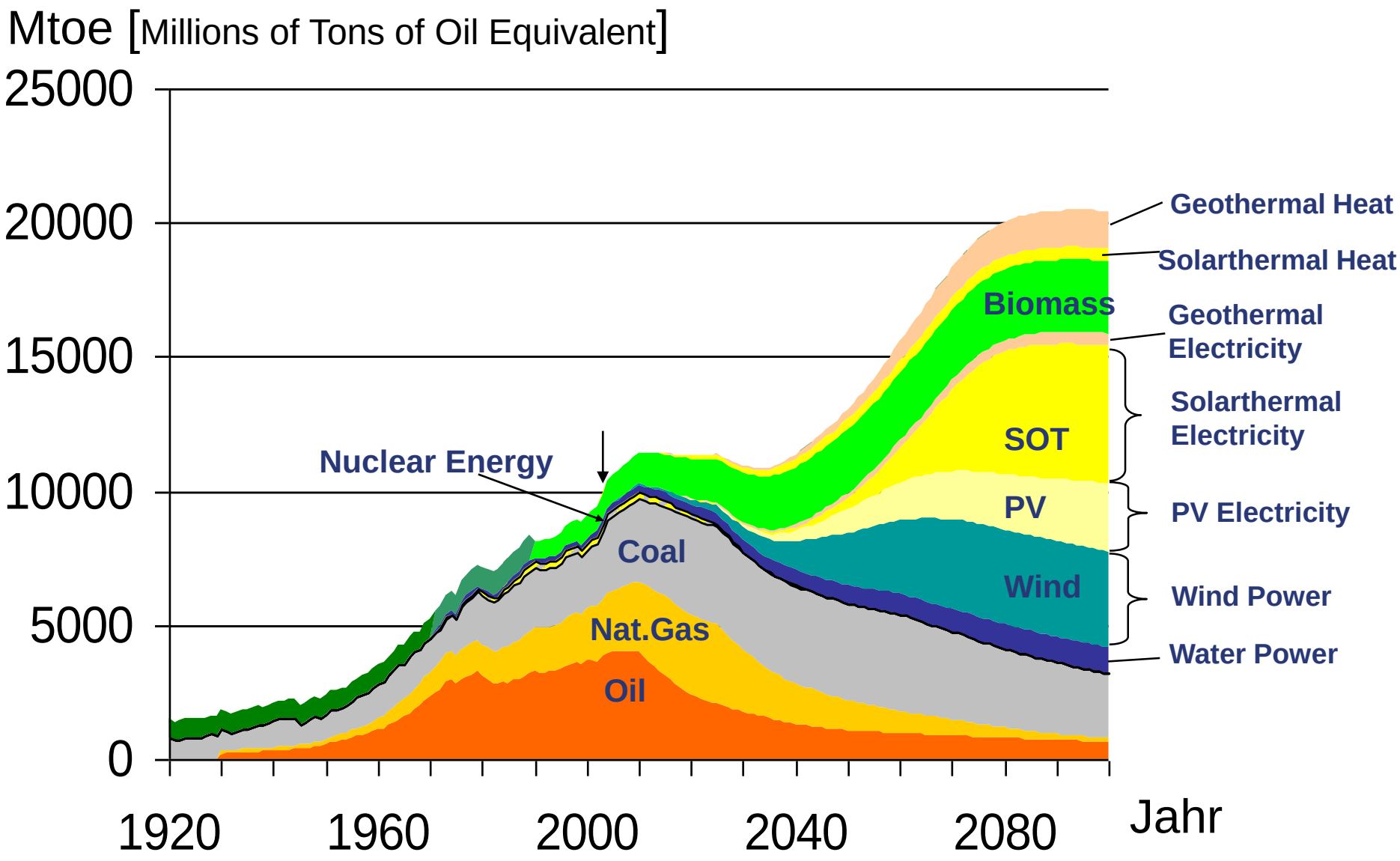
„ We should leave the oil, <u>before</u> it will leave us“

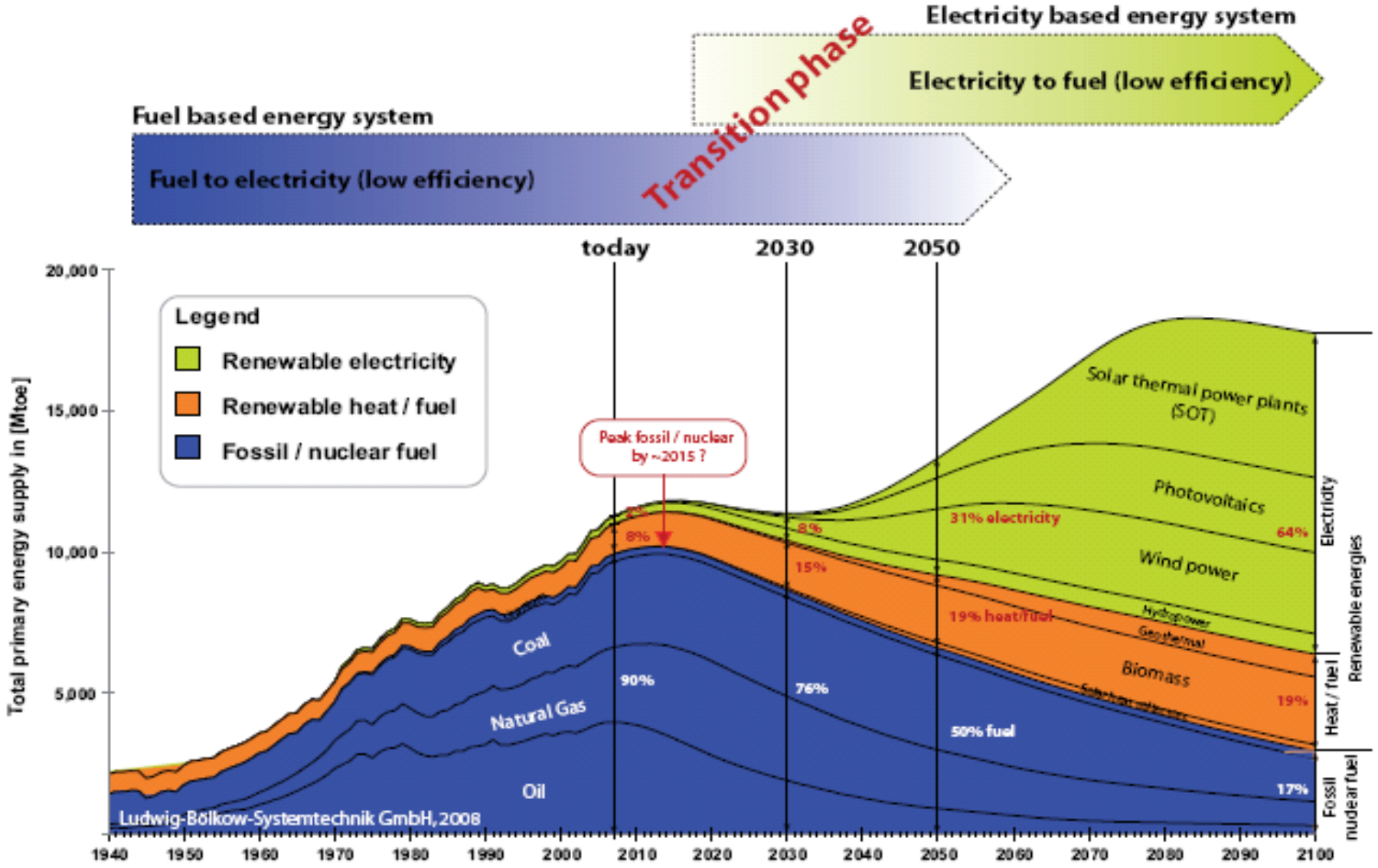
(Fatih Birol, Chief-Economist of International Energie-Agency, IEA, 8.April 2008)

