

# Renewable fuels in car transport – will biofuels or electricity or hydrogen win in the long run?

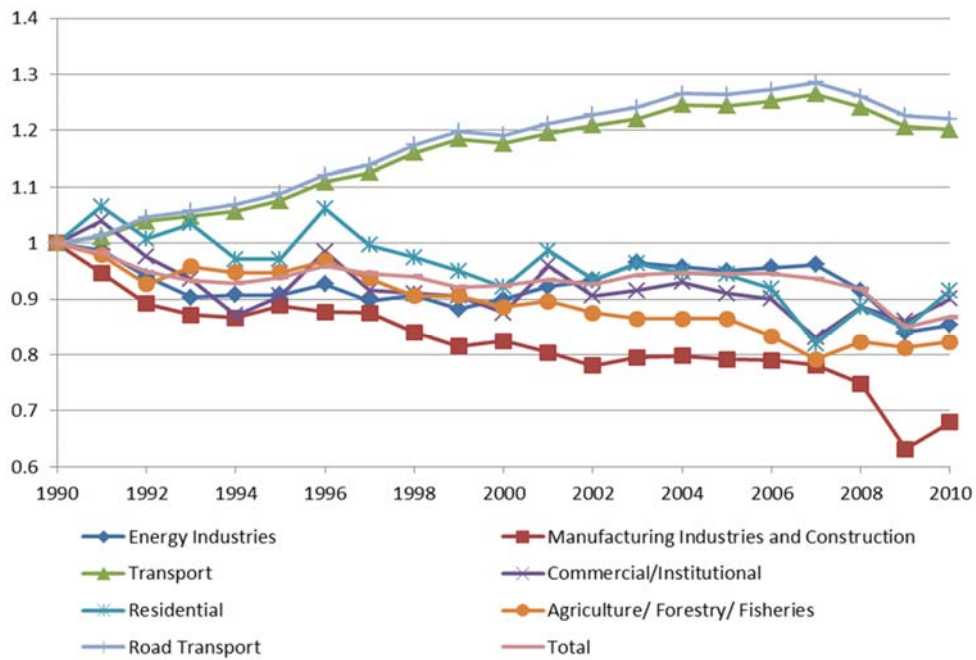
Amela Ajanovic, Reinhard Haas

All-Energy, Aberdeen, 2014

## Content

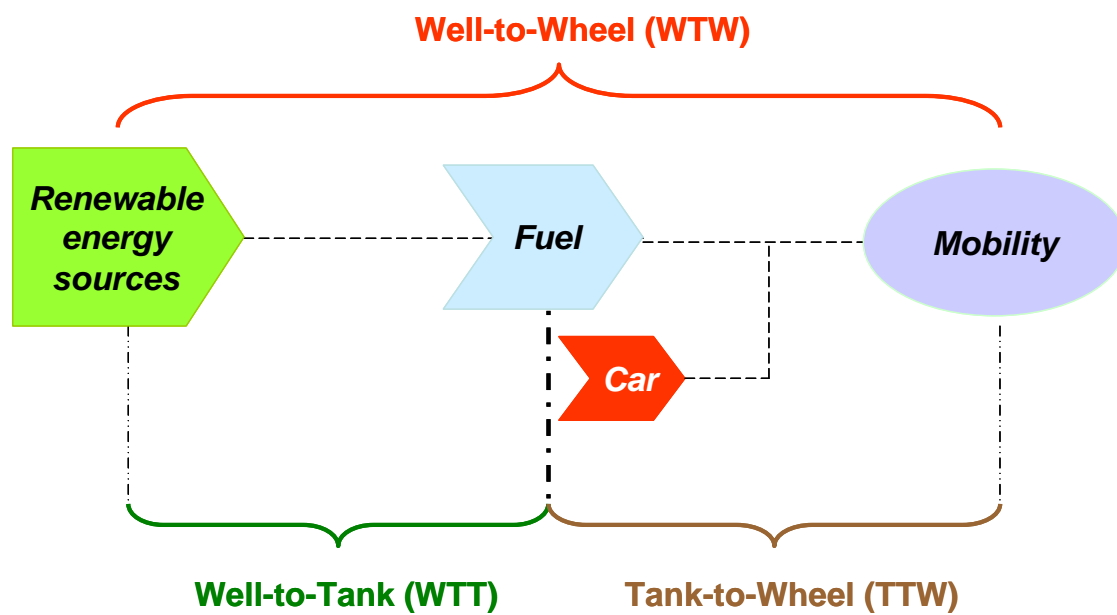
1. Introduction
2. Method of approach
3. Environmental assessment
4. Economic assessment
5. Conclusions

