aLIFEca

INTERNATIONAL WEBINAR aLIFEca

LCA analysis in MOOC aLIFEca

Dorota Burchart,

Silesian University of Technology

Faculty of Transport and Aviation Engineering

Poland

Co-funded by
the European Union

aLIFEca

One of the goal of MOOC aLIFEca is life cycle assessment of vehicles

Co-funded by the European Union

LCA in automotive: alternative fuel vehicles

- LCA of internal combustion engine vehicles (ICEVs)
- LCA of battery electric vehicles (BEVs)
- LCA of fuel cell electric vehicles (FCEVs)
- Comparative LCA of petrol ICEVS, diesel ICEVS and BEVS – CASE STUDY

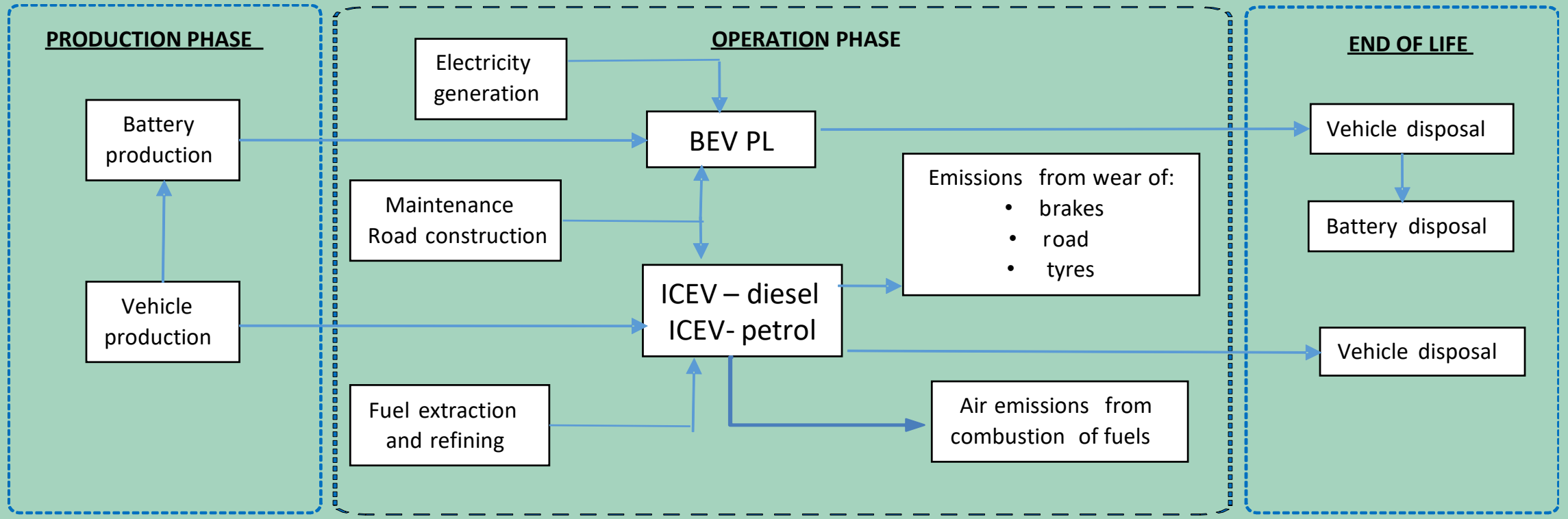
Goal and scope of LCA of alternative fuels

- Comparative analyzes of the environmental impacts of internal combustion engine vehicles (ICEVs), versus battery electric vehicles (BEVs) by taking the life cycle of these cars into account.
- For this purpose, carbon footprint and water footprint of these vehicles was analysed.
- LCA of alternative fuels was carried out on the example of different energy mix