A possible Scenario of World Energy



Quelle: LBST Alternative World Energy Outlook 2005

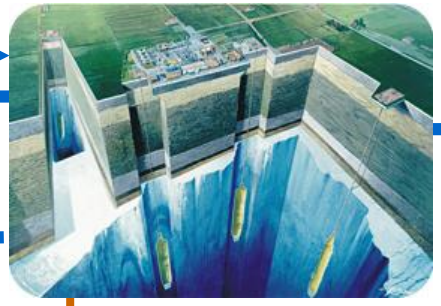
Future primary energy supply



Hydrogen as secondary energy carrier

Electricity Hydrogen

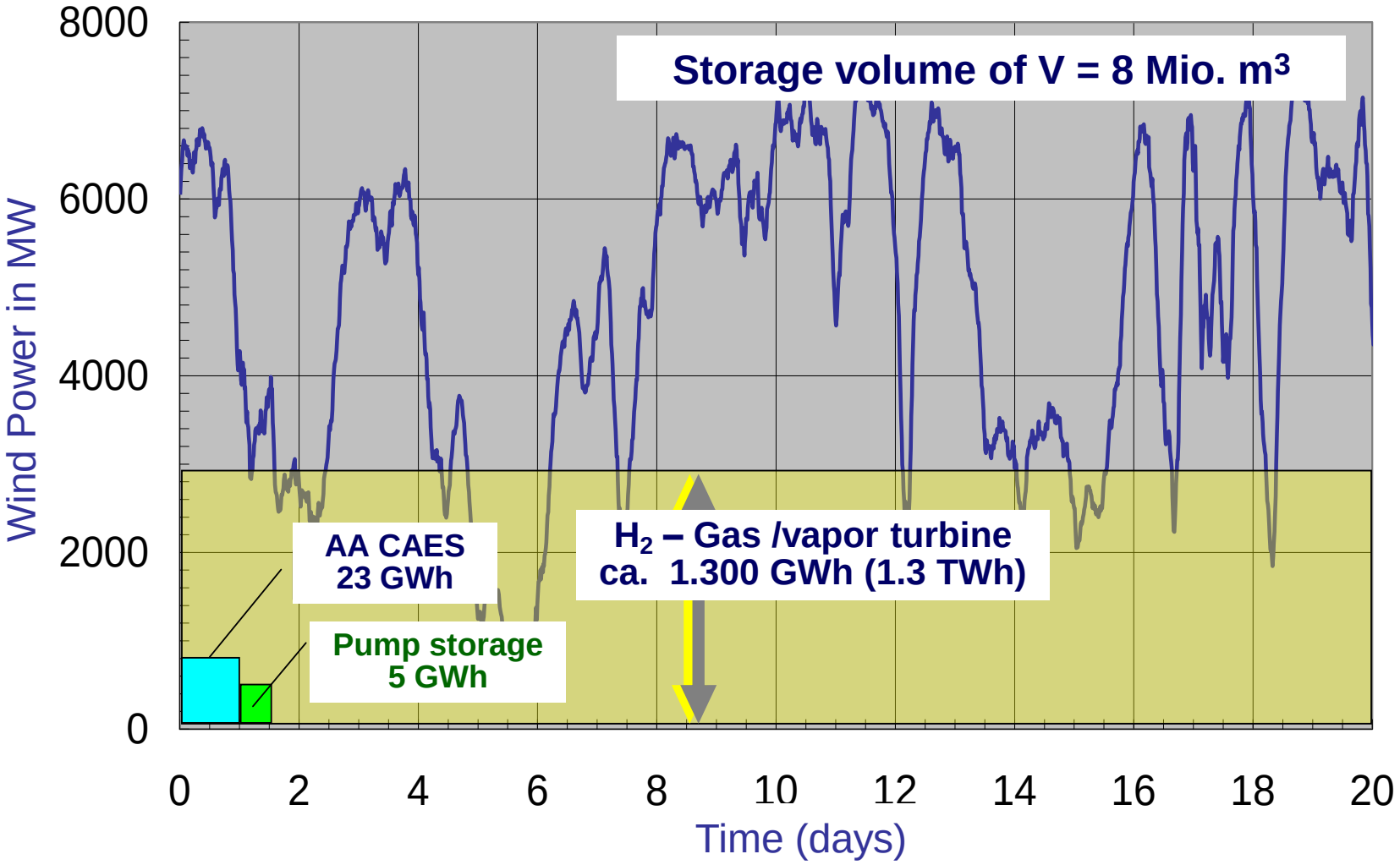
or:



Or: Methanisation
(Sabatier-process)