# 1. Introduction



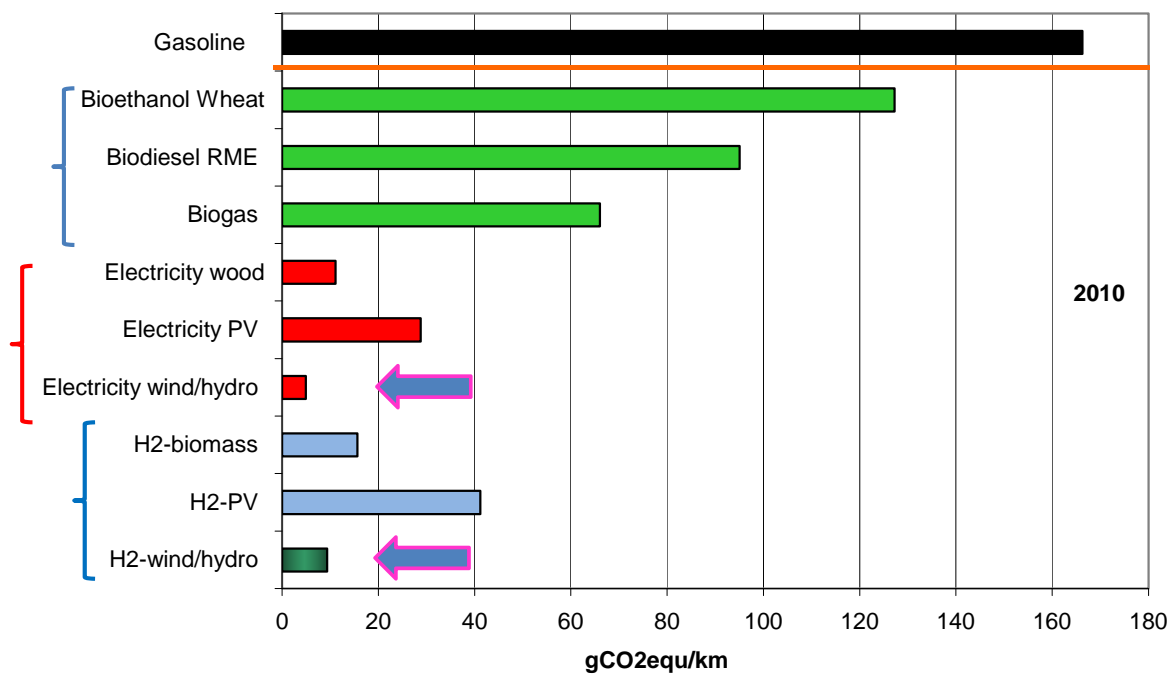
GHG emissions in EU-27

# 2. Method of approach



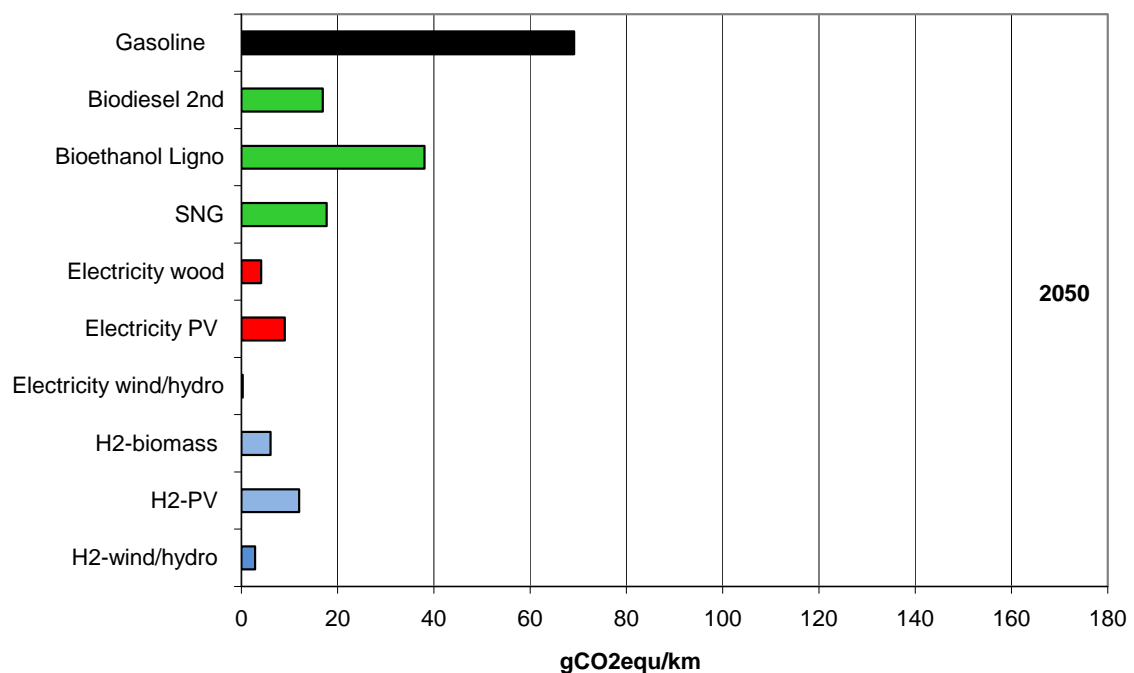