Co-funded by the European Union

Assumptions of LCA

System boundaries for the life cycle of BEVs and ICEVs



Co-funded by the European Union

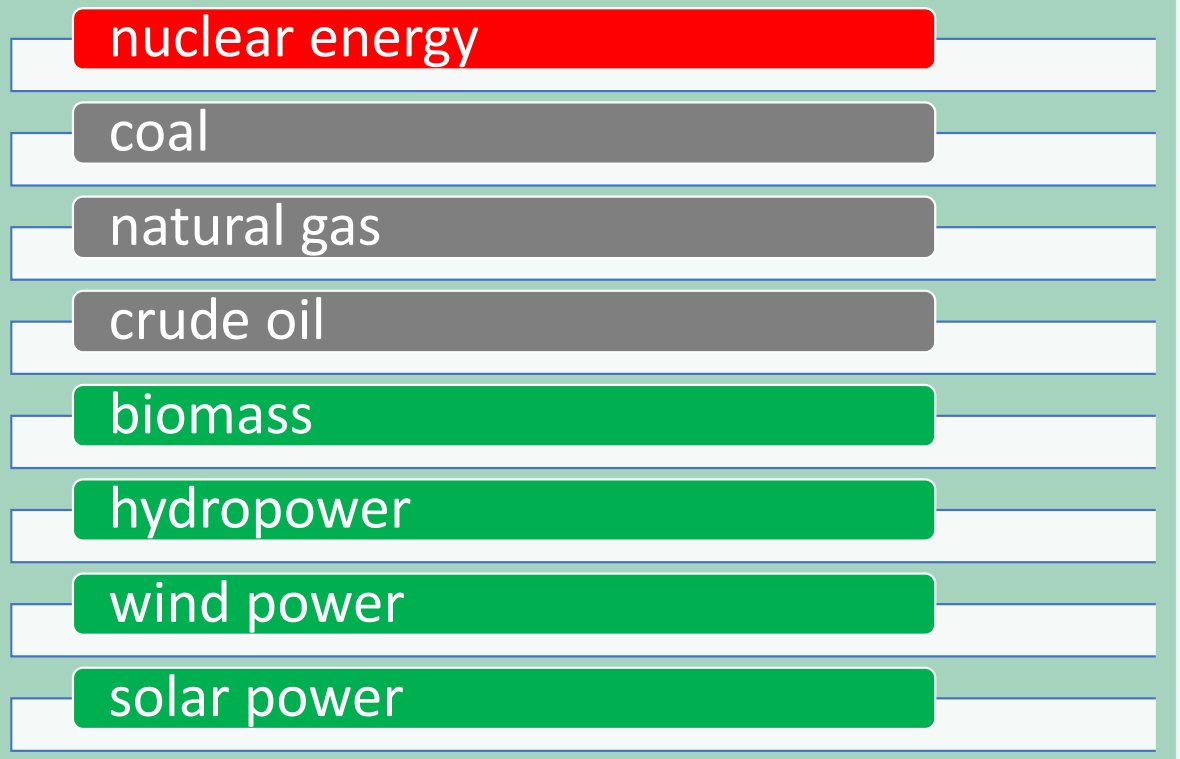
Methodology and assumpions of LCA for vehicles

The environmental footprints assessment was conducted using the SimaPro software with the Ecoinvent database.

The functional unit for vehicles was defined as 100 km.

The system boundaries for BEVs included the cycles of an electric passenger car service life and battery charging, taking into account the trends in the electricity supply for battery charging purposes between 2015 and 2050.

