

Possible approach to a concept for an Environmentally Friendly Vehicle (EFV) (Brainstorm)

GRPE – 1st informal meeting EFV WG
(Geneva, 6 June 2008)

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TNO | Knowledge for business



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Background

- Many approaches, ideas, technologies to solve
 - Climate change
 - Energy efficiency
- How can policy makers decide what to support?
- Problem: how to compare objectively impact on environment?

Objectives

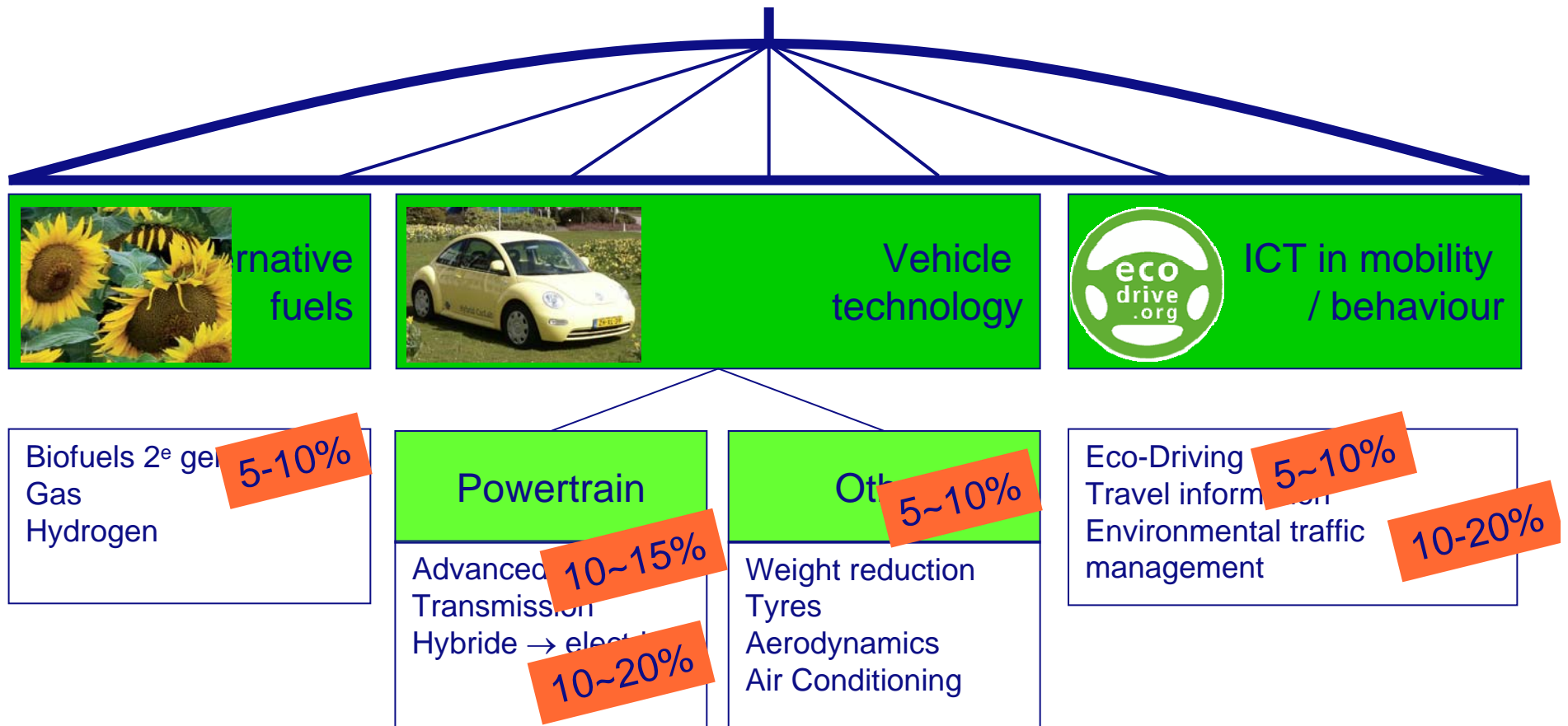
Review the feasibility of EFV concept: Globally harmonised method for evaluating environmental friendliness of a vehicle

- Propose scope and parameters for EFV concept
- Proposal plan for literature study

Focus on energy efficiency and CO₂ emissions based on well-to-wheel approach

Feasibility question: aim also to set a standard and certify (like EEV for HD)?

