DaimlerChrysler

The 22nd International Battery, Hybrid and Fuel Cell Electric Vehicle Symposium

Well-to-Wheel Visualization

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Index

Table of Content

- Motivation of an OEM for alternative drivetrains
- Well-to-Wheel (WtW) parameters and data origin
- Criteria to define a vehicle developement strategy
- Sample WtW-analysis and results until today
- Basic specifications of Optiresource-Car software
- Sample visualization of WtW-results with OPTIRESOURCE
- Outlook and next steps
  - DaimlerChrysler Stand EVS-22 for immediate trials
  - www.optiresource.org for further information
- Optiresource Foundation

Motivation of an OEM for alternative drivetrains

- Individual mobility and efficient transport are an important basis of modern society and economy
- An affordable, reliable and environmentally benign long term fuel supply is a prerequisite for unrestricted mobility

Driving Forces

- Effective global reduction of CO_2 Emissions
- Securing of Energy Supply by Reducing the Dependence on Oil Imports from Politically Unstable Regions
- Reduction of the Consumption of Fossil Fuels, and
- Need for Cleaner Fuels to Support Emission Reductions

Elements of a hydrogen supply infrastructure

Primary Energy

- Crude Oil
- Natural gas
- Coal
- Uranium

- Solar
- Wind
- Hydro
- Geothermal
- Biomass
- Waste

Production

- Reforming
- Gasification
- Electrolysis
- HT-Splitting
- Thermo-Solar
- Solar direct