The energy chain for providing the service mobility

### 3. Environmental assessment



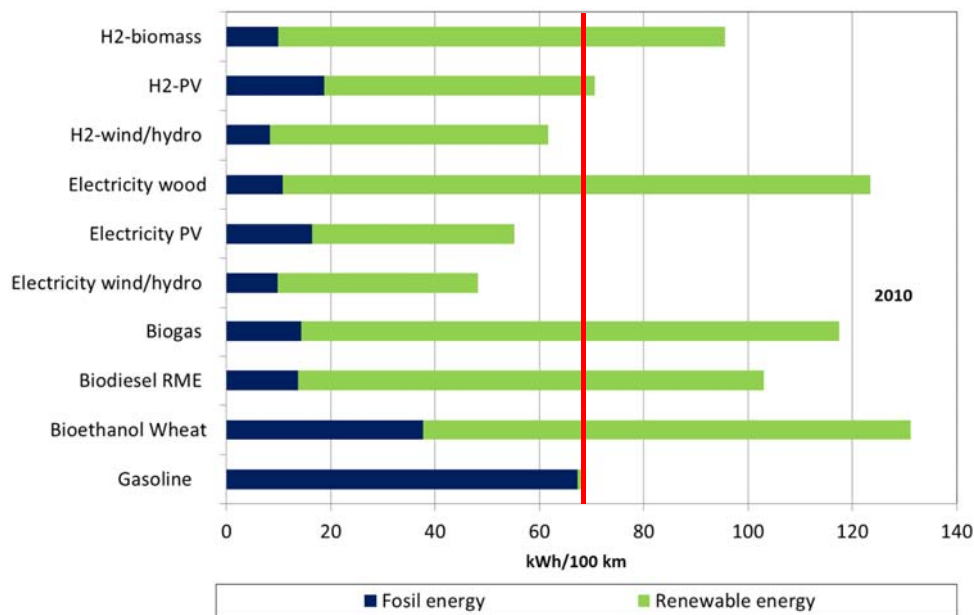
Comparison of specific WTW CO<sub>2</sub>-emissions in 2010

