Economic & Environmental analysis of biofuels in Europe

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Aim

- Biofuels life cycle comparison under economic & environmental terms

- Data refer to literature review for EU25 during the last 5 years.

Biofuels

Comparative data on:

- Biodiesel & Pure vegetable oil
- Bioethanol from: sugar, starch & lignocellulosic substrates
- Biogas & Bio-hydrogen for transport

Key Factor

- The performance of different biofuels depends very much on the specific characteristics of their life cycle, e.g. country, resource, vehicle, state of technology.
- The data presented are averaged in order to cover the reported ranges.

Approach

Economic appraisal:

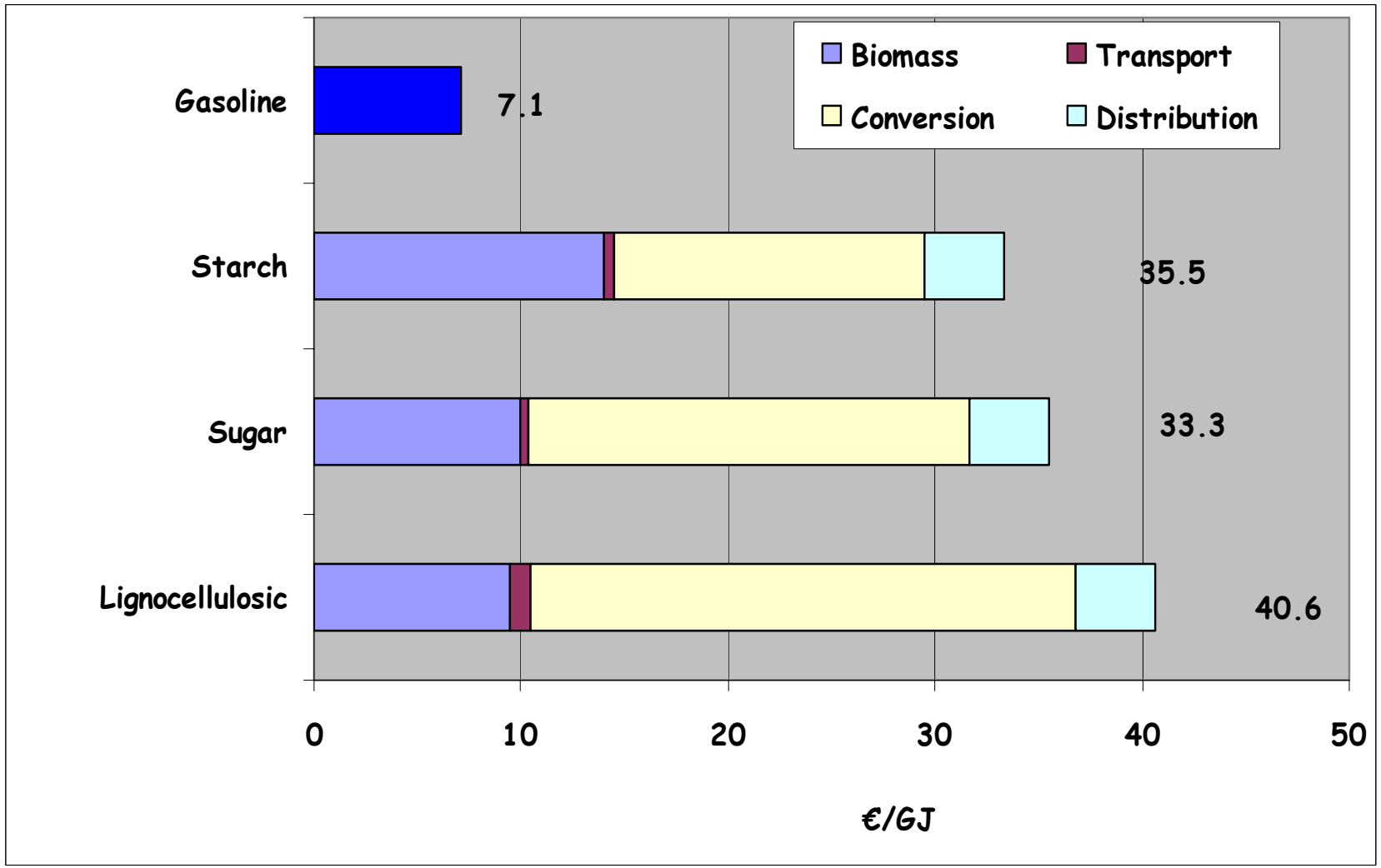
- Biomass production costs
- Transport costs for raw materials
- Conversion to biofuels costs
- ***Biofuel cost at filling station***
- ***Total driving costs***