- Central
- On site

Distribution

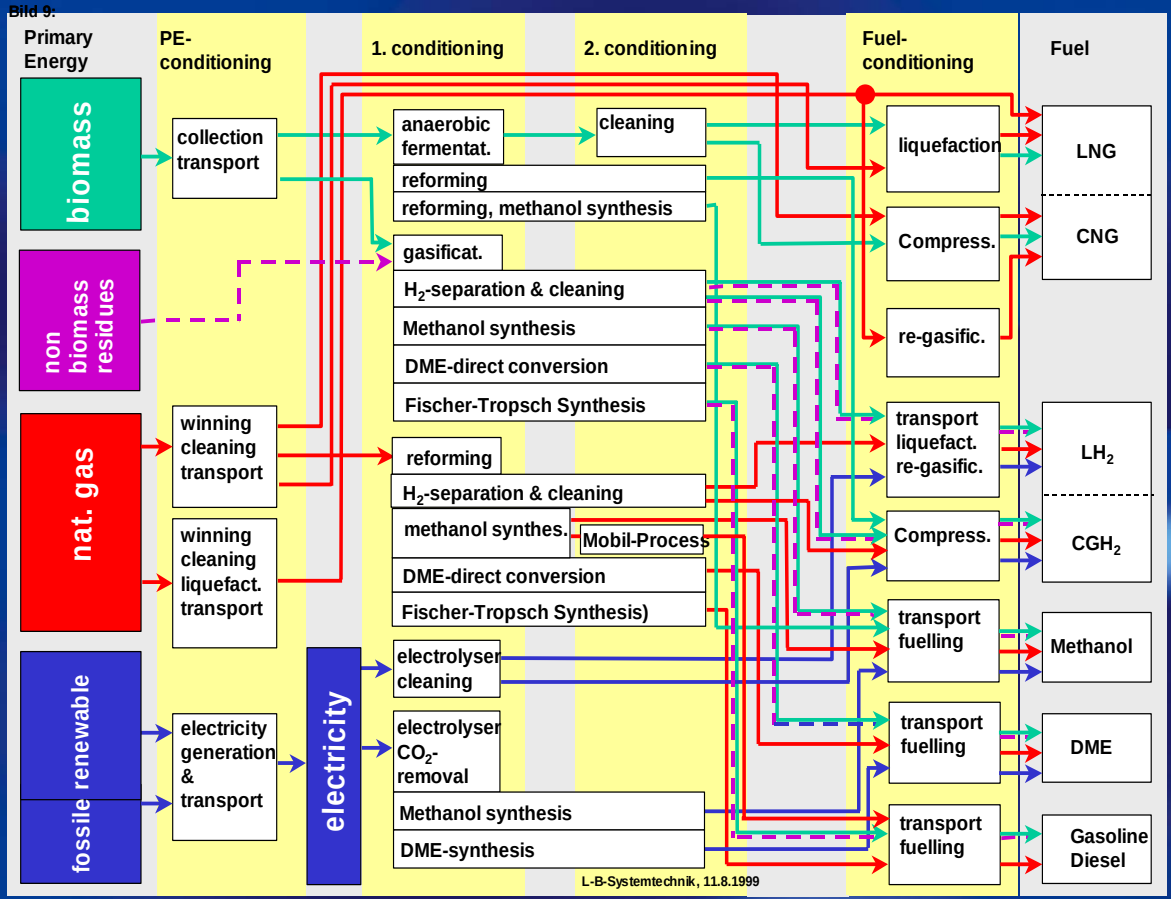
Conditioning

- Compression
- Liquification
- Synthesis

Transport

- Pipeline
- Truck
- Ship

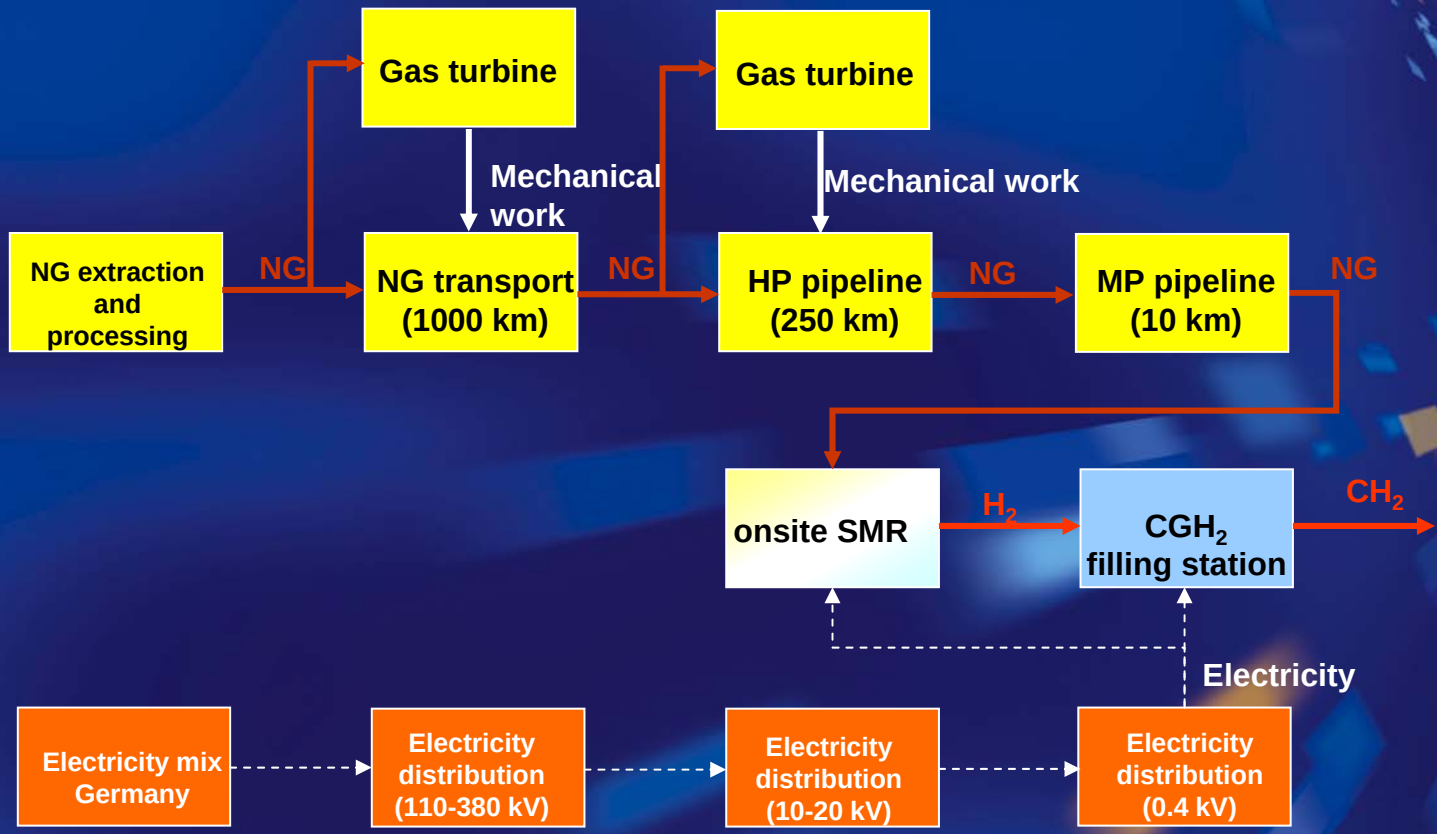
Well-to-Wheel parameters and data origin



Basic WtW data (for EU) have been researched by CONCAVE/EUCAR/JRC and are widely accepted,

...but high complexity affords detailed knowledge of correlations and processes as well as powerful calculation methods (e.g. E3-database from LBST).