Comparison of netto-storage capacities

Source: KBB UT

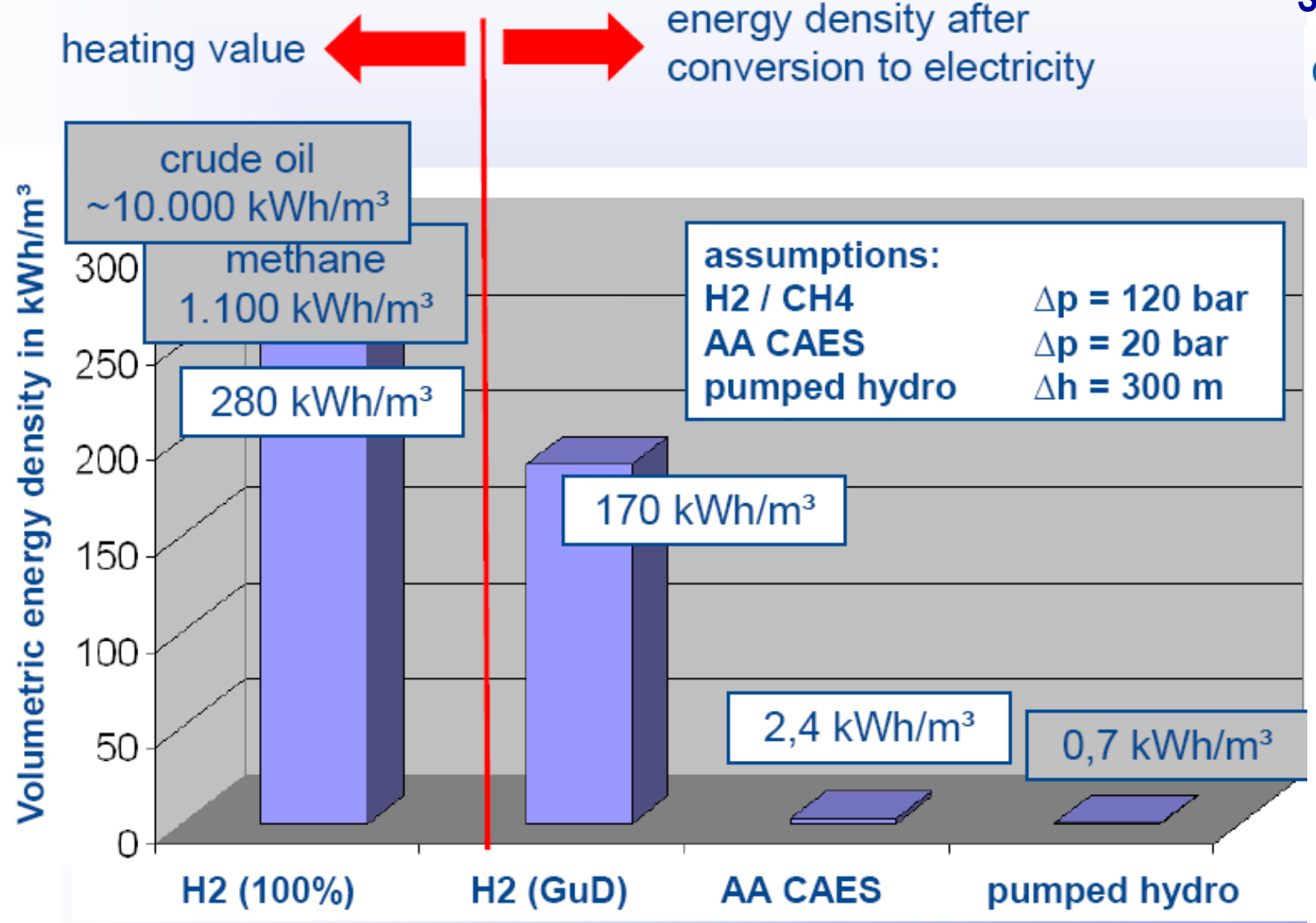


8 Mio. m³ correspond to the biggest German natural gas caverne field

For comparison: Pump storage Goldisthal has a Volume of 12 Mio. m³

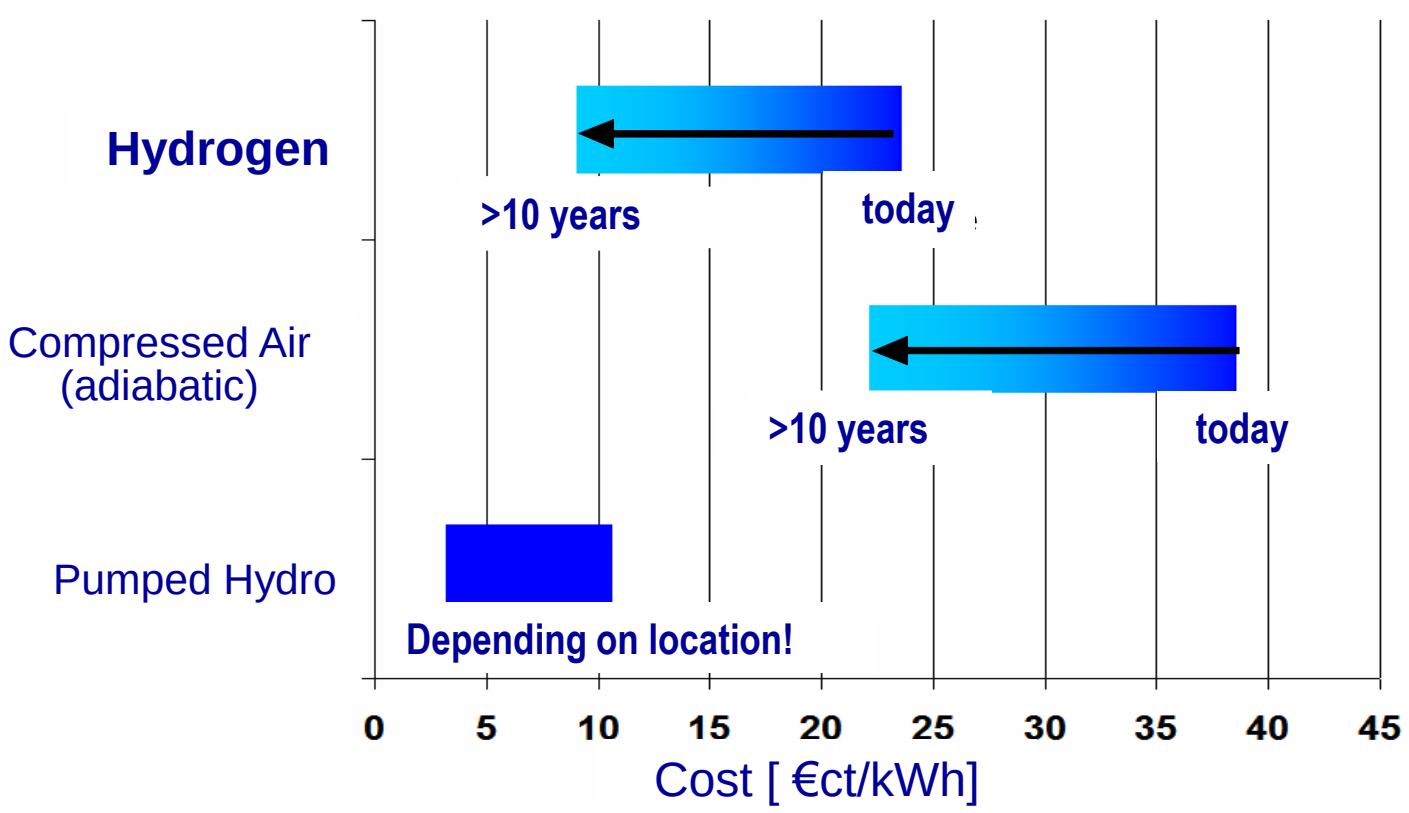
Comparison of volumetric energy density

Source:



Storage costs for „Storage by weeks“

500 MW for 200 hours (100 GWh), 2 cycles per month



Only costs for storage; the costs for purchase of energy are to be added..

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Consequence:

- Renewable energies need storage-systems for basic power supply
- Large quantities of energy can be stored only by means of chemical energy
- Hydrogen makes renewable primary energies ready for basic power supply

Fuel Cell vehicle Mercedes-Benz B-Class

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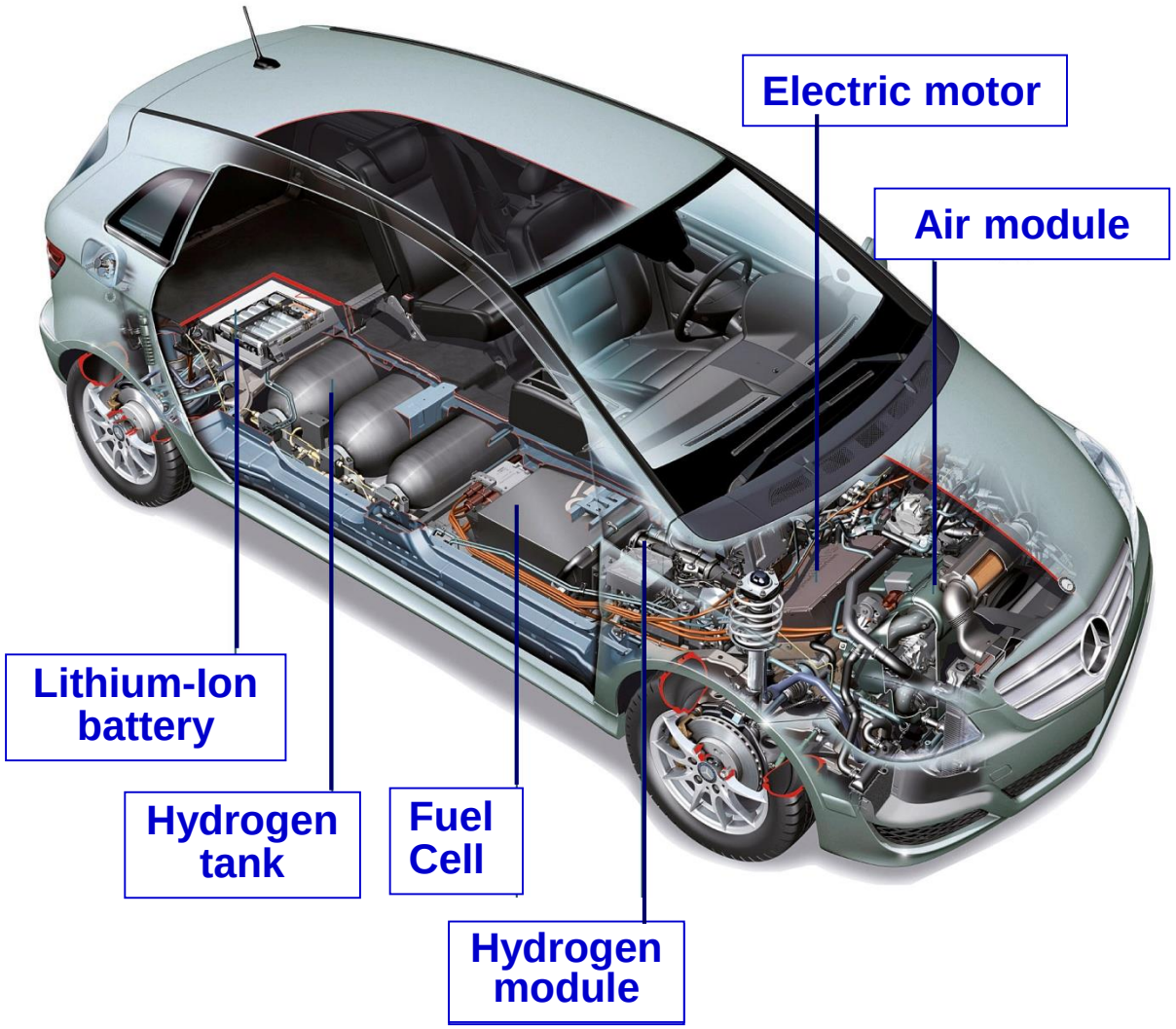
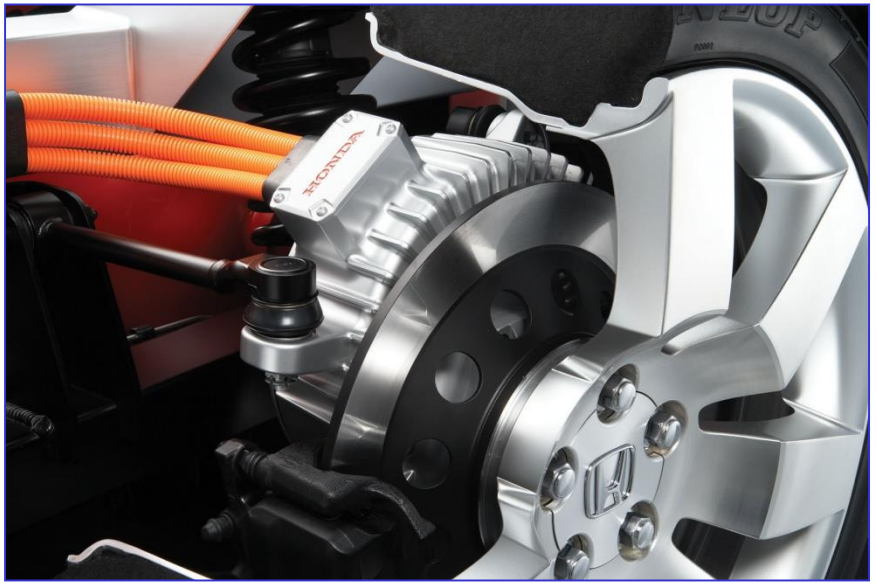


