

Key Challenges for Sustainable Propulsion

Introduction

In the area of Sustainable Propulsion, co-funded research supports the development of technologies and services that meet customer and societal demands whilst fulfilling more and more challenging regulatory standards. This document describes the Sustainable Propulsion Key Challenges and Research Recommendations.

Optimised powertrain technologies for future hybrid vehicles

Mobility of people and transportation of goods are fundamental needs of our modern society and the evolution of the road transport system will improve through advances in vehicle and powertrain technologies in accordance with the future fuels & energy scenario. The Internal Combustion Engine (ICE) has played a fundamental role over the last century and most likely will continue to do so even over the medium- to long-term (i.e. until 2030 and beyond).

Increasingly the optimisation of the powertrain goes hand-in-hand with all types of hybridisation applications as well as dedicated alternative-fuel engines. In particular, the ongoing electrification of the powertrain will continue to progress according to the different vehicle mission profiles, while the need to increase energy security and reduce the dependency on fossil- and oil-based fuels will promote wider exploitation of renewable energy sources.

As concerns the Commercial Vehicles market, it is expected that ICEs will remain predominant for years to come given the need for high energy density for the propulsion of larger vehicles.

How to optimise combustion processes and architectures to make ICEs even cleaner, more efficient and cost competitive?

Affordable Zero Emission Vehicles (BEVs/FCEVs)

Moving towards the widespread market penetration of zero emission vehicles is an ambitious societal challenge that could become a reality in the next decades. In the longer-term perspective, the development stage of a European electricity and hydrogen infrastructures is seen as a key enabler for Battery Electric Vehicles and Fuel Cell Electric Vehicles to become more popular and appealing to customers.

Further steps have to be made to adapt the range of these vehicles to the customers' expectation and identify cost-effective solutions for the systems and components (e.g. the battery and its management system) in order to make these vehicles affordable. New vehicle concepts better suited for future integrated mobility systems and urban mobility needs, both for people and for goods transportation, must also be developed.

How to develop Zero Emission Vehicles that are affordable and are supported by an appropriate energy infrastructure?

Sustainable Fuels & Energy Provision

Energy is essential for transport: today, fossil fuels (oil and natural gas) still provide the major source. While global transport fuel demand is growing rapidly, the reduction of energy-related CO₂ emissions is paramount in order to mitigate climate change effects and environmental impact.

Biofuels (liquid and gaseous fuels produced from biomass) as well as new pathways to produce synthetic fuels based on renewable energy sources will prove to be an essential element for the future energy needs of the transport sector. Technical impact assessments comparing all of the different feasible pathways are essential to evaluate all the stages of the life of products from cradle to grave (i.e. from raw material extraction through materials processing, manufacture, distribution, use, repair, maintenance, and disposal or recycling).

How to optimise road transport with sustainable fuels and energy, reducing GHG emissions from well-to-wheel and noxious emissions from tank-to-wheel?