Example for a H_2-supply chain: CH2 from on site reforming of natural gas



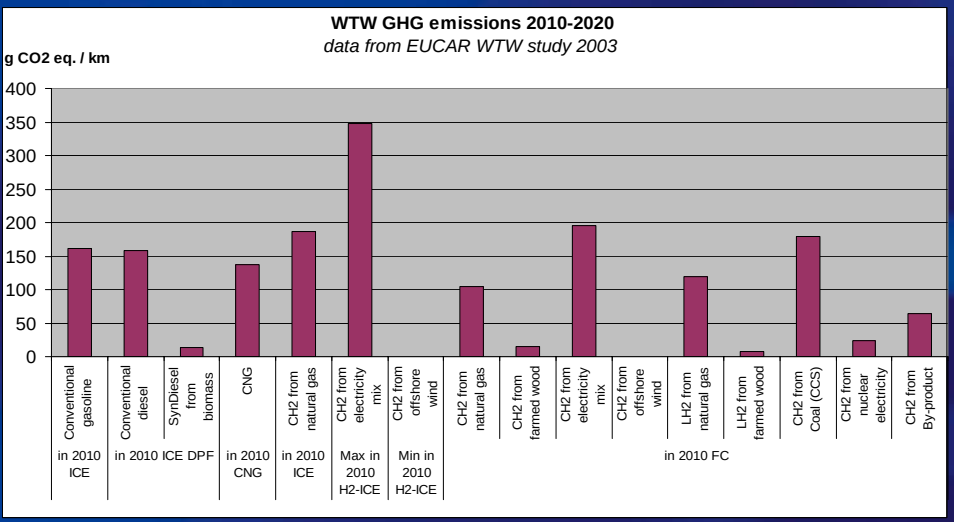
Present WtW studies

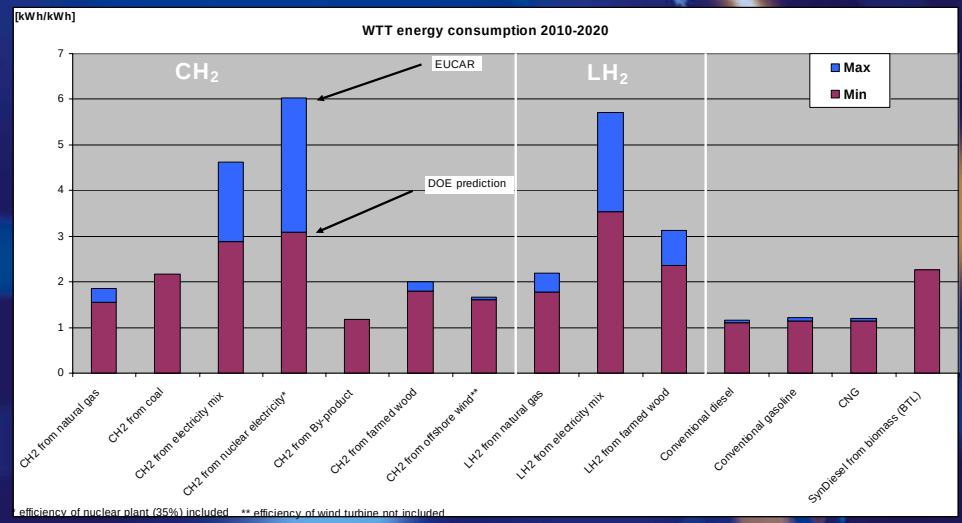
http://www.transportation.anl.gov
GM WtW North America

http://www.lbst.de/gm-wtw
GM WtW Europe

http://ies.jrc.cec.eu.int
CONCAWE/EUCAR/JRC

Sample of actual WtW data visualization





Premises are difficult to show, data are difficult to compare, add and sort.
No interactivity and difficult replication.