Environmental evaluation:

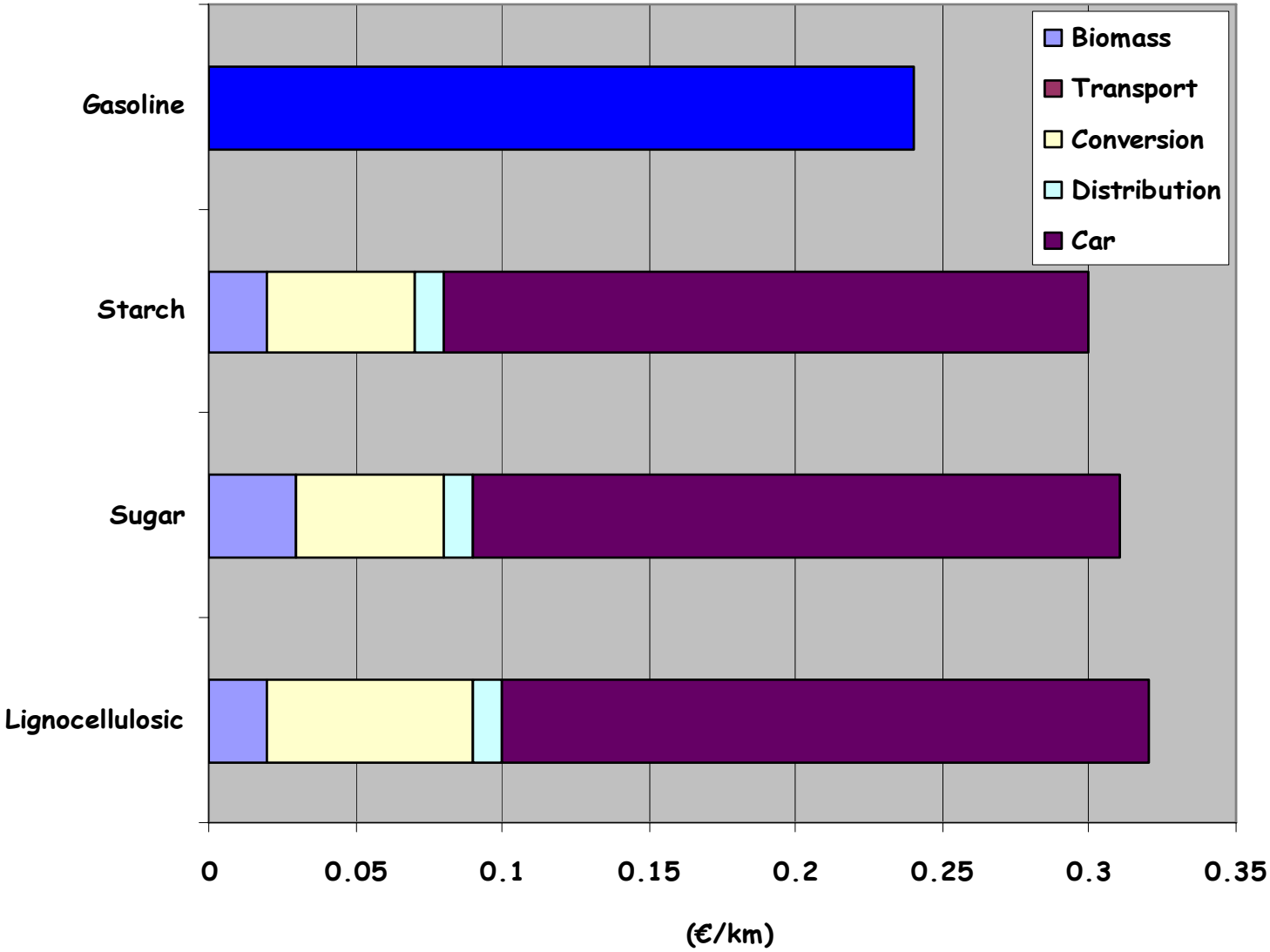
- Energy inputs
- CO_2 emmissions



