



Executive Summary

This report is a deliverable of USE-iT (Users, Safety, Security and Energy in Transport Infrastructure); a Horizon 2020 Coordination and Support Action (CSA) project managed by the Forum of European Highway Research Laboratories (FEHRL). The aim of USE-iT is to better understand the common challenges facing transport modes and in conjunction with stakeholders to produce a multi-modal research roadmap to develop technologies and approaches to addressing these challenges. In addition to a work package on management (WP1) and a work package on dissemination activities (WP5), USE-iT is divided into three technical Work Packages addressing important challenges facing all modes; providing better customer information (WP2); improving safety and safety (WP3) and reducing carbon emissions and energy consumption (WP4). This report relates to Work Package 4; reducing the carbon emissions and energy consumption associated with the transport sector.

Transport is one of the largest contributors to global greenhouse gas emissions (GHG), and user of energy – mainly fossil fuels. Following the European Commission’s Transport White Paper [2], the EU transport sector needs to reduce its emissions by 60% by 2050 compared to 1990s levels, which represents a significant challenge for all modes. Over the past decade a multitude of different innovations have been developed which are designed to reduce carbon, however the difficulty for the industry is to identify which ones have the most potential to both reduce carbon and maintain/improve other vital characteristics such as safety, durability, affordability etc. In WP4 a significant number of technologies were identified which could help reduce energy and carbon; these have been categorised into three areas, each with three concepts, as shown below.

Area	Concept
Powering transport	Improving fuel efficiency
	Use of alternative fuels
	Energy harvesting
Constructing and maintaining infrastructure and vehicles	Low carbon materials and design
	Improved asset management
	Efficient technology and automation
Operating and managing transport systems	Traffic management
	Sustainable procurement
	Behaviour change

An international literature review was carried out to identify technologies related to each concept. A total of 111 technologies were identified, the majority of which relate to the infrastructure and technology domains, and road and rail modes. The list produced is by no means exhaustive, but does represent a broad range of technologies or approaches that may be used in the transport sector to reduce carbon. The technologies are summarised in the body of this report, and described in more detail in the templates in Appendix B.

The next step in the project is to discuss the technologies with key industry stakeholders from all modes in order to identify potential research topics that could benefit more than one transport mode. This will be done through:

- A stakeholder workshop to be held on 21st January 2016 in Brussels
- A questionnaire sent out to stakeholders on 28th November 2015
- In-depth interviews with stakeholders to be carried out between December 2015 and February 2016.

The additional information gathered will be summarised in the next WP4 deliverable that will identify common research challenges across modes. The research topics from WP4 will be incorporated into the final USE-iT research agenda, together with the outputs from the other WPs. This research roadmap will be a useful resource in the development of investment strategies for multiple transport infrastructure funders including European, national and regional public bodies and private infrastructure investors.