Essential Facts

1) Vehicle is constructed, fabricated and approved under serial condititions.
2) It was tested by a turn of 125 days around the world with 30.000km

Start of serial production of Fuel-Cell cars at Daimler in 2017

Concept of Honda



TOYOTA „Mirai“

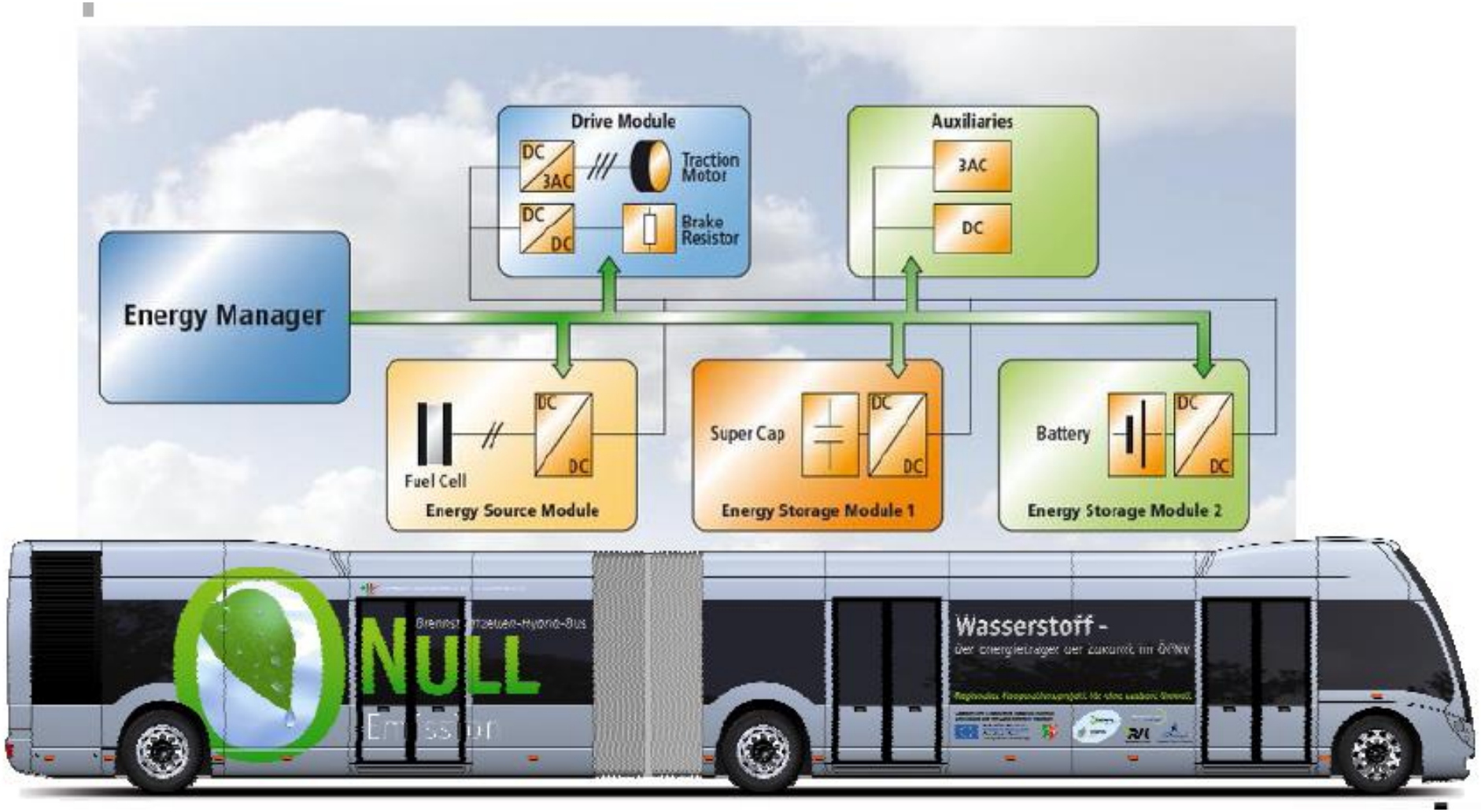
Deutscher Wasserstoff- und Brennstoffzellen-Verband

„Phileas-Bus“ in Cologne in daily use in public trafic

Source: HyCologne -Wasserstoff Region Rheinland

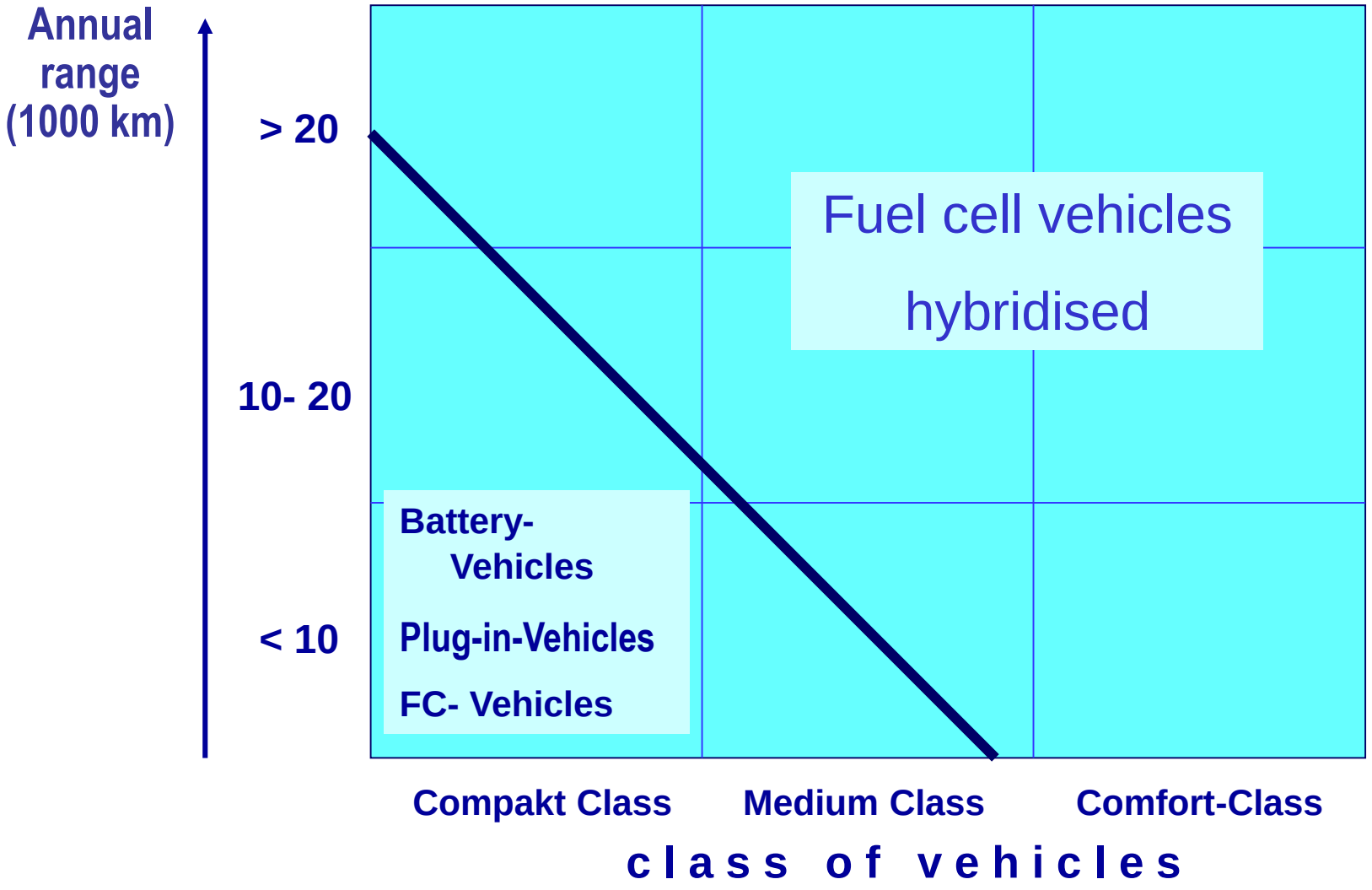
H2-Bus NRW - Innovative Fuel Cell Hybrid Buses