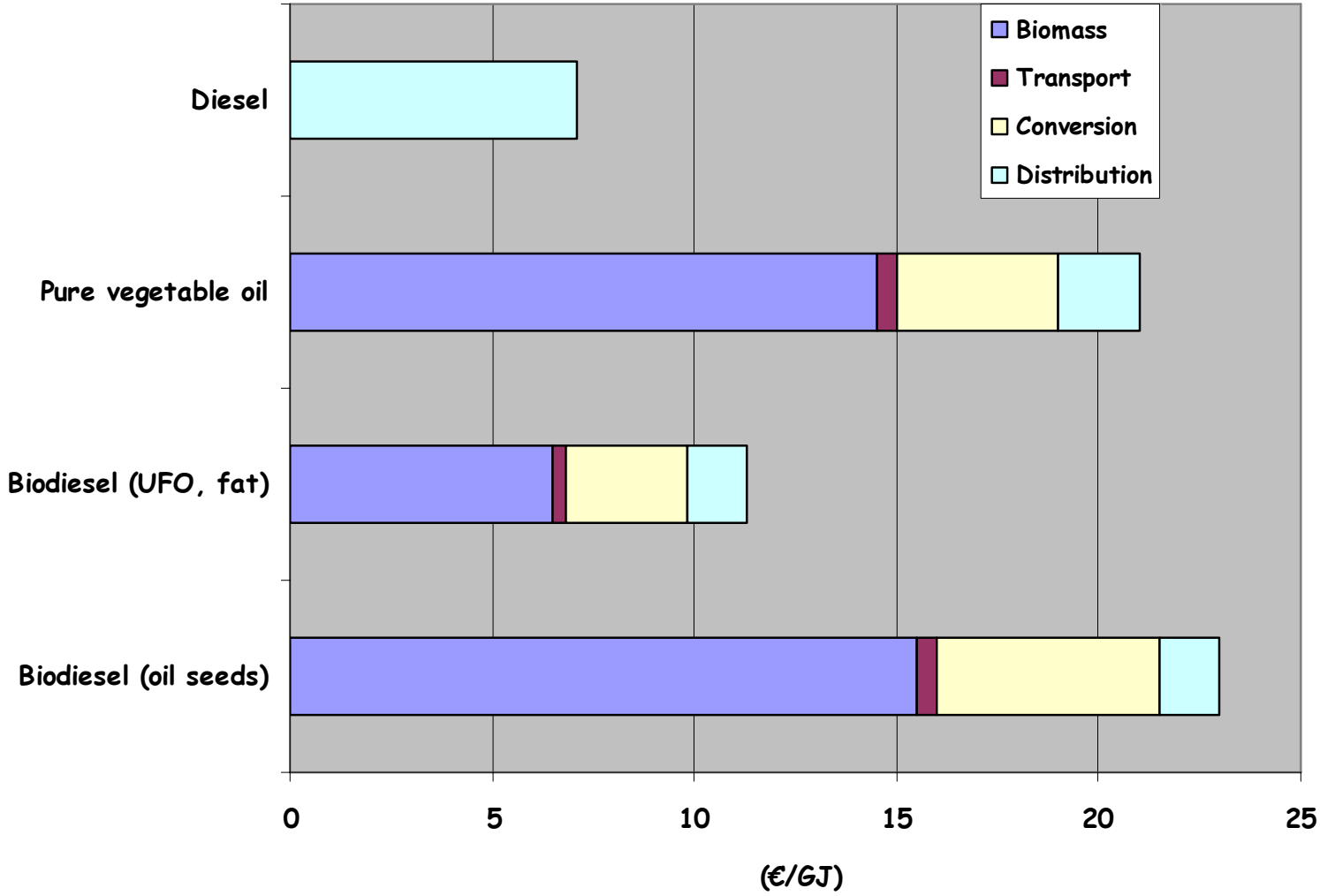

Bioethanol: Costs at filling station (€/GJ)