Criteria to define a vehicle development strategy

- Energy Consumption
- CO2 emissions
- Fossile fuel consumption

First 3 criteria to be considered in Optiresource

- Investment, cost
- Marketshare, market
- Performances
- PM, NOx, HC emissions
- Grey energy
- Recycling
- …

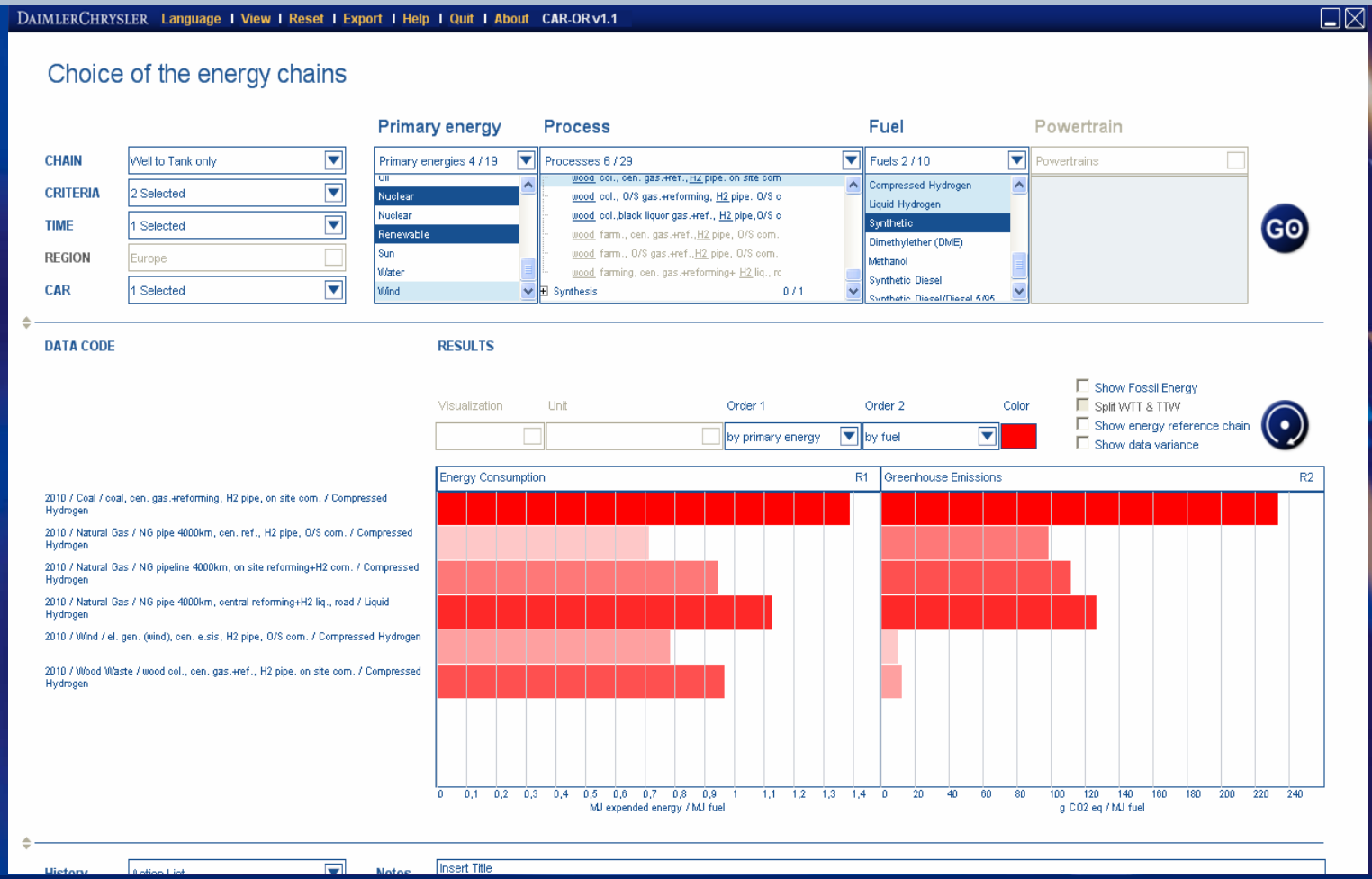
Basic specifications of OPTIRESOURCE software