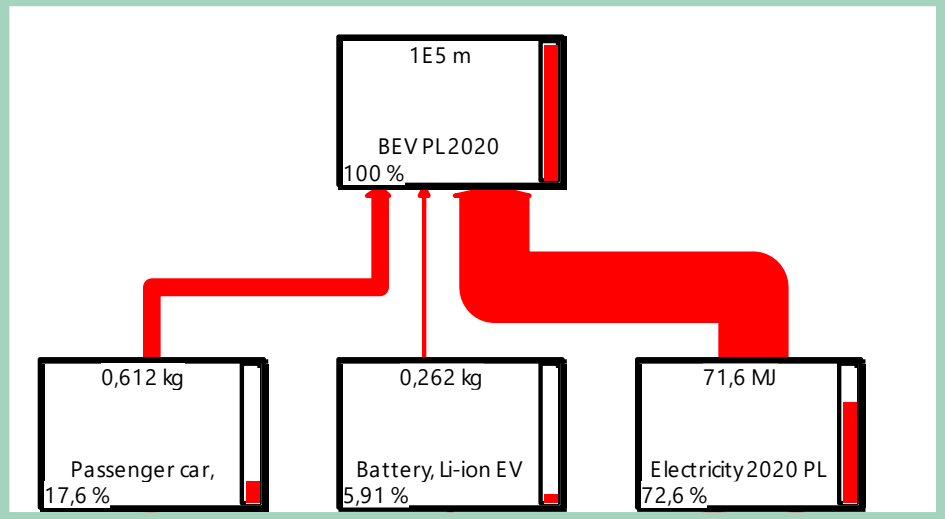
Main energy sources



The computational model of LCA cover analysis for individual electricity sources.

Co-funded by the European Union

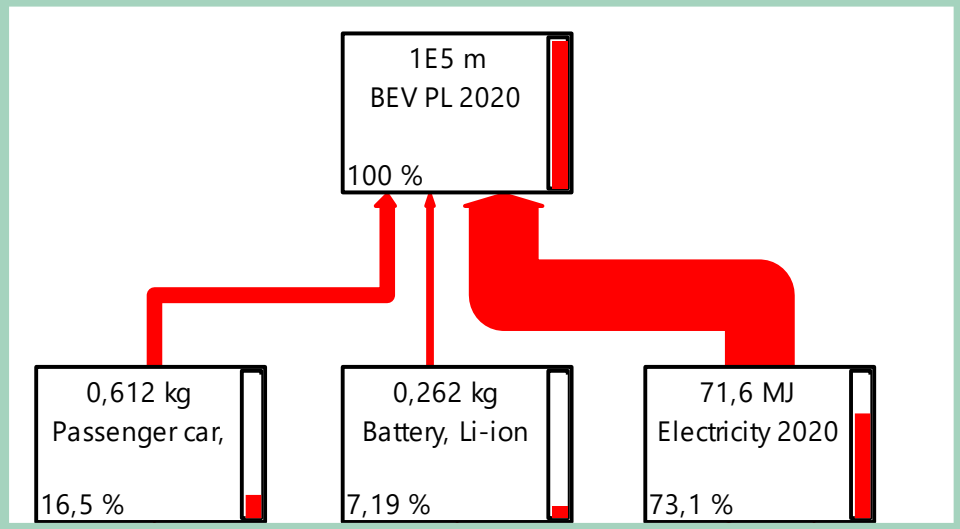
Environmental footprints of BEVs in Poland



Determinants of the carbon footprint of BEVs

$$CF_{EV} = (CF_{ES\,1-8} * S_{ES\,1-8}) * E_{EV}$$

Computational model of carbon footprint



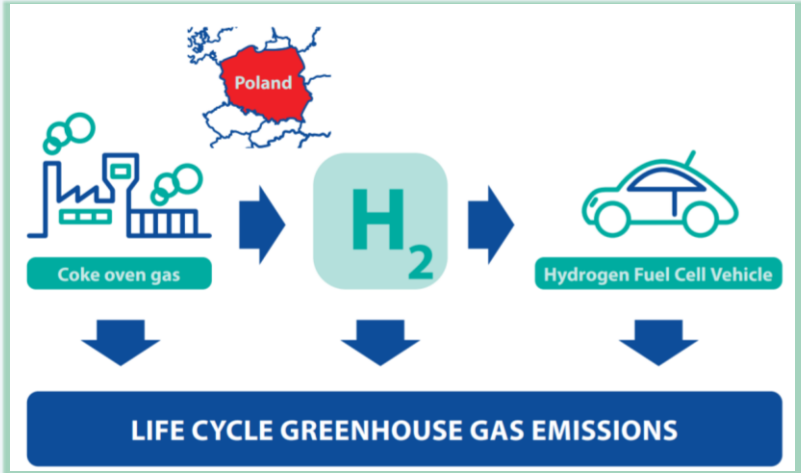
Determinants of the water footprint of BEVs