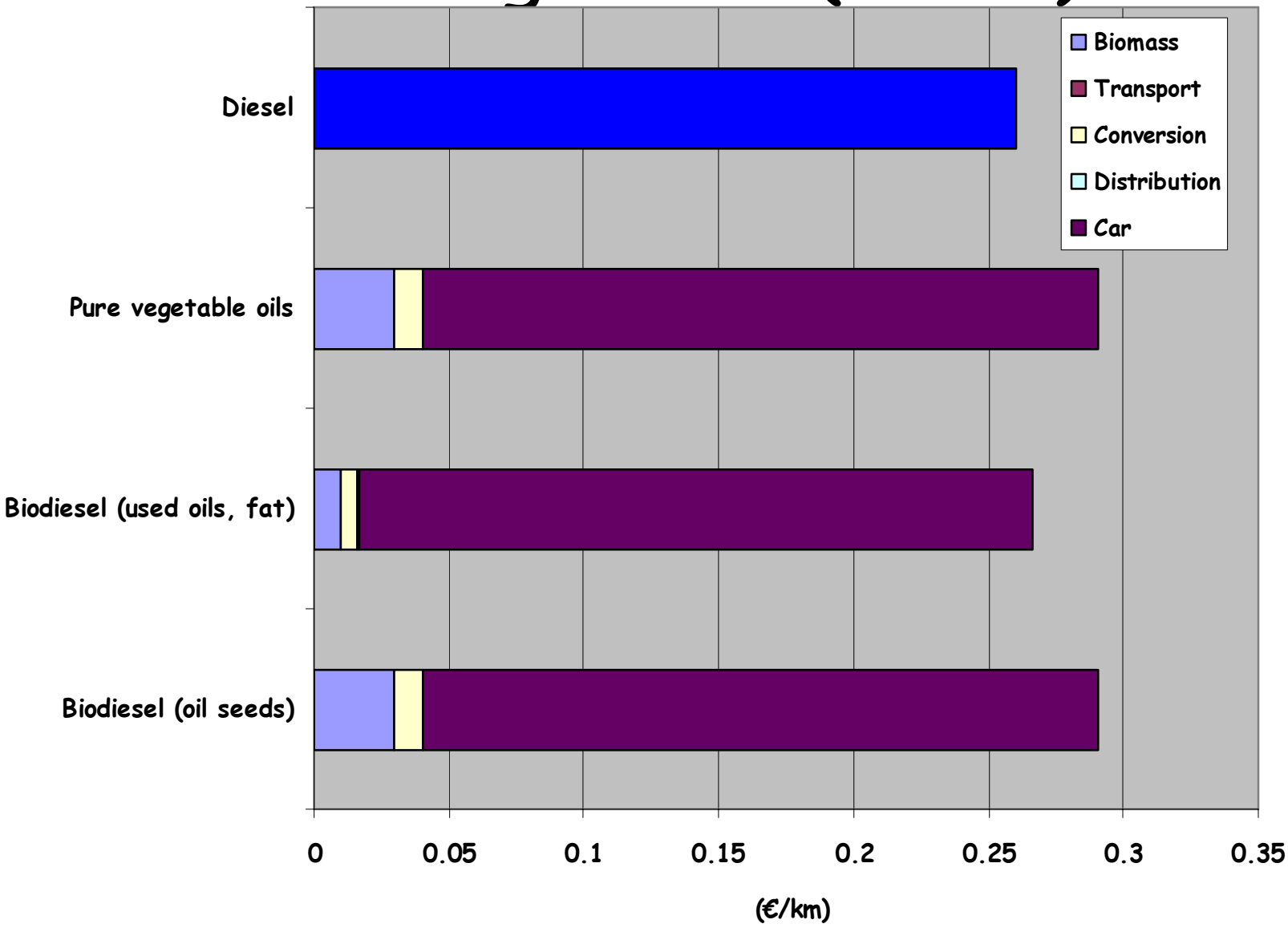
Bioethanol: Driving costs (€/km)