Hybrid fuel cell electric drive technology concept



Source: Vossloh

Market segments for battery- and fuel cell vehicles



J. Töpler

Original-Source: Coalition Study

Comparison of system cost battery-electric vehicle / FC-vehicle

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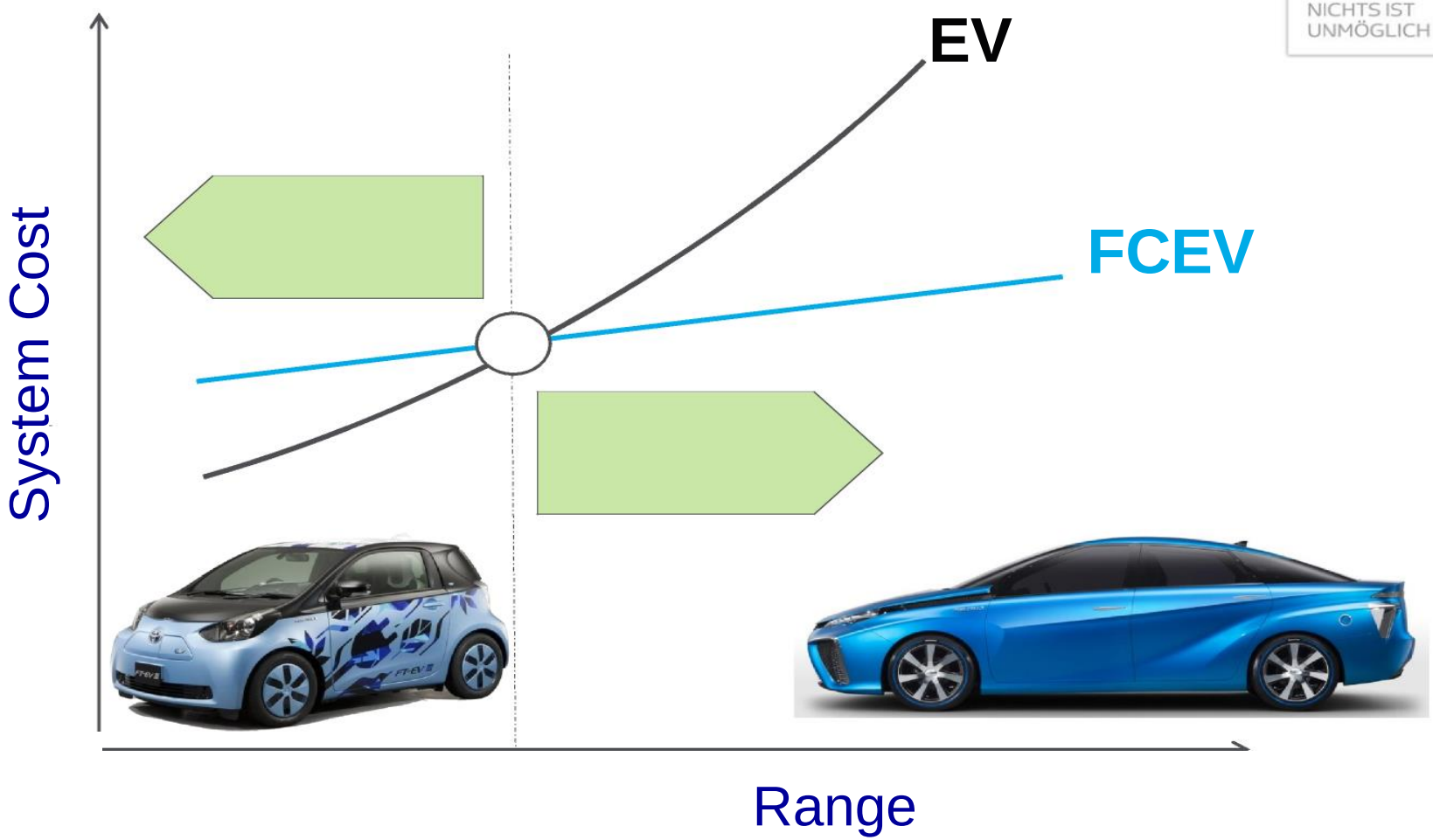
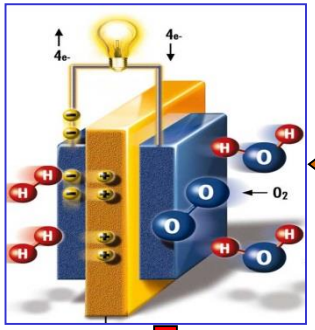
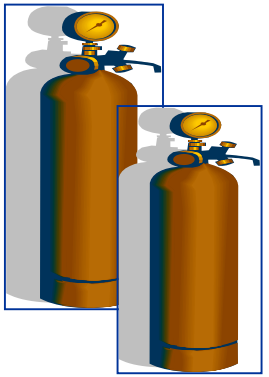
TOYOTA