Scope and parameters: Efficient, Clean, Smart

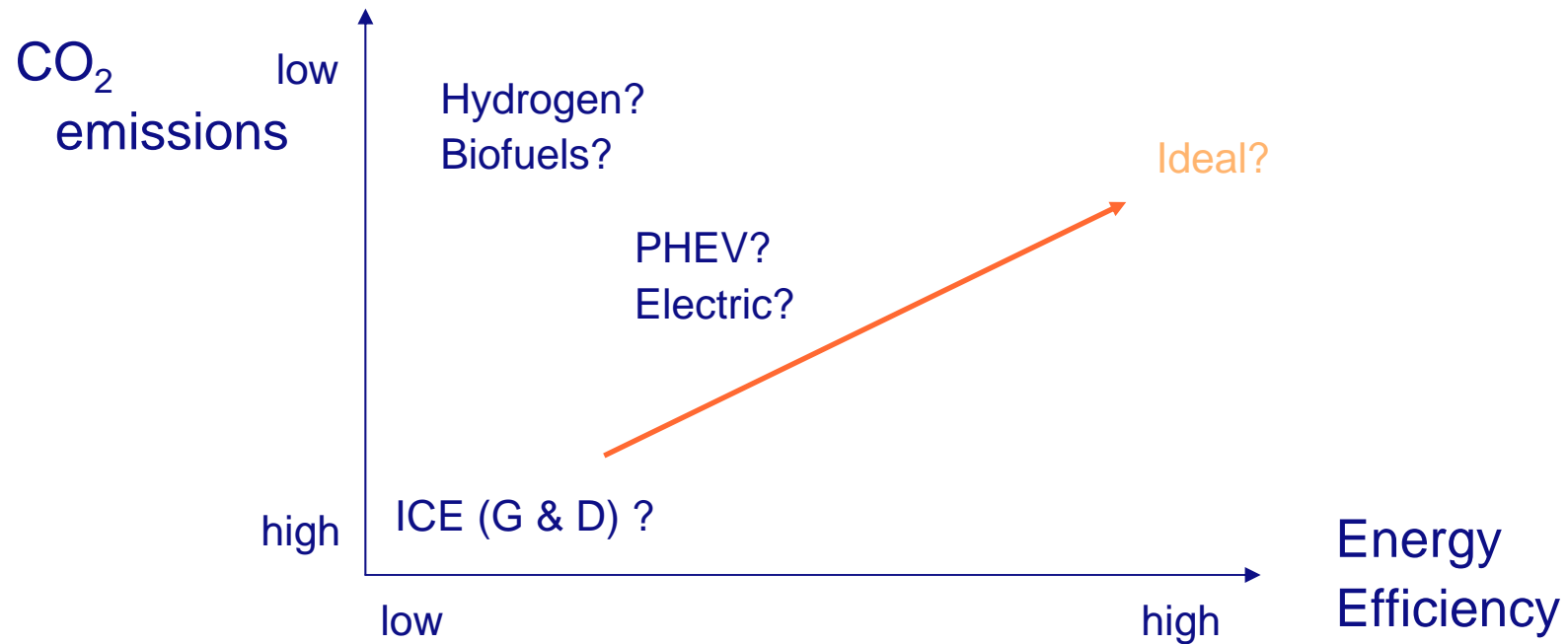


- Focus on **Efficient vehicle technology**

Scope and parameters

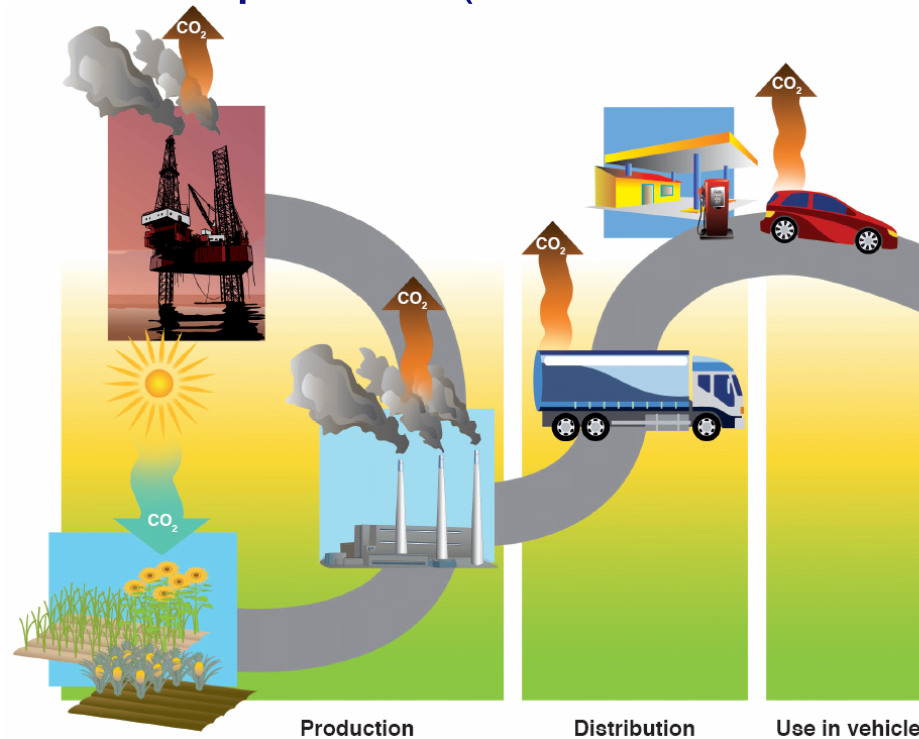
- Focus on passenger cars first?
- Pollutant emissions not considered (but minimum standard Euro6 or stricter)?
- Consider real world?
- Technology neutral (!)