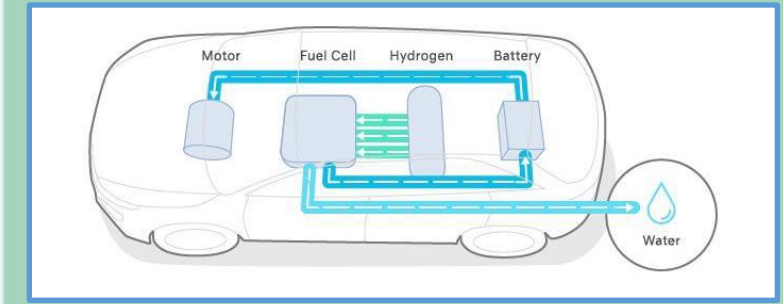
$$WF_{EV} = (WF_{ES\,1-8} * S_{ES\,1-8}) * E_{EV}$$

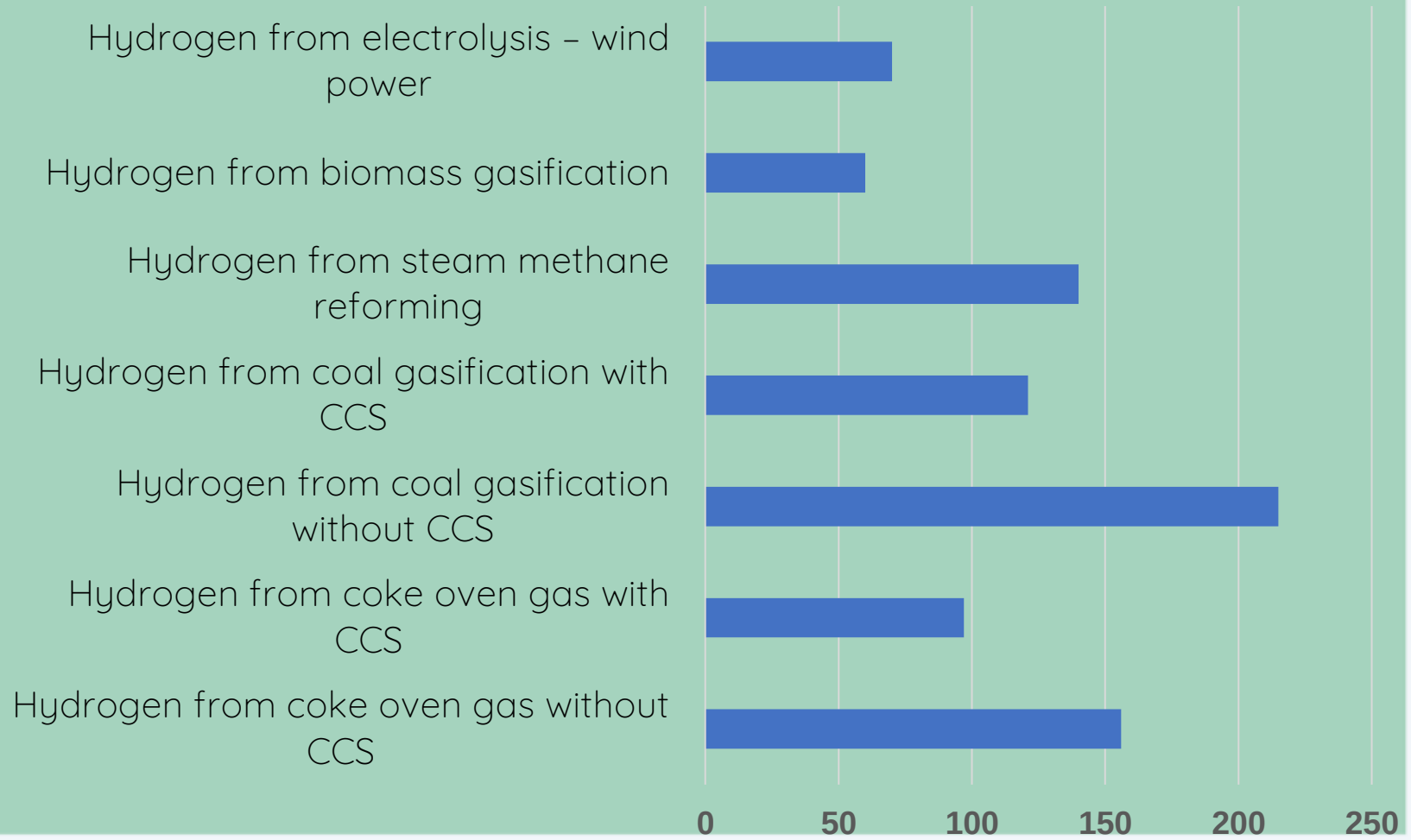
Computational model of water footprint

Co-funded by the European Union

Results of LCA for FCEVs

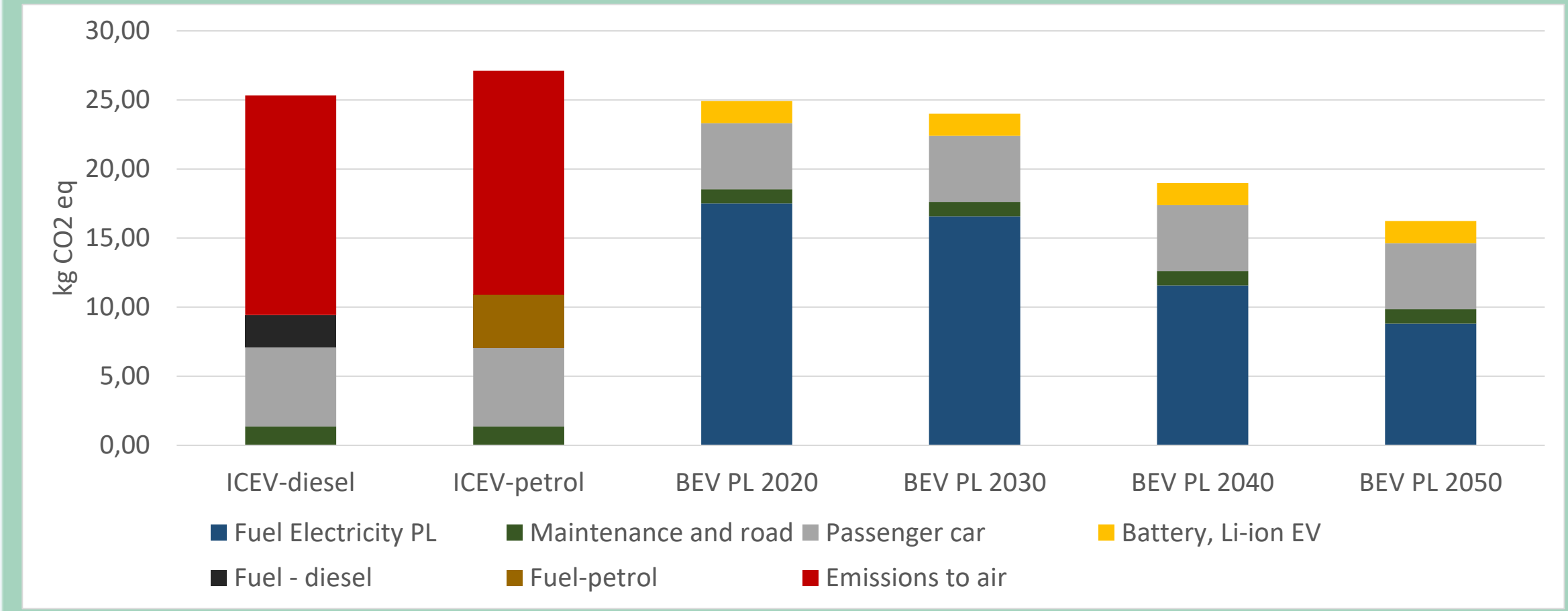






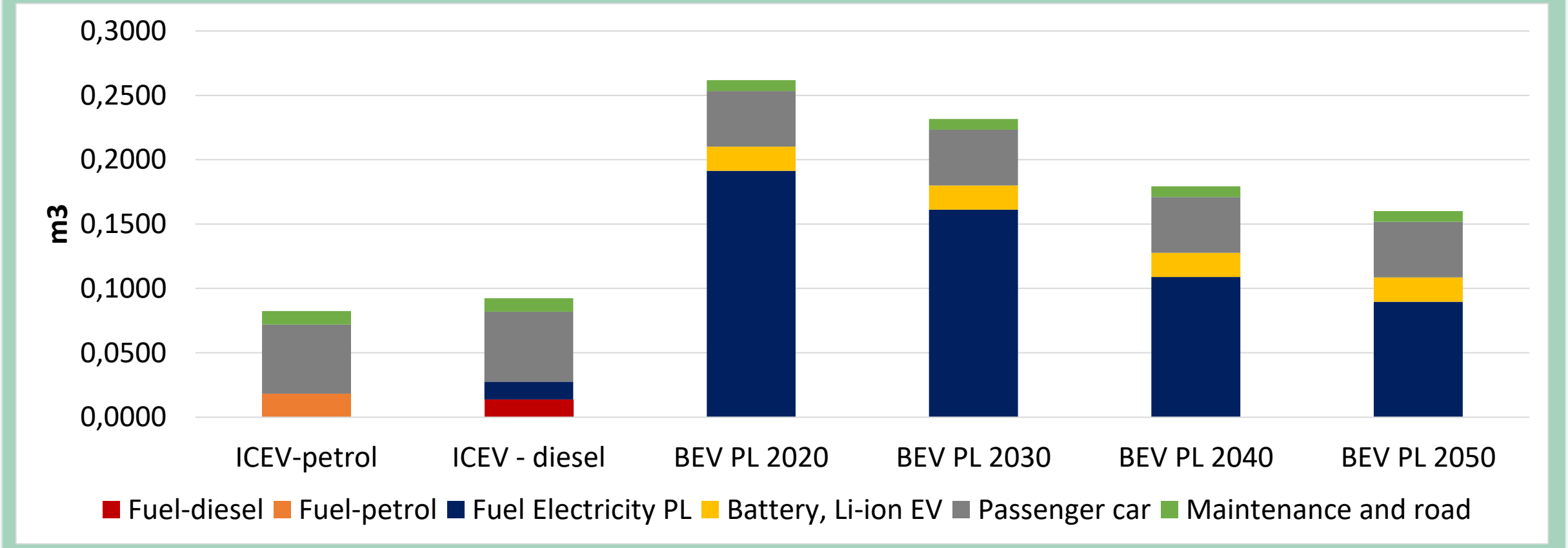