NICHTS IST UNMÖGLICH

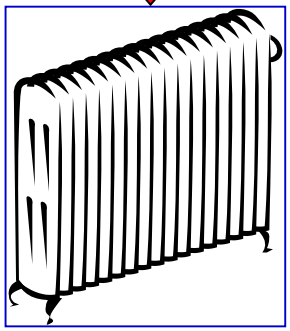


Powertrain of a H_2/FC-hybrid-vehicle





Electricity-Management



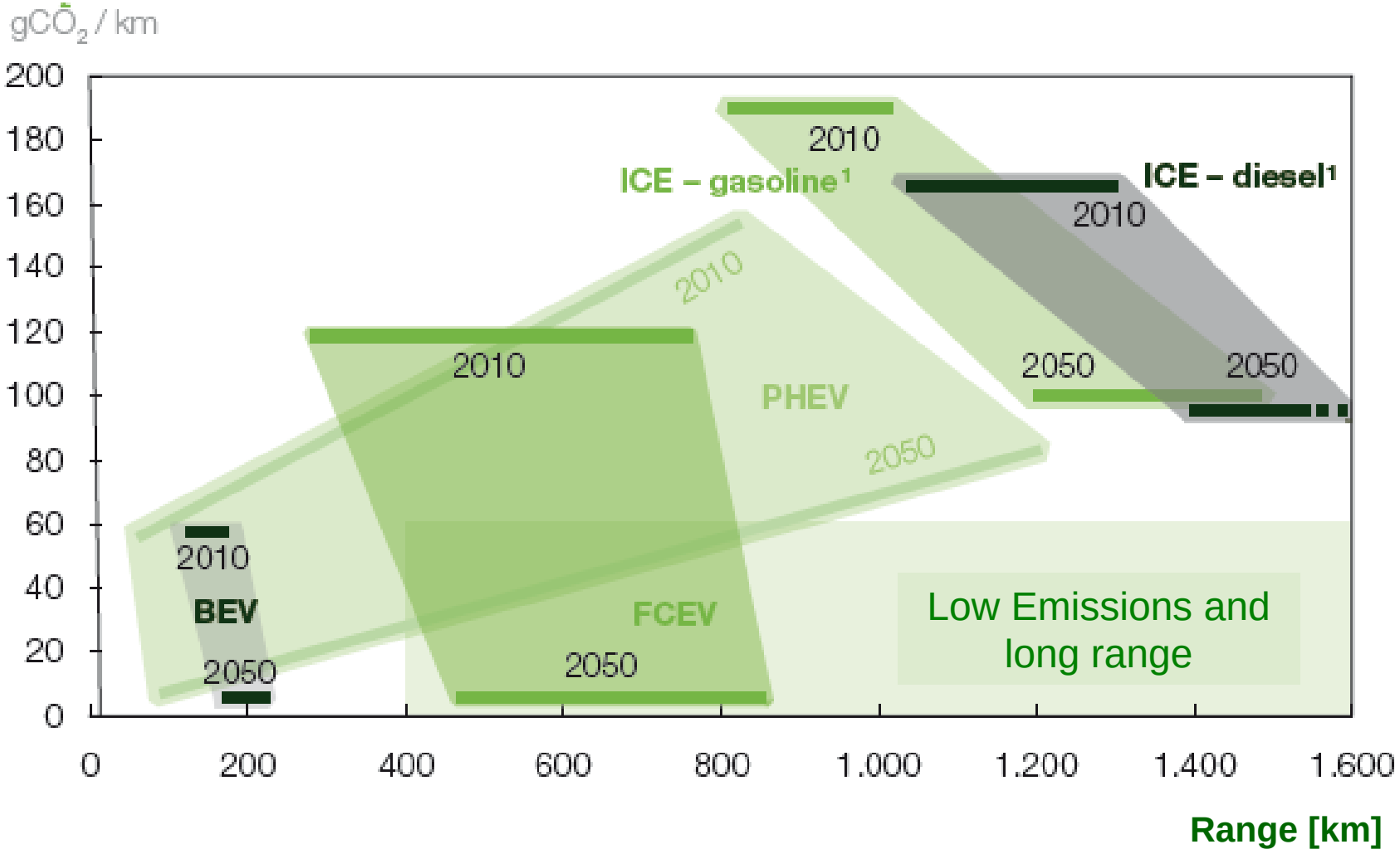
Hydrogen

Electricity

Heat

Comparison of CO_2-Emissions and Ranges of Advanced Propulsion Systems

CO_2-Emissions



Source: Coalition Study

Consequence:

Hydrogen

- introduces renewable energies into mobility,

- enables electric vehicles to reach long distances

- and makes mobility CO_2-free.

Hydrogen and fuel cells in materials handling vehicles

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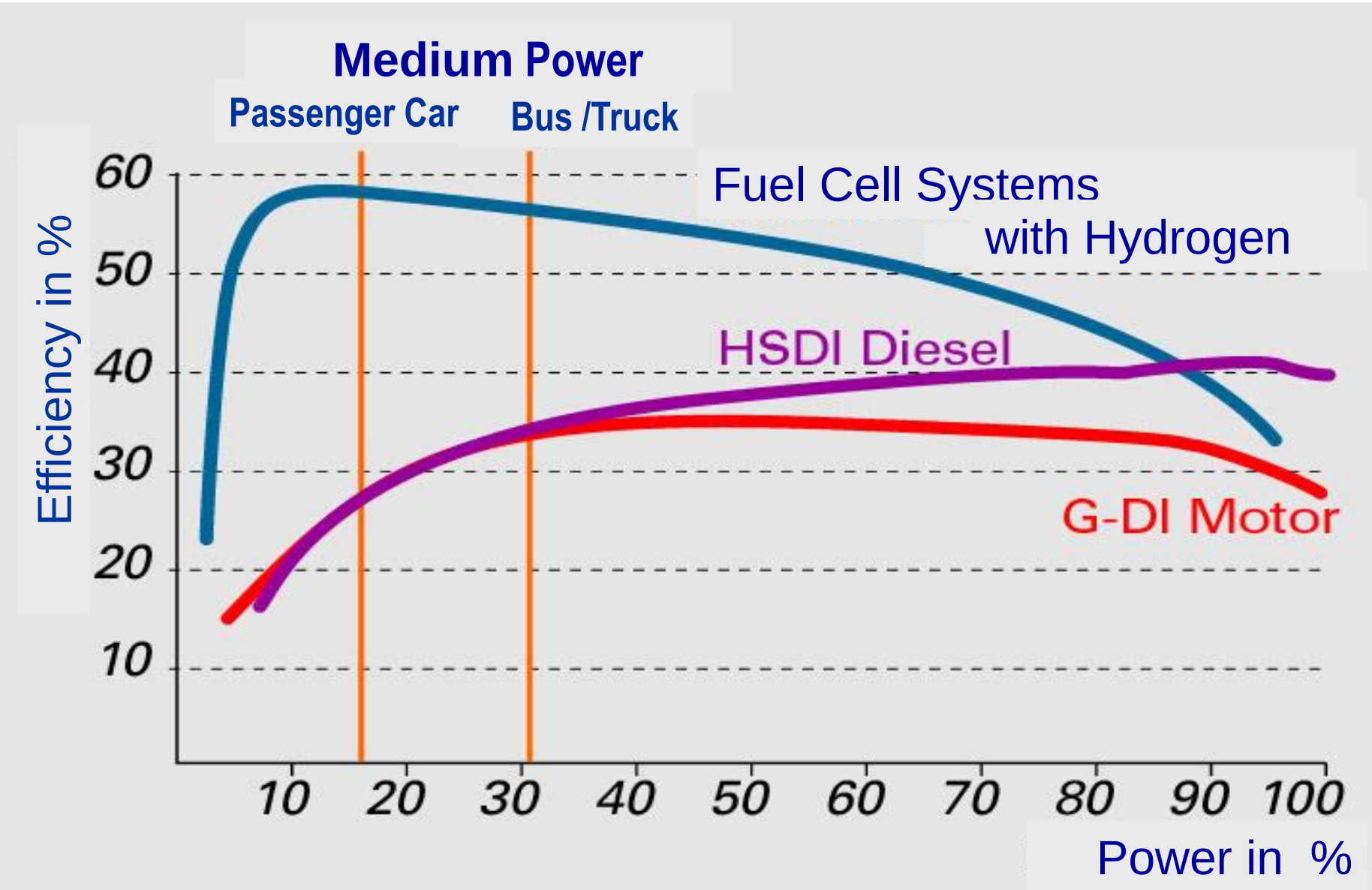
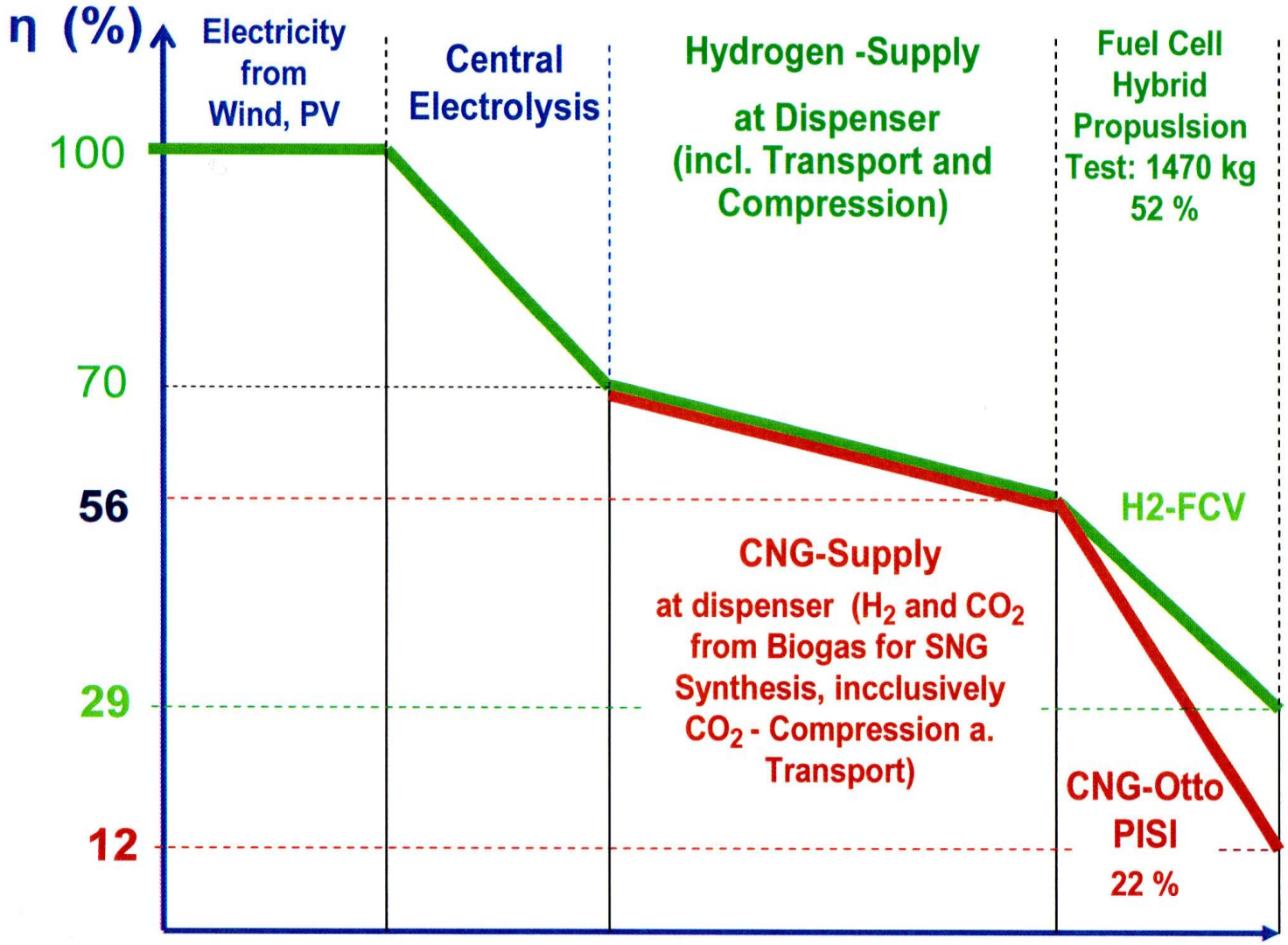
Electric bicycle with H_2/FC-System

