4.6 Challenge 6: ICT for Mobility, Environmental Sustainability and Energy Efficiency

Economic growth is increasing the demand for energy. To maintain its prosperity and competitiveness on global markets, Europe has to focus on energy efficiency in the most energy-intensive sectors[20]. The recent liberalisation of the energy market has stimulated the offer of eco-innovative solutions and new economic models at service supply level, at local level (cities, neighbourhoods) and at large.

Society at large is increasingly aware and sensitive to climate change impact and to the importance of a safe, clean and healthy environment to sustain quality of life. EU leaders have pleaded in favour of an integrated climate and energy policy[21]. In addition to reducing its gas emissions, Europe must also take measures to adapt to climate change and minimise adverse impact on people, the economy and the environment[22].

Transport accounts for ~30% of total energy consumption in the EU. While the EU is currently negotiating with the automotive industry on how to reach an average CO_2 emission of 120g/km for the new cars fleet by 2012, ICTs offer a new, complementary way of reducing CO_2 emissions and increasing safety of the whole transportation system. This includes dynamic transport management and control strategies involving multiple interactions with vehicles.

ICT for safe, clean and smart mobility

ICT continues to provide new intelligent systems that assist the driver to avoid accidents, provide drivers with real time information to avoid congestion, and optimise a journey or the engine performance to improve energy efficiency. Autonomous on-board systems are complemented with vehicle-to-vehicle and vehicle-to-infrastructure co-operative technologies and improved, flexible traffic network management. The future transportation system needs cleaner and more efficient vehicles, energy-efficient intelligent infrastructure (including cooperative traffic control and management systems), as well as new mobility concepts. Improving safety remains a key objective.

ICT for energy efficiency

ICT plays an increasing role in reducing the energy intensity of the economy, thus helping to decouple growth from energy consumption and creating new opportunities. Innovative ICT-based energy saving tools and techniques will help the European products and services to become more competitive and will foster the emergence of a new category of jobs and energy efficiency services. The power grid needs new ICT-based monitoring and control systems to take on its growing complexity and distribution and has to incorporate user-oriented energy trading facilities; optimisation in near-real time of the production/demand matching is the challenge to achieve energy positive buildings and neighbourhoods.

ICT for environmental sustainability and climate change adaptation

Improved connectivity of environmental systems is increasingly required as a result of the multiplication of international environmental commitments. Policy formulation and environmental management increasingly rely on distributed monitoring and management

[20] Buildings ~40 %, transport ~30% and industry ~30%.

[21] The European Council of 8-9 March 2007 set the combined targets of (i) reducing greenhouse gas emissions by 20% by 2020 (compared to 1990), (ii) increasing to 20 % the share of renewable energy sources by 2020 (compared to the present 6,5%) and (iii) saving 20 % of the EU's energy consumption (compared to projections for 2020).

[22] Green Paper "Adapting to climate change in Europe – options for EU Action", COM(2007)

systems able to interact with common protocols and semantics and to cope with higher complexity at various scales. ICT offer an enormous potential for bridging information spaces and stimulate environmental services in Europe. Moreover, adapting to climate change and the related more frequent and extreme weather events requires a strong effort to raise the European capacity to mitigate impacts of natural disasters.

ICT and urban infrastructures

Cities represent a particularly complex environment with acute sustainability challenges. Four out of five Europeans live in urban areas which consume about 80% of the energy in Europe. Cities import huge amount of resources through large infrastructures to consume them in various processes creating air, water and land pollutions. Urban transport faces congestion problems and accounts for up to 70% of pollutants from transport. Optimal management of urban complexity requires full integration of a wide range of technologies.

Research under this Challenge should take into consideration relevant technologies and other results from successfully completed or ongoing projects.

Objective ICT-2009.6.1: ICT for Safety and Energy Efficiency in Mobility

Target Outcomes

a) **ICT for Intelligent Vehicle Systems** for further improving road safety and overall performance of transportation systems. This includes advanced in-vehicle safety systems with improved performance and reduced costs, based on open standard elements; systems supporting autonomous driving (first in restricted environments and later on open environments); new approaches to crash avoidance and collision reduction including development of sensors and sensor networks; human machine interface design principles; advanced methods for traffic situation detection and communication (including vulnerable road users); and technologies for addressing digital footprint, data security and privacy of in-vehicle applications; numerical and experimental methods and technologies for design and evaluation of systems under real world conditions; methods for the design and evaluation of systems.

