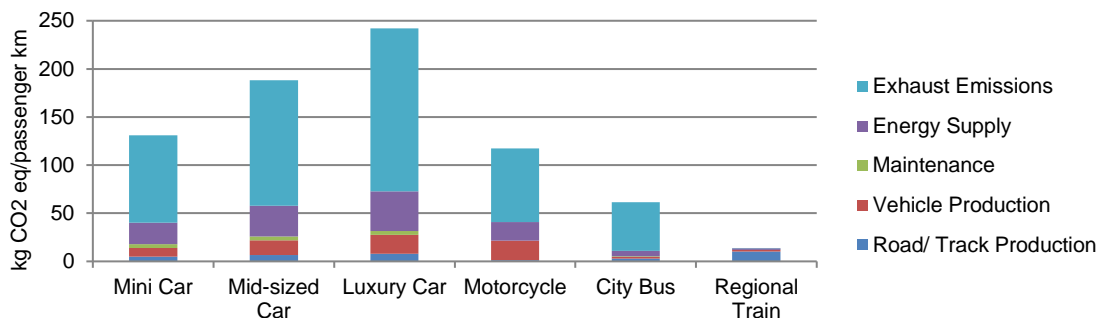


CA: B2 Topic: B2.2 Transportation Impact Assessment
Code: M3-B2.2: Indicators for technology performance

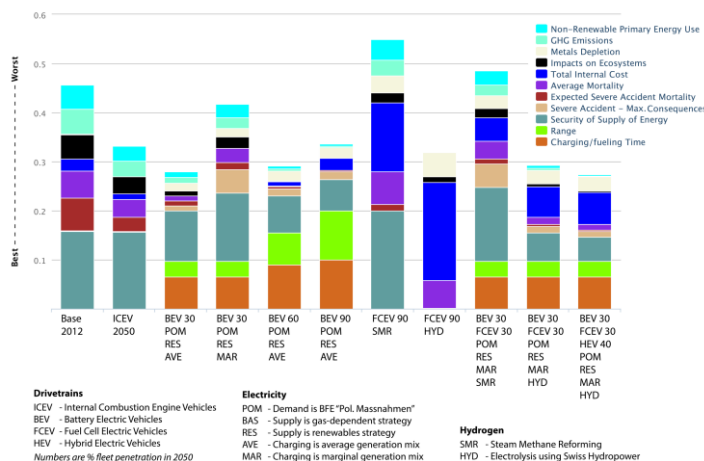
An example of estimated performance of **current** mobility technologies is provided in the figure below showing Greenhouse Gas Emissions (GHG) based on Life Cycle Assessment (LCA). A broad spectrum of environmental, economic, risk and utility indicators was generated for all major current mobility technologies.



Life cycle global warming emissions per passenger kilometer for common passenger transport modes.

Thanks to synergies with the THELMA project and its continuation within the SCCER Mobility corresponding sustainability indicators were generated for **future** passenger cars with time horizon until year 2050. Nearly 3000 different vehicle types, combining different vehicle classes, drivetrains, and energy supply chains, were evaluated employing Life Cycle Assessment (LCA), Cost Assessment (CA) and Risk Assessment (RA). Multi-Criteria Decision Analysis (MCDA) was applied to car fleet options with different proportions of advanced technologies as well as different ways that the energy system could develop. The fleet development is based on s-shaped market penetration curves for electric vehicles to meet the final sales target in 2050. Battery vehicle sales are allocated to drivers with the highest economic payback based on multi-agent transport simulation (MATSim) driving profiles, while all other drivetrains were evenly distributed to the remaining drivers.

Once the full set of sustainability performance indicators was available for current and future passenger cars a Multi-criteria Decision Analysis (MCDA) framework was created in order to better understand the tradeoffs associated with different proportions of advanced powertrain vehicles in the future passenger car fleet. Compared to the base year, the total GHG emissions caused by Swiss passenger cars in 2050 are estimated to decrease by 25%-65%, depending on the penetration rate of advanced powertrain vehicles and the development of the energy system. MCDA result considering many indicators with equal weighting of environmental, economic, social, security of supply and utility criteria is shown below. This broader evaluation exhibits a more differentiated picture and indicates some challenges for advanced mobility with respect to sustainability goals.



Car Fleet Multi-Criteria Decision Analysis (MCDA) Ranks with equal waiting of sustainability criteria (Source: Hirschberg et al., 2016).