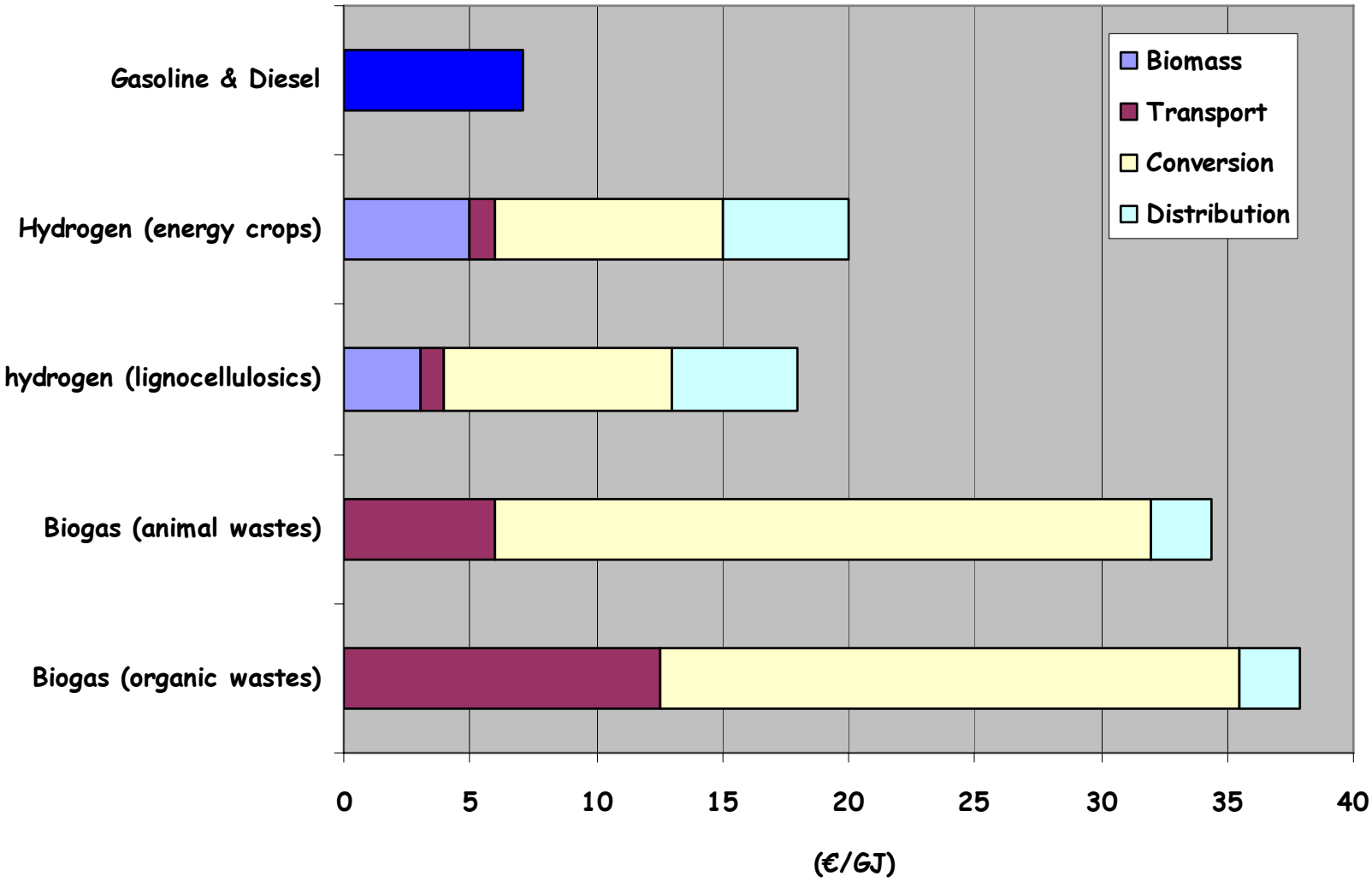
Biodiesel & Pure vegetable oil
Costs at filling station (€/GJ)



Biodiesel & Pure vegetable oil Driving costs (€/km)