- Interactive and easy-to-use SW to get quick and clear answers to many questions:
  - how do different energy chains compare in terms of energy consumption, GHG emissions etc.?
  - what are the chains allowing for the optimization of the consumptions and emissions?
  - what is the impact of different energy scenarios?
  - and many others…..
- Interactive software & database are stored in a USB key
- SW only needs Windows 2000/XP with MS "**.**net Framework"
- SW is designed as a modular and scalable system. The same data-base has different "modes" and different user interfaces
- In the current version 2 "modes" and 3 user interfaces are implemented

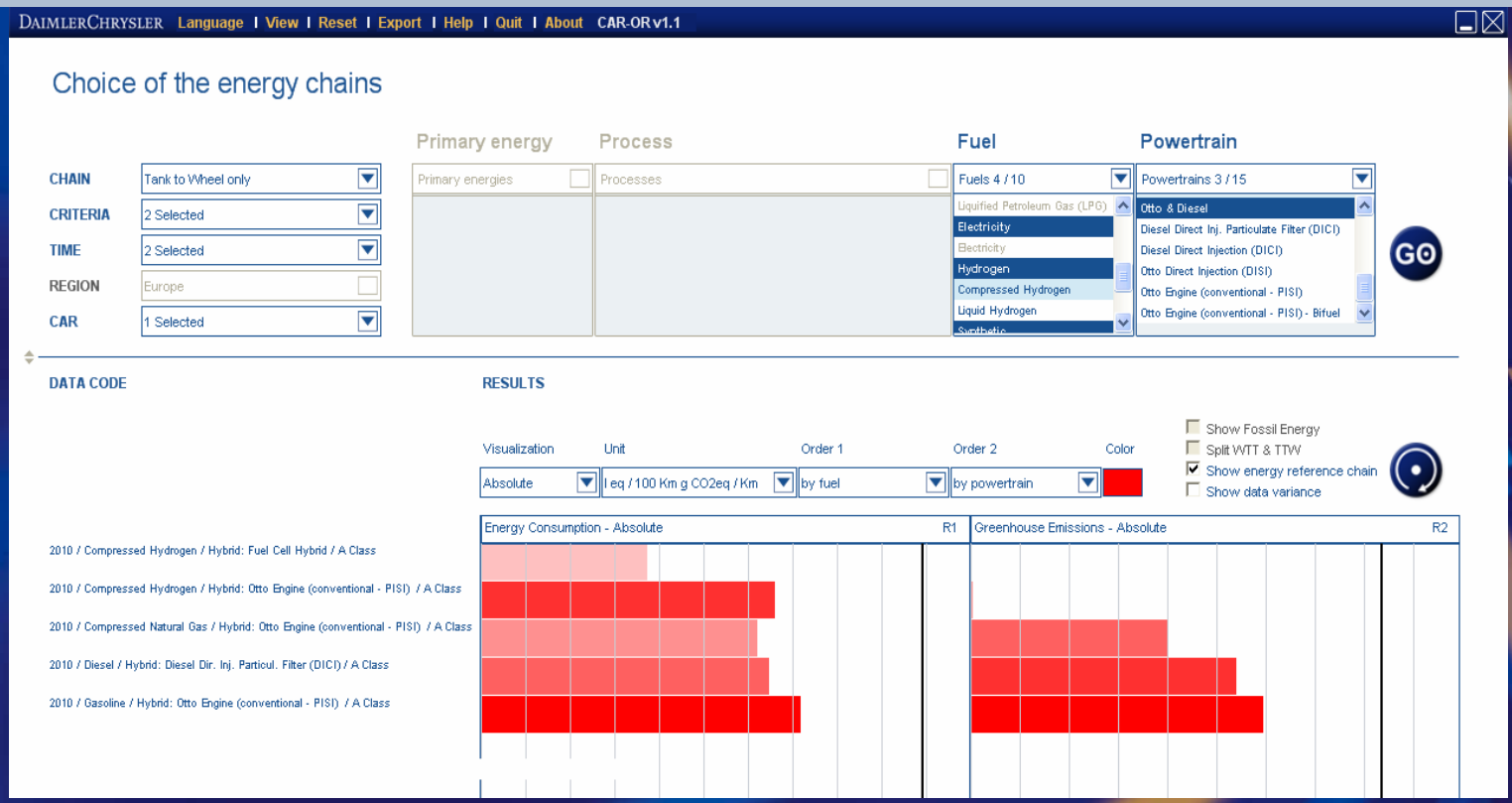
Implementation of OPTIRESOURCE software

- "Modes"
  - "Query mode": the user selects the chains according certain criteria and then the results are visualized (more than 500 chains available)
  - "Scenario Mode": the users defines scenarios in terms of energy supply and energy demand and then visualize and compare them (available starting from January 2007)
- User interfaces
  - User interfaces:
    - "For Experts"
    - "For All Users"
    - "For Exhibitions"