Source: Hochschule Rhein-Main

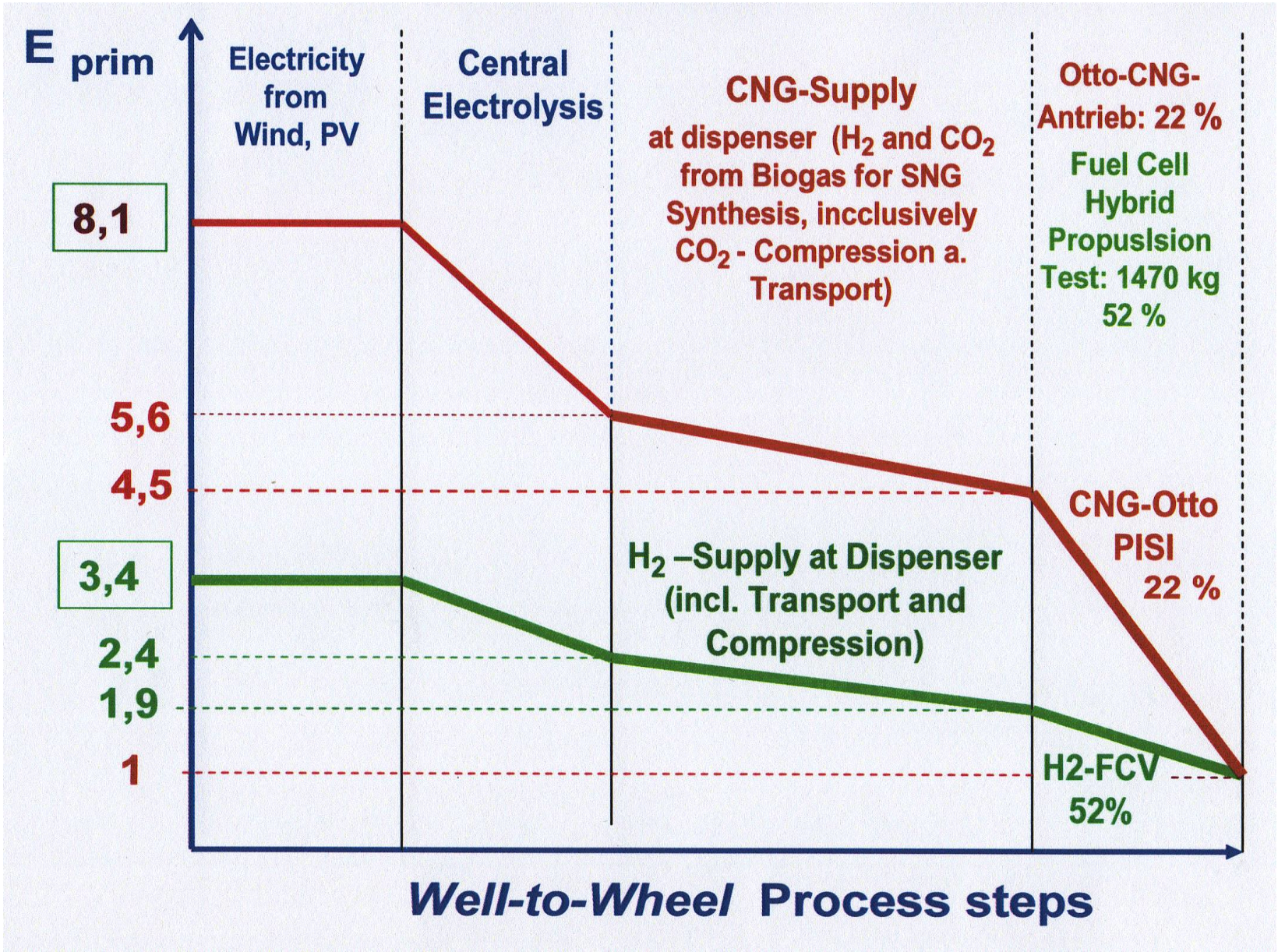
Comparison of Fuel Cell System and Internal Combustion Engine



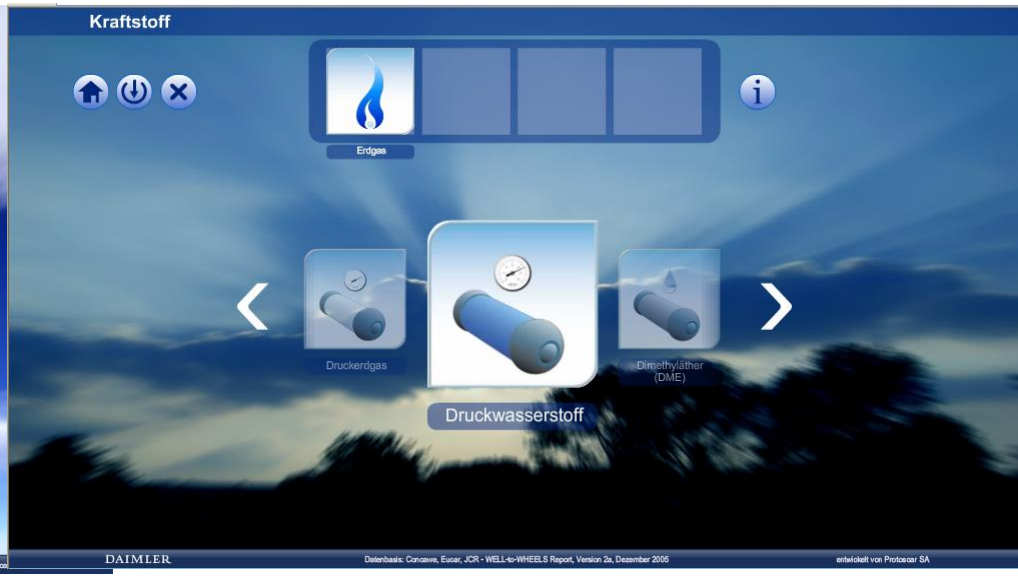
W-t-W with renewable electricity : H_2 or CNG for mobile application of passenger cars in NEDC



W-t-W with renewable electricity : H_2 or CNG for mobile application of passenger cars in NEDC (normalized to 1 for final energy at wheel)