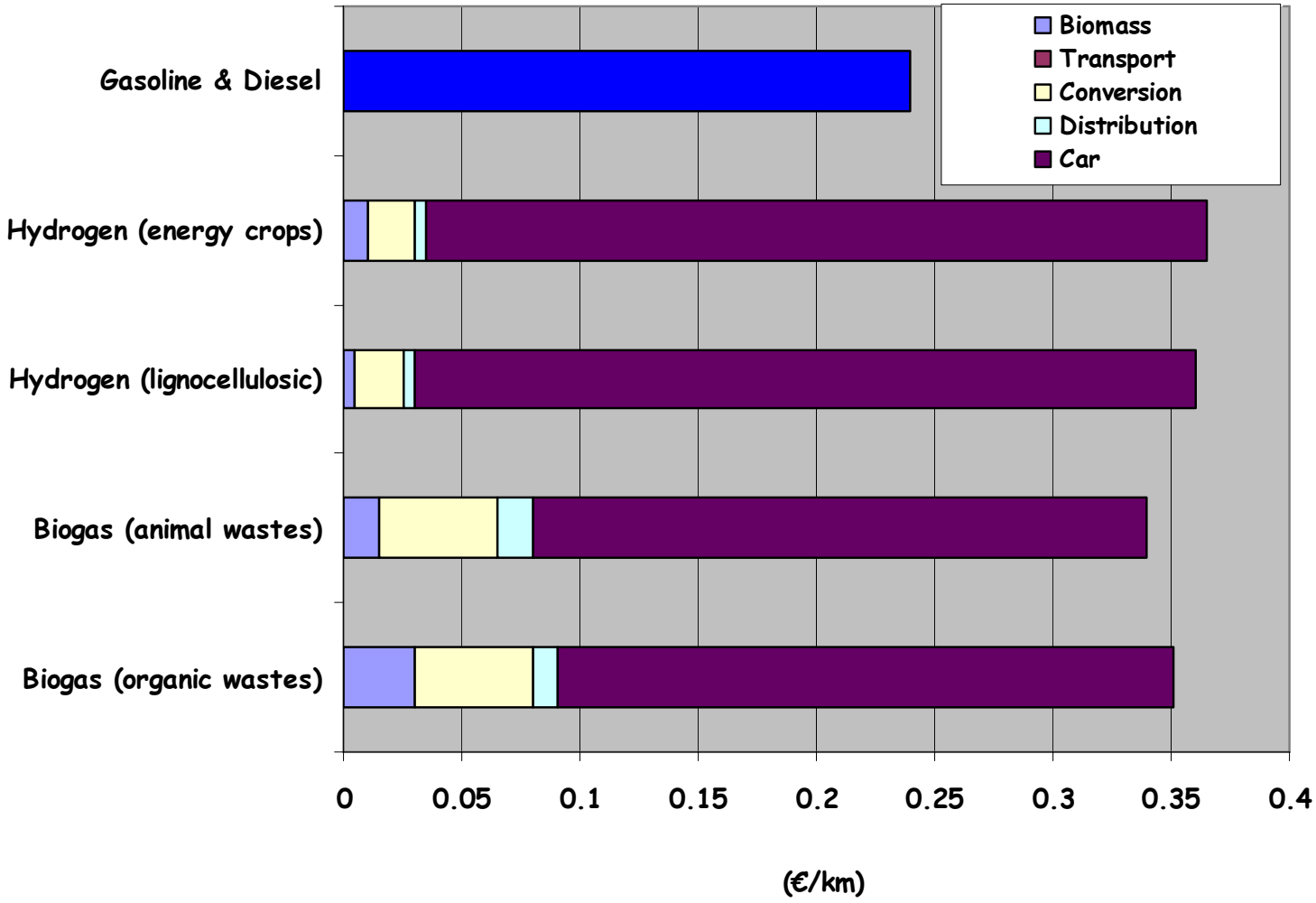


Biogas- Biohydrogen Costs at filling station (€/GJ)