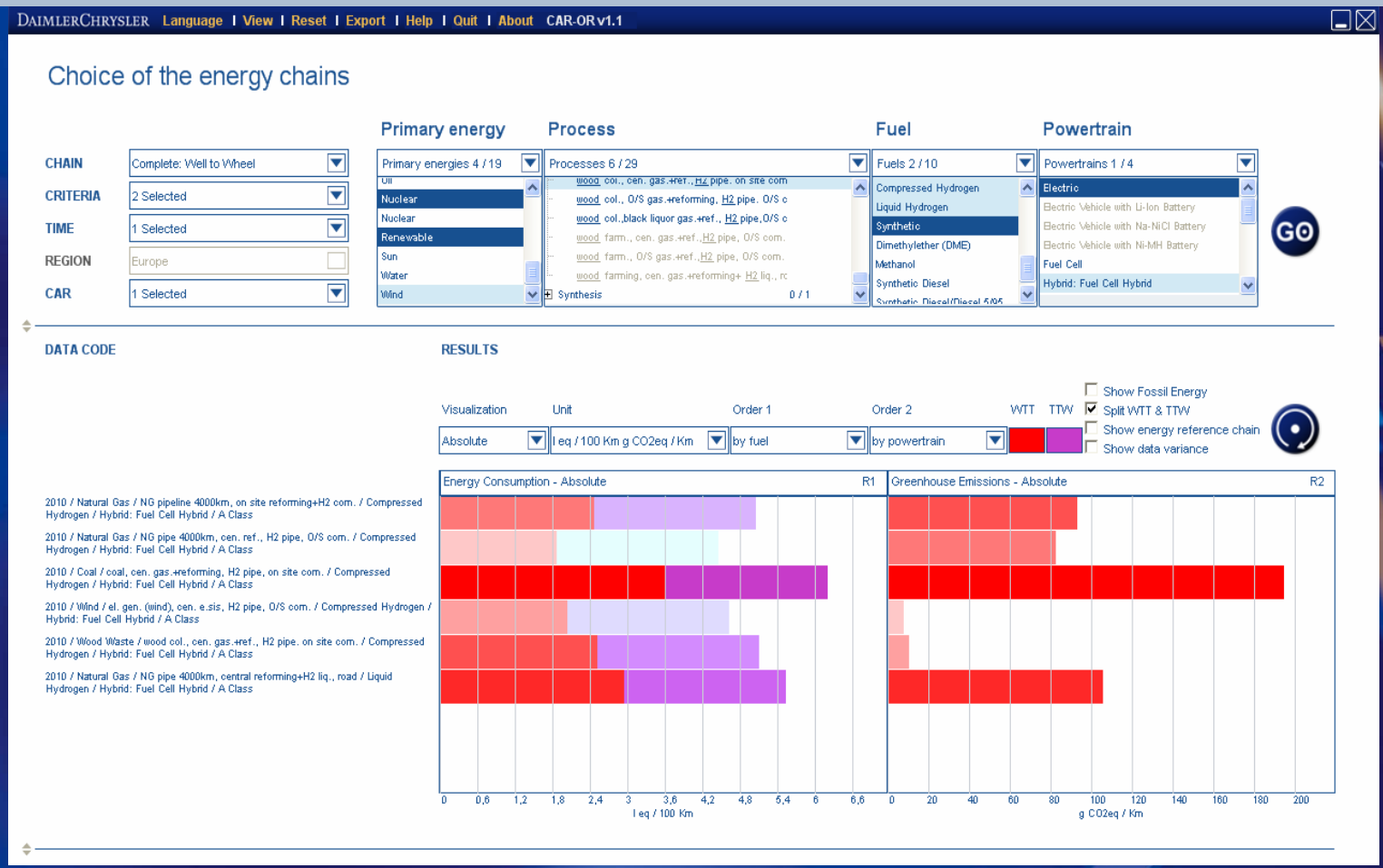
Example for WtT results: Energy consumption and GHG-emissions for H_2-production from various primary energy sources