### 3. Environmental assessment



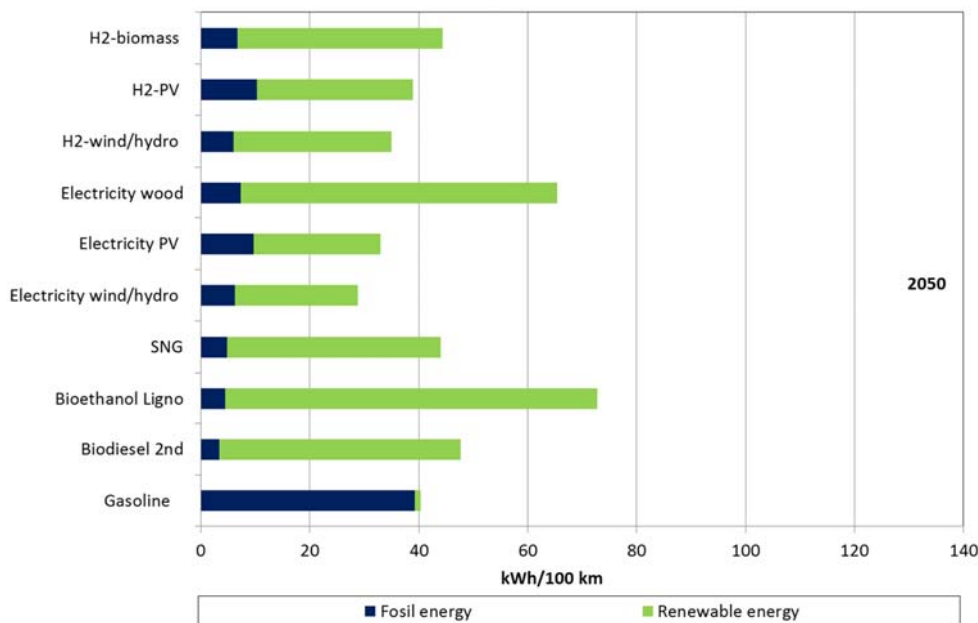
Comparison of specific WTW CO<sub>2</sub>-emissions in 2050

### 3. Environmental assessment



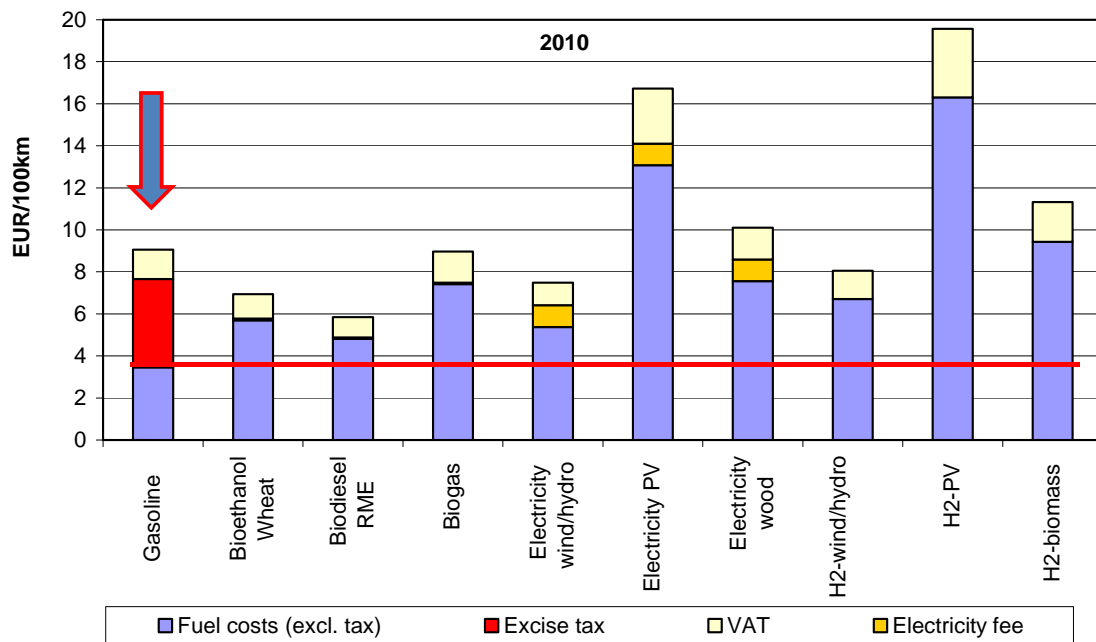
Renewable (RE) and fossil (FF) energy shares in the whole WTW energy service provision chain in 2010 for gasoline versus renewable fuels