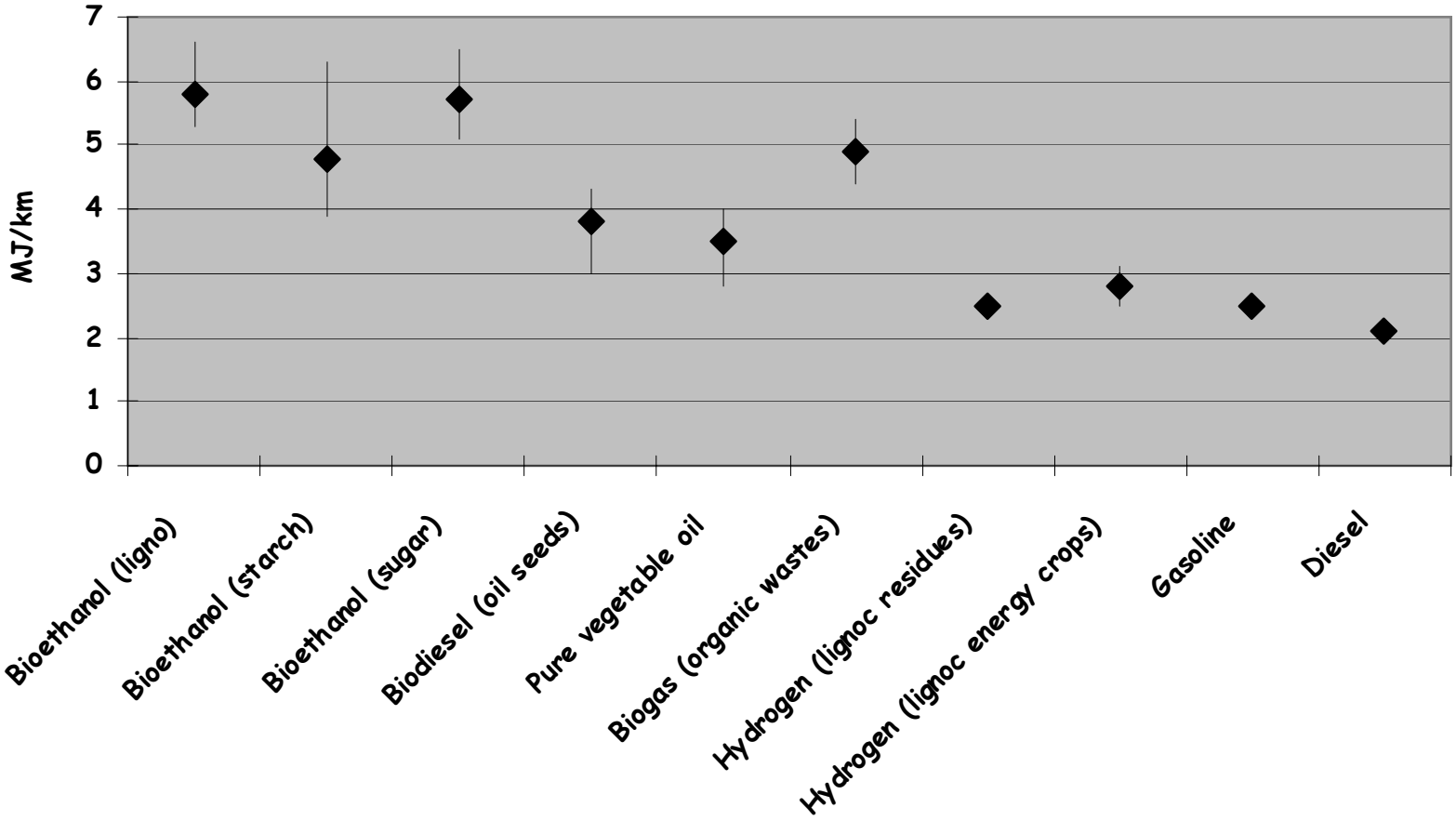




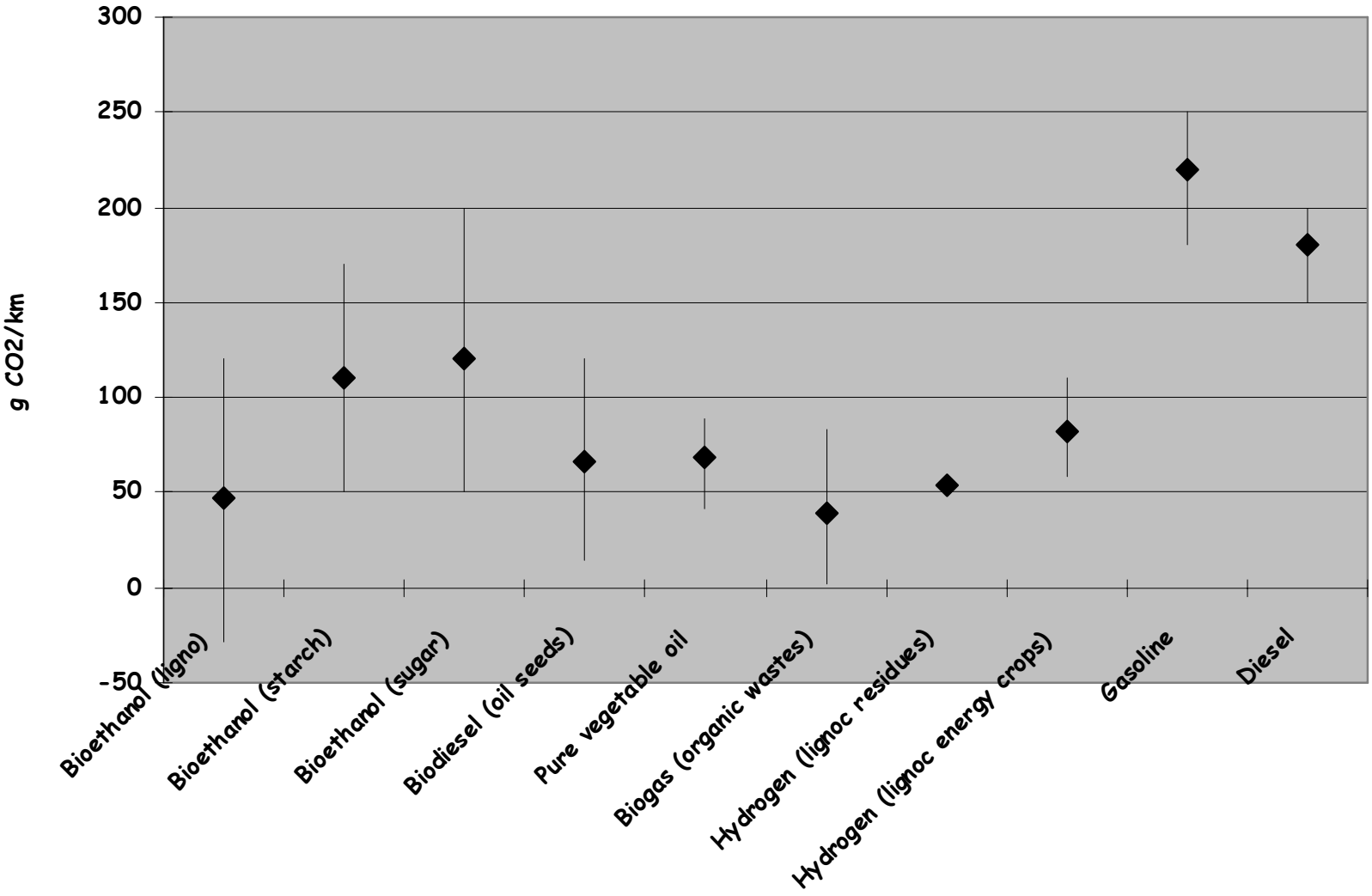

Biogas- Biohydrogen Driving costs (€/km)



Energy inputs (MJ/km)



Emissions CO_2/km






Conclusions

- Biofuels costs at filling station (17- 40 €/GJ) is higher than fossil fuels (~7 €/GJ). Future technological development is expected to contribute to cost reductions (15- 35 €/GJ).
- Total driving costs for biofuels is relatively higher today (25- 46 €/100km) than fossil (24 €/100km) but reductions are expected with technological development (15- 35 €/100km).




Conclusions

- Total primary energy demand of biofuel (3-7 MJ/km) is generally higher compared to conventional fuels (2- 2.5 MJ/km). On-going developments are expected to reduce primary energy demand for biofuels (2-5 MJ/km) .
- Compared to conventional fuels most of the biofuels have significant lower greenhouse gas emissions.




Selected literature

- www.viewls.org
- AEA (2003) International resource costs of biodiesel and bioethanol. UK Dept of Transport
- IEA (1999). Automotive fuels for the future
- Jonsson O., Persson M. (2003) Biogas as transportation fuel. Swedish Gas Centre
- Hart, D. et al. (2000). Hydrogen supply for SPFC vehicles. ETSU. UK
- www.ufop.de
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