Co-funded by the European Union

Carbon footprint of petrol ICEVs, diesel ICEVs, and BEVs



Co-funded by the European Union

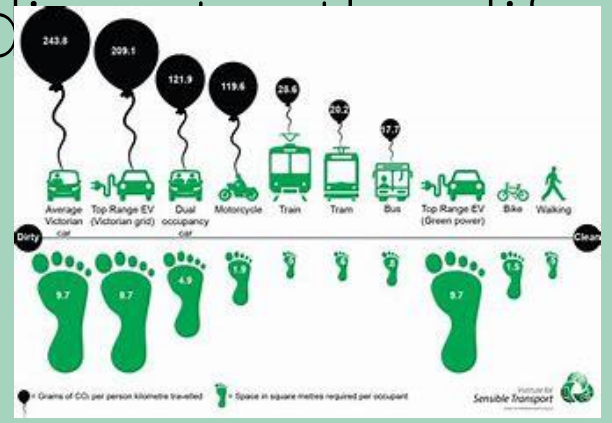
Water footprint of petrol ICEVs, diesel ICEVs and BEVs



Co-funded by the European Union

Conclusions

Environmental footprints proposed are useful tools which can serve the purpose of decision making for the assessment of transport sustainability and circular economy in transport accord



Co-funded by the European Union

aLIFEca

You can become a specialist in LCA of alternative fuels with MOOC aLIFEca

Co-funded by the European Union