### 3. Environmental assessment



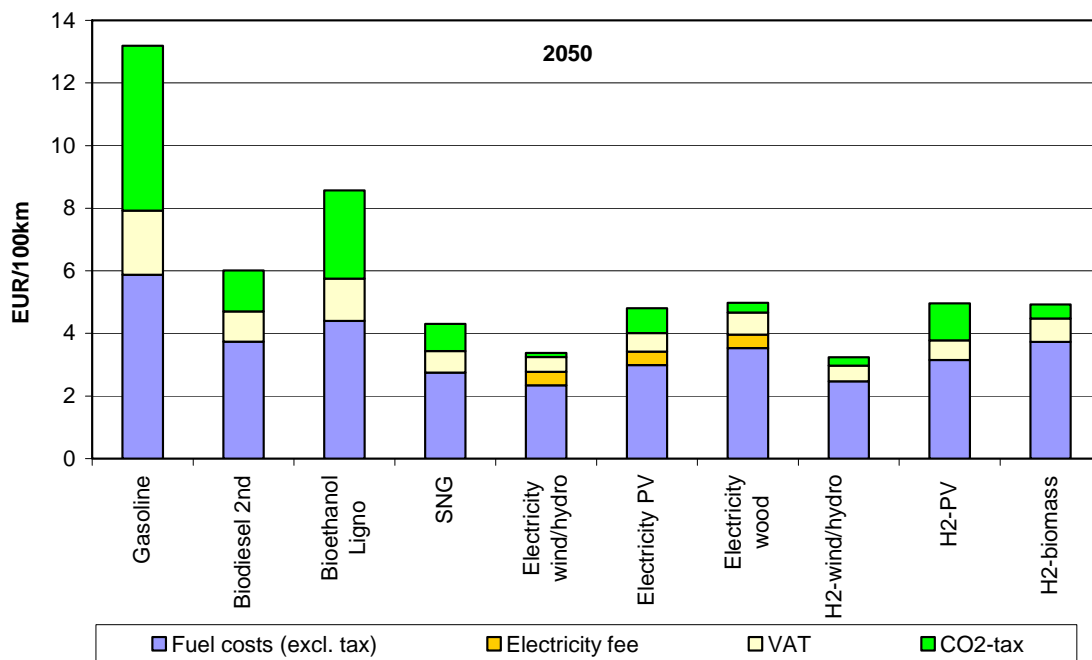
Renewable (RE) and fossil (FF) energy shares in the whole WTW energy service provision chain in 2050 for gasoline versus renewable fuels

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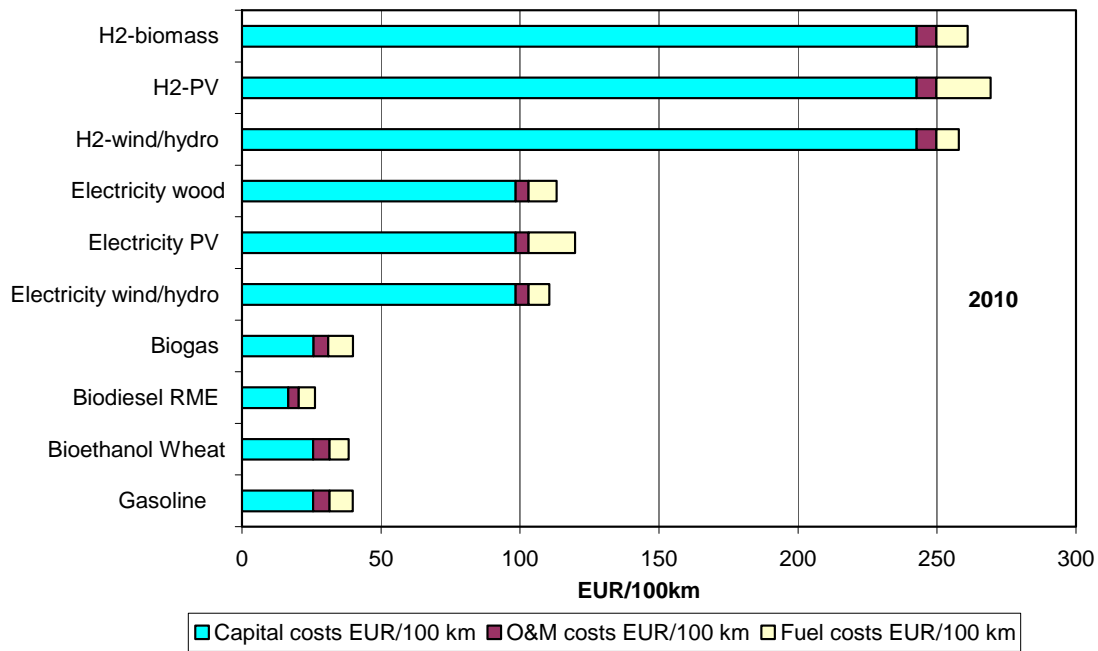
Transport service fuel costs in 2010 per 100 km