Example for TtW results:
Energy consumption and GHG emissions of various drivetrains

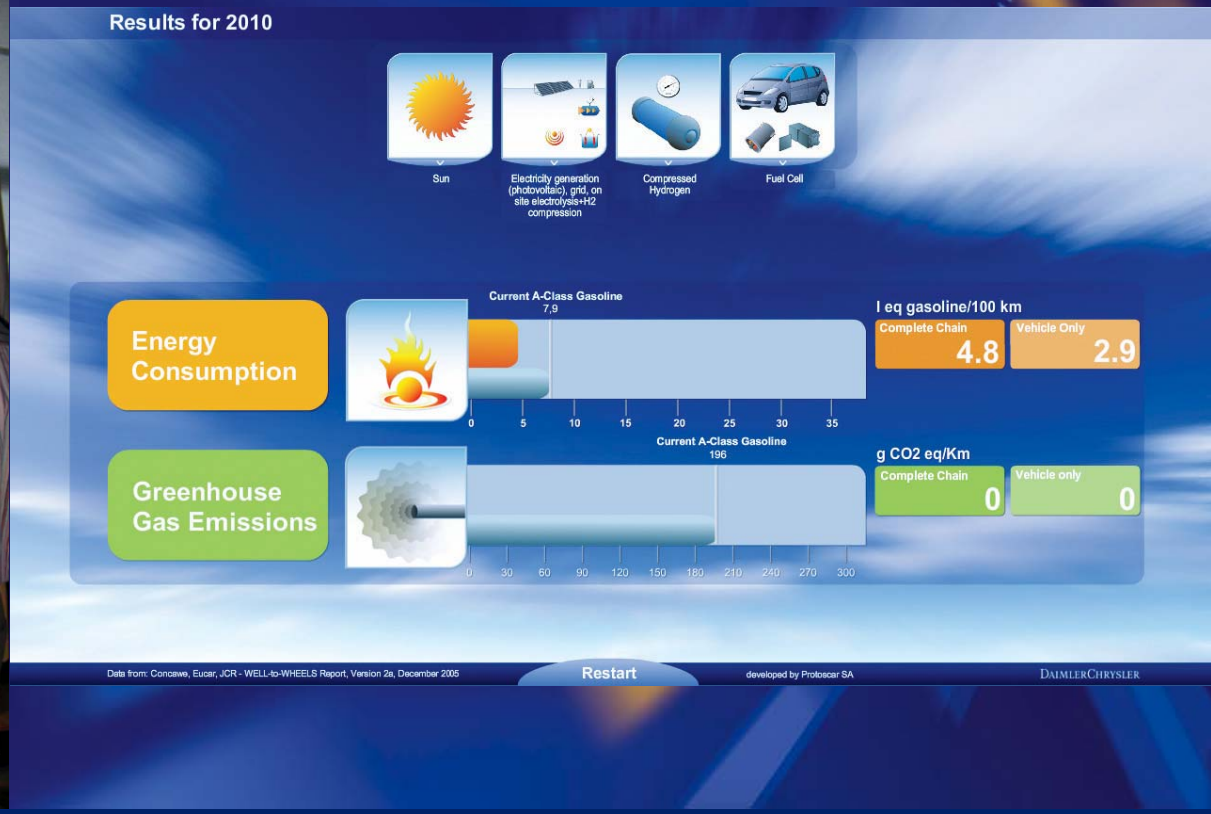


Example for WtW results:
Vehicle drive train: Fuel cell hybrid
Fuel: Hydrogen from different primary energies



Example for WtW results:
Vehicle drive trains: Fuel cell and ICE
Fuels: Compressed hydrogen, gasoline and compressed natural gas

Example of QUERY-MODE visualization „for All Users“



Outlook

Now….try out yourself - on the EVS-22 DaimlerChrysler stand

Join the Optiresource Foundation:

- In order to involve mores stakeholders, DaimlerChrysler intends to create a Foundation, open to other companies: you can join!
- Joining the Foundation, you participate in the definition of the specifications for the further developement of the software.
- Buy & use (starting 2007, January) Optiresource software for optimizing your vehicle/fuel developement strategy.
- Suggest further aspects to be included in the software.

….check out www.optiresource.org