“Optiresource” *(Daimler AG)*



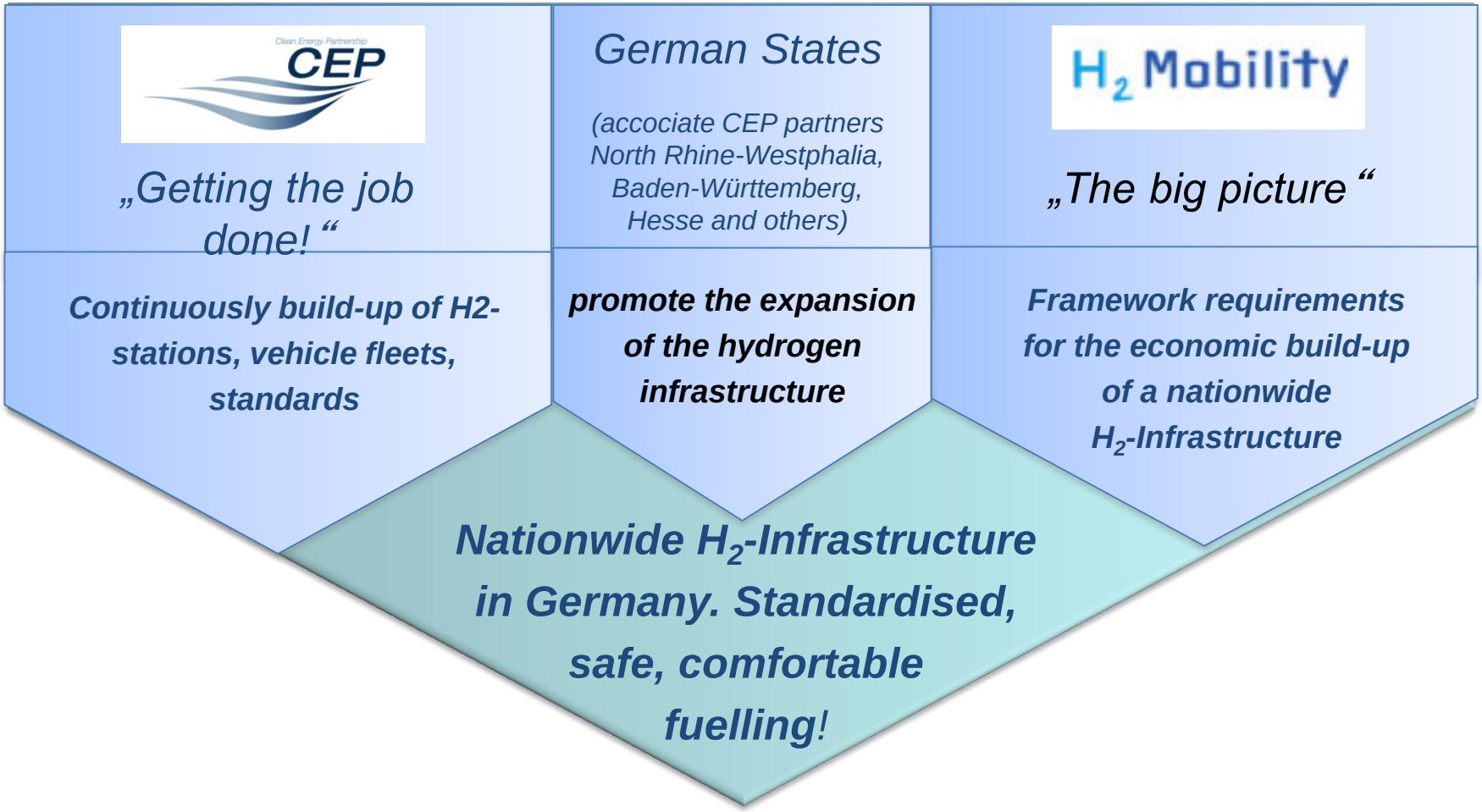
See:

http://www2.daimler.com/sustainability/optiresource/index.html

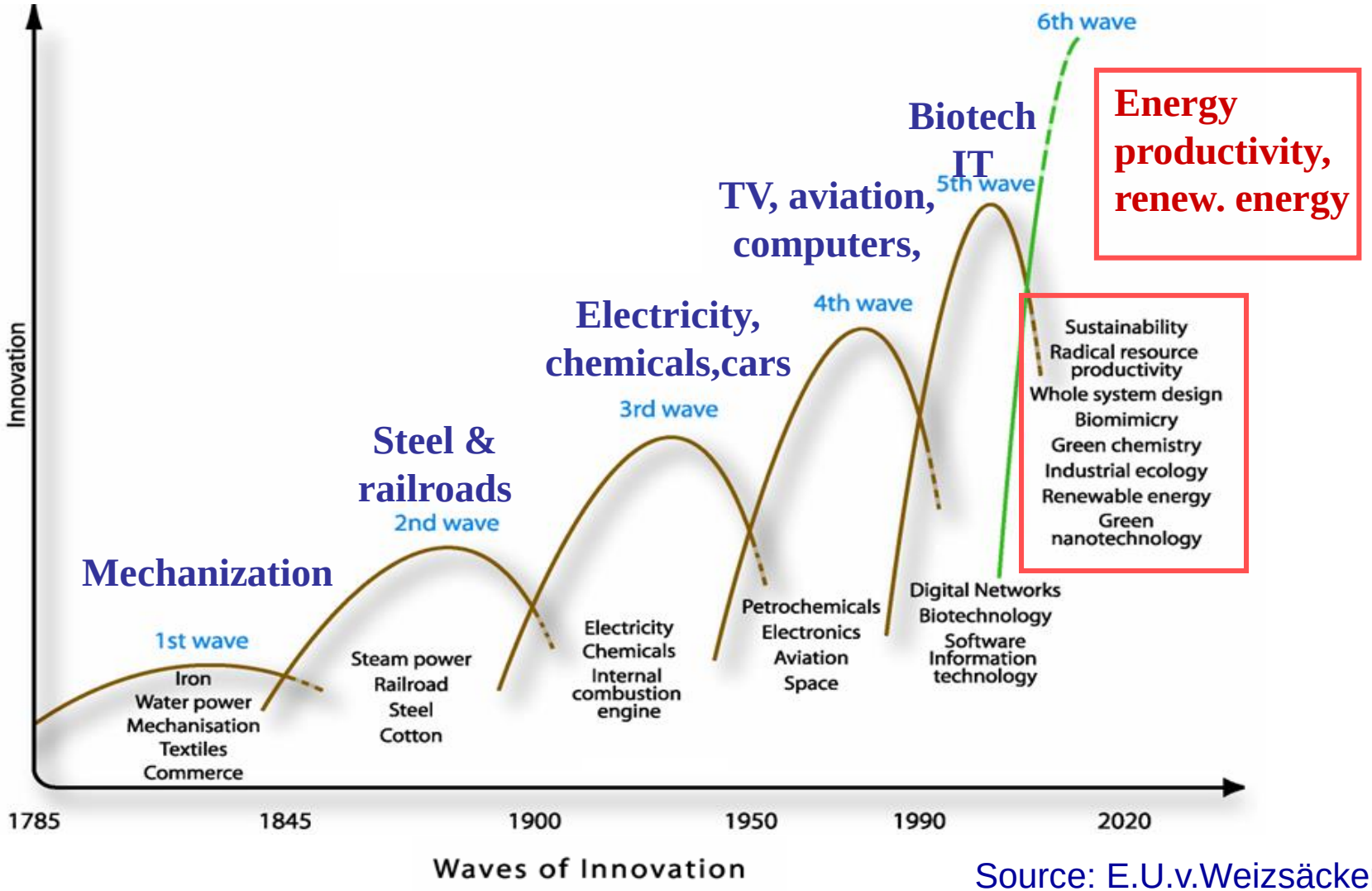
50 hydrogen filling stations for **Germany**

- In June 2012 the German Ministry of Transport and industry partners resolved to expand the netwok of filling stations to **50 stations by 2016**
- Germany will be the world´s first country with a basic supply network
- CEP created the technical preconditions that are now being built on

CEP & H_2 Mobility – Expansion of the filling station network in Germany



The sixth Kondratjew: Energy productivity
(after Charlie Hargroves, Brisbane, Australia)



Energy productivity, renew. energy

Source: E.U.v.Weizsäcker

- *The laws of nature and the laws of mankind (especially those of a completely free economy) are not in harmony.*
- *It is not to be expected, that the laws of nature will adapt to those of mankind.*
- *Mankind can only survive, when it fits in with the laws of nature and does not affect the oecological system as a whole or in any of its parts*
- *The future will be ethic or it will not be!*

Thank you very much for your attention!

And see us occasionally at

www.dwv-info.de!

Which are the questions I can answer at first?

For further details would like to inform you about this book