### 4. Economic assessment



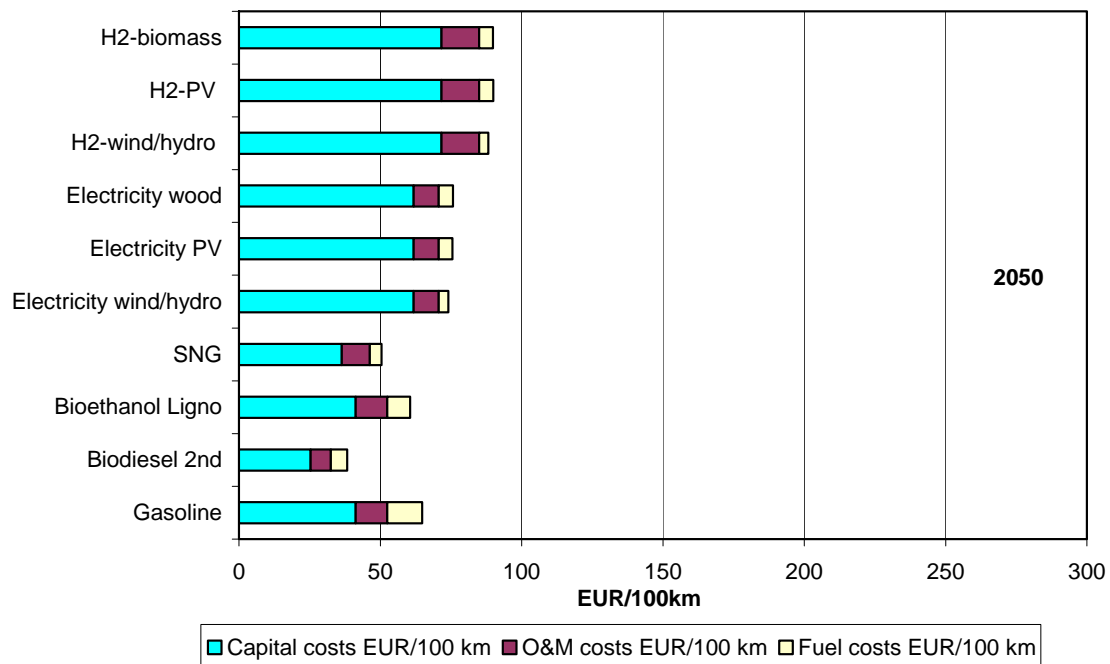
Transport service fuel costs in 2050 per 100 km

## 4. Economic assessment



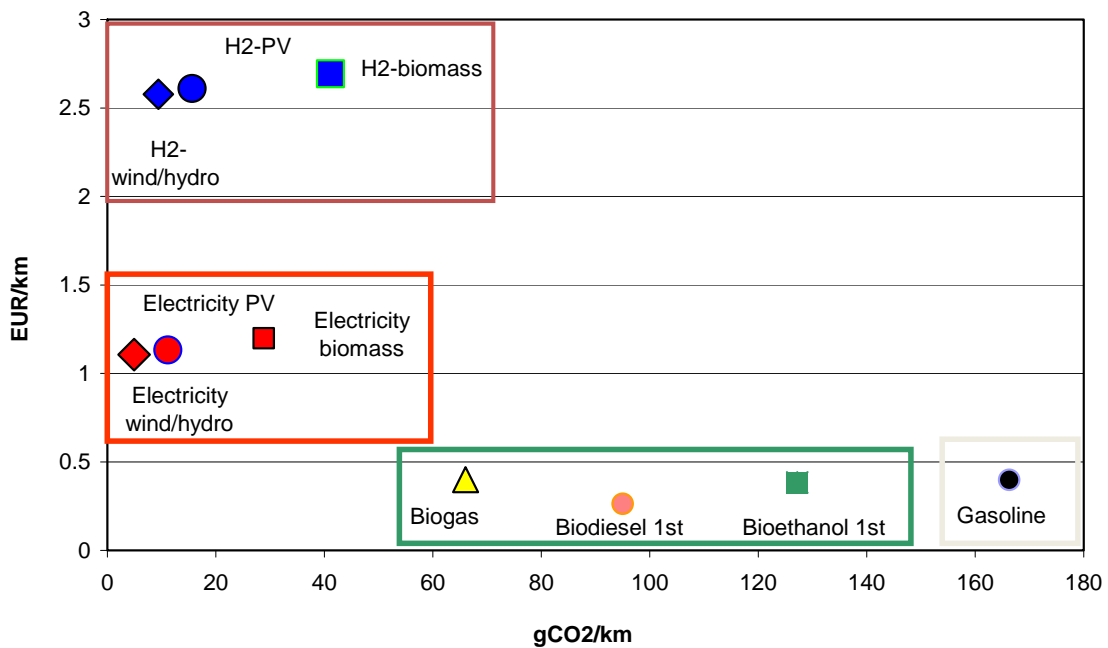
Total specific costs of transport in 2010 per 100 km