   Projects need to take an integrated approach to safety, considering together the infrastructure, vehicles, drivers and other transport users.

b) **ICT for Clean and Efficient Mobility** for further improving energy efficiency and reducing CO_2 emissions in all modes of transport. This includes new tools, systems and services supporting energy-efficient driving (eco-driving) based on on-board systems and/or co-operative infrastructure and energy-optimised, adaptive traffic control and management technologies and systems for urban areas and inter-urban road networks. It also includes methodologies for assessing the impact of advanced ICTs in energy efficiency and CO_2 reduction, aiming at international harmonisation and standardisation of the methodologies through co-operation with Japan and the USA.

c) **Coordination and Support Actions**

   A common research agenda for energy efficiency by enhancing international cooperation; increased user awareness and dissemination of research results by supporting the Intelligent Car Initiative and the eSafety Forum, by supporting standardisation and by preparing a common showcase for cooperative systems.

Expected impact

- World leadership of Europe's industry in the area of Intelligent Vehicle Systems and expansion to new emerging markets, improving the competitiveness of the whole transport sector and the automotive industry.
- Significant improvements in safety, security and comfort of transport. This includes contribution towards the objective of reducing fatalities with 50% in the EU by 2010, and longer term work towards the 'zero-fatalities' scenario.
- Significant improvements in energy efficiency, emissions reduction and sustainability of transport. This includes contribution to reduction in the energy consumption and congestion in road transport.

Funding Schemes

a) and b): IP, STREP; c): CSA

Indicative budget distribution[10]

- IP/STREP: EUR 48 million, of which a minimum of 50% to IPs and a minimum of 30% to STREPs

- CSA: EUR 5 million

Call

ICT call 4

Objective ICT-2009.6.2: ICT for Mobility of the Future

Target outcomes

a) **Field Operational Tests for Integrated Safety Systems and Co-operative Systems** to assess improvements in the efficiency of the transport system, in the safety of all road users and in making individual mobility more comfortable. This includes large-scale test programmes aiming at a comprehensive assessment of the efficiency, quality, robustness and user-friendliness of close-to market systems, before their full-scale deployment in Europe. Where needed, performance validation of safety-related co-operative systems can be envisaged in controlled proving ground environments emulating realistic levels of complexity.

   Projects need to collect statistically significant data allowing analysis of user acceptance, performance and benefits for road safety and efficiency of both autonomous on-board and cooperative systems, and to assess especially the impact of integration of in-vehicle safety systems with the co-operative systems including naturalistic driving tests, where possible building on initiatives promoted by Member States and/or Associated Countries.

   The objective is to support at least two IPs to be funded under a).

b) **ICT-based systems and services for Smart Urban Mobility and new Mobility Concepts** to address the environmental footprint and safety of mobility, while fostering economic growth. This includes innovative new tools, services and methods for demand management, moving from restrictive to permissive systems; ICT tools and services for logistics optimised for urban environments; use of ICT for replacing mobility (virtual mobility, telepresence); and new, multi-modal urban mobility concepts.

c) **Coordination and support actions**

In the framework of the Intelligent Car initiative: research agendas, dissemination of results (user awareness campaigns), assessments of socio-economic impact and training.

d) **International cooperation**

In accordance with the specific cooperation agreements with Japan and the USA, active exchange of information will be fostered through the creation of bilateral task force(s) and regular workshops which will establish a mechanism for mutual validation and exploitation of programme results, e.g. methodologies, draft specifications and standards, and for accessing Field Operational Tests datasets.

Expected Impact

- Improved safety, efficiency and competitiveness of transport systems across Europe, towards the objective of reducing fatalities within the EU.
- Optimised mobility of people and goods in urban environments across different transport modes, through the provision of accessible and reliable logistics information services.
- Improved quality of life in urban environments, through the provision of innovative demand management and traffic control and management systems, as well as new mobility concepts which meet the increased demand, support economic growth, are environmentally sustainable and capable of accommodating future uncertainties and shocks.
- Wider uptake of intelligent vehicle systems and co-operative systems through proof-of-concept to all stakeholders in Field Operational Tests.
- Increased European research excellence by fostering closer cooperation with leading international partners.

Funding schemes

a): IP, STREP, CSA; b): STREP; c), d): CSA

Indicative budget distribution[10]

- IP/STREP: EUR 32 million; the objective is to support at least 2 IPs to be funded under a) in addition to STREPs

- CSA: EUR 5 million

Call

ICT call 6

Objective ICT-2009.6.3: ICT for Energy Efficiency

Target Outcomes

a) **ICT tools for the future electricity market**

Architectures and tools enabling the emergence of an open electricity market that allows new roles for energy brokers, that makes it possible for third parties to operate as virtual power plants and that allows for the establishment of variable energy tariffs in near real-time. This includes specific service delivery platform and uniform energy and information interfaces that are open to different business models and that can self-configure and adapt to the varying requirements of a market still in its definition phase.