Relation Energy efficiency and CO₂



- Need to include both: $EFV = EE + CO_2$

For assessment of EFV (CO₂ & energy), the whole chain is important (Well-to-wheel analysis)



- Production fuel (WTT) and use in vehicle (TTW) now
- Development, production & disposal of the vehicle in the future

$$\text{EFV} = \text{WTT} + \text{TTW}$$

Combine CO2 and Energy efficiency (1)

- $EFV = EE \text{ (WTT)} + EE \text{ (TTW)} + CO_2 \text{ (WTT)} + CO_2 \text{ (TTW)}$

• Powertrain efficiency

• Fuel type
• Fuel production

Assume:

Depend mainly on fuel type
Little variation per fuel type
??

Difficult to compare vehicles with different type of fuel (eg electric with gasoline)

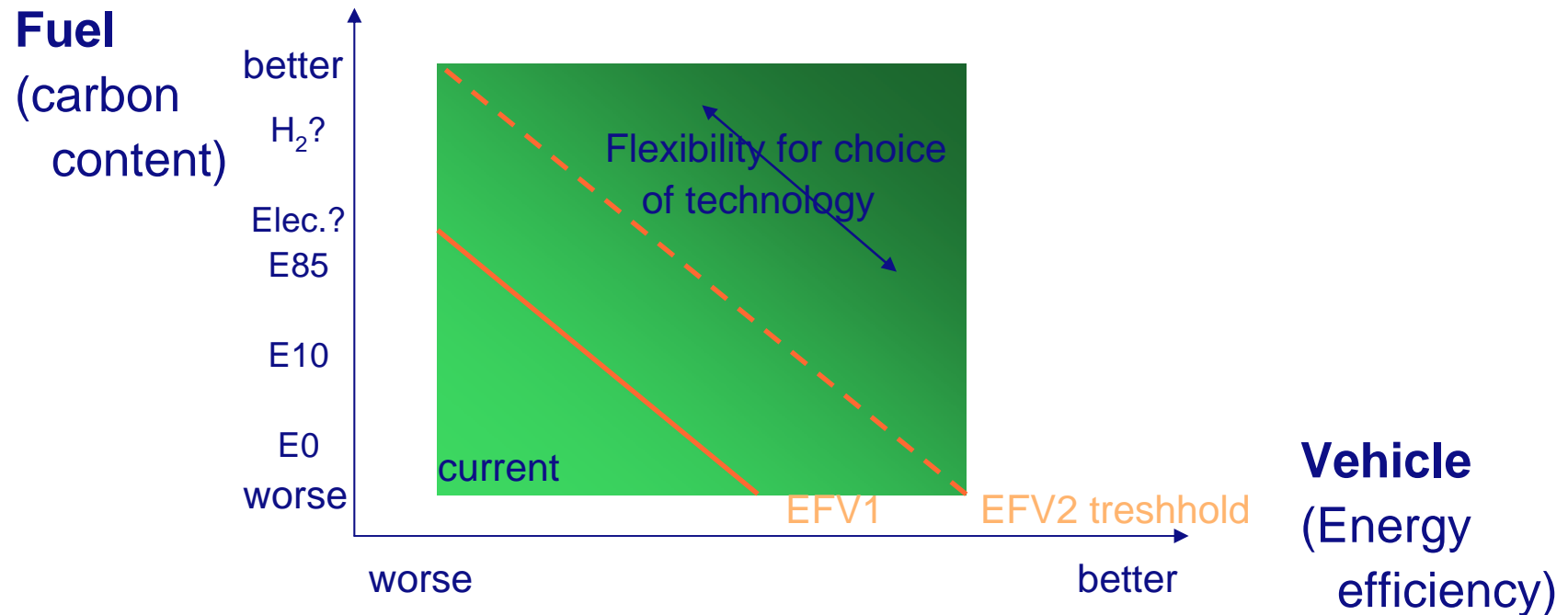
- Seperate :
EE (TTW) car manufacturers & CO2 (WTT) fuel industry

Combine CO₂ and Energy efficiency (2)

- To weight importance of CO₂ versus Energy efficiency:
- Normalise! Standard based on:
 - Average
 - Minimum
 - Best in class

- $$EFV = \frac{\text{CO}_2 \text{ [g/kWh]}}{\text{standard CO}_2 \text{ [g/kWh]}} (\text{WTT}) + \frac{\text{EE [\%]}}{\text{standard EE [\%]}} (\text{TTW})$$

Seperate fuel & vehicle characteristics



- Further investigation of definitions is needed
- Importance of default values

Literature study (technology and regulations)

State of the art of EFV technology

- Biofuels
- Plug-in hybrids
- Electric
- Hydrogen
- ...

Successful (worldwide) concept & regulation

- Euro norms
- PC CO₂
- Frontrunner; EEV
- Procurement
- Fiscal measures

Thank you !