## 4. Economic assessment



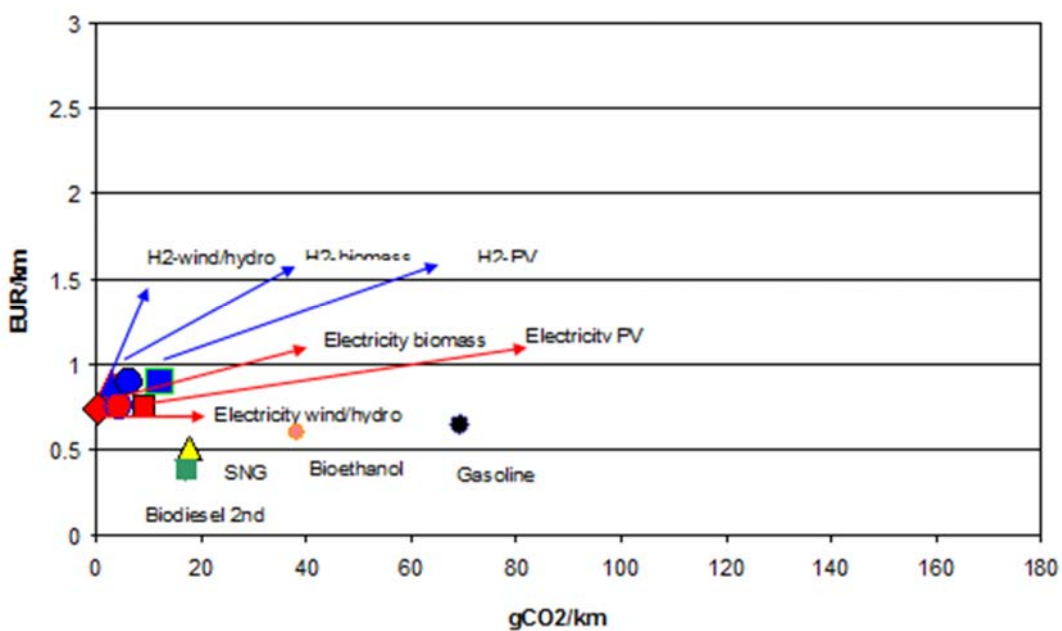
Total specific costs of transport in 2050 per 100 km

## 4. Economic assessment



Comparison of specific CO<sub>2</sub> emissions and costs of mobility with different fuels in 2010

## 4. Economic assessment 2050



Comparison of specific CO<sub>2</sub> emissions and costs of mobility with different fuels in 2050

## 5. Conclusions

### 1<sup>st</sup> generation biofuels

- Modest environmental performance
- Restricted potentials

### 2<sup>nd</sup> generation biofuels

- higher expectations
- significantly better ecological and energetic performance in comparison to the 1<sup>st</sup> generation;

Since 2<sup>nd</sup> generation biofuels could enter the market between 2020 and 2030, 1<sup>st</sup> generation biofuels will remain in the market at least until 2030. However, if a CO<sub>2</sub> based tax is introduced it is very likely that 1<sup>st</sup> generation biofuels could become irrelevant in the long term.

## 5. Conclusions

### Hydrogen and electricity from RES

- In 2010 and 2050 electricity is slightly favorable from ecological point of view given the same RES
- Most favorable RES are wind and hydro;
- Despite very good CO<sub>2</sub> balances, hydrogen from renewable energy sources will not become competitive before 2050 due to high capital costs of cars;

This leads to the final conclusion that “renewable fuels” will play a significant role only if the proper mix of policies, intensified R&D, and corresponding riding down the Learning Curve are timely implemented.





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