

V.3 'European Green Cars' Public-Private Partnership (GC)- Cross-thematic cooperation between NMP, Environment (including Climate Change), Transport (including Aeronautics) and ICT

The automotive industry is one of Europe's key industrial sectors, whose importance is largely derived from its linkages within the domestic and international economy and its complex value chain. It is estimated to account for close to 8% of total manufacturing value added (ca. EUR 120 billion, 2006) and about 6% of total manufacturing employment (over 2 million employees). The automotive industry also provides an indirect employment to 10-11 million persons and is one of the largest RTD investors in the EU with over EUR 20 billion annually (ca. 5% of its turnover)⁵⁶.

The foreseeable shortage in crude oil based energy carriers is driving fears about energy security: 73% of all oil consumed in Europe is used in transport and estimates predict a doubling of passenger cars within the next 20 years. From an environmental and energy point of view there is an urgent need to find alternatives to fossil fuels in order to secure future energy supply, to guarantee the availability of appropriate material recycling technologies, and to reduce greenhouse gas emissions and other potential environmental impacts related to the automotive industry entire life-cycle. It is thus increasingly evident that a particular emphasis should be put on the rapid development of technologies supporting the massive emergence of more efficient and sustainable road transport solutions based on alternative fuels/energy, and on the RTD efforts associated with them.

The *'European Green Cars' PPP Initiative* is a series of measures boosting research and innovation aiming at facilitating the deployment of a new generation of passenger cars, trucks and buses that will spare our environment and lives and ensure jobs, economic activity and competitive advantage to car industries in the global market. A series of different measures are proposed: support to research and innovation through FP7 funding schemes, specific EIB loans to the automotive and other transport industries and its suppliers, in particular for innovative clean road transport, and a series of legislative measures to promote the greening of road transport (circulation and registration taxes, scrapping of old cars, procurement rules, the CARS21 initiative).

⁵⁶ "European industry – a sectoral overview, 2006 update, EC-DG ENTR

Other actions that are very closely related to the 'European Green Cars' Initiative but not formally included in it are being implemented, such as the 'Fuel Cell and Hydrogen' (FCH) Joint Technology Initiative and the road transport projects funded under the FP7 Transport Theme.

The 'European Green Cars' Initiative includes three major research and development avenues within its RTD pillar:

- **Research for heavy duty vehicles based on internal combustion engines (ICE)** [Sustainable Surface Transport sub-theme (SST)]: The research will primarily concentrate on advanced ICE with emphasis on new combustion, the use of alternative fuels (e.g. bio-methane), intelligent control systems, 'mild' hybridisation (use of recuperated electricity to power the auxiliary systems) and special tyres for low rolling resistance.
- **Research on electric and hybrid vehicles:** This component will be the most essential in this package. To have a real impact on the green economy, research in this field should no longer focus on electric vehicle technologies seen in isolation from the rest of the transport system: a massive introduction of the technology requires the availability of smart electricity grids and intelligent vehicle charging systems tailored to customers' needs.
- **Logistics and co-modality** combined with **intelligent transport system** technologies are essential to optimize the overall system efficiency and sustainability avoiding for example that empty trucks circulate on highways due to sub-optimal logistics. In this respect, smooth and co-operative interactions between the different transport modes will be essential.

The 2011 work programme focuses on the second research avenue: electric and hybrid vehicles and their infrastructures. Three groups of topics covering collaborative research activities as well as coordination and support actions are included:

- Materials, technologies and processes for sustainable automotive electrochemical storage applications, jointly implemented between Themes NMP, Transport and Environment.
- Research on electric and hybrid vehicles, implemented through the Sustainable Surface Transport (SST) sub-theme of the Transport Theme.
- Information and Communication Technologies for the fully electric vehicle, implemented through the ICT Theme.

The indicative budget for the "European Green Cars" PPP initiative is EUR 95.75 million in 2011, of which EUR 50.25 million is from the Transport Theme, EUR 10 million from the NMP Theme, EUR 30 million from the ICT Theme, and EUR 5.5 million from the Environment Theme.

V.3.1 "European Green Cars" (GC) – Topics implemented jointly by NMP, Transport (including Aeronautics) and Environment (including Climate Change) Themes.

One of the crucial aspects of research needed for electric and hybrid vehicles related to electrochemical storage. It should concentrate on both: new low cost materials (nickel and cobalt oxides are expensive and their prices are exploding) and on safety problems related to thermal runaway. Research on these issues is multidisciplinary and must involve several Themes to gather specialised knowledge and critical mass in a research field where step changes are needed. Another aspect that will be looked at is the issue of the recycling of batteries at the end of their life cycle and the development of technologies to maximise the

recovery of materials, in particular for those of high added-value or presenting high environmental impacts.

The Call is organized jointly by the NMP, Transport and Environment Themes. The indicative budget of the NMP part for this "Green cars" PPP initiative is EUR 10 million in 2011, with the Transport Theme contributing also EUR 10 million, and the Environment Theme contributing EUR 5.5 million. The indicative budget of the Call is therefore EUR 25.5 million.

GC.NMP.2011-1, GC.ENV.2011.3.1.3-1, GC.SST.2011.7-7 **Advanced eco-design and manufacturing processes for batteries and electrical components.**

Content/scope: Further development and deployment of electrical vehicles call for large scale production of batteries and electrical components with good performances and at the lowest possible cost. Research shall address the whole value chain including the eco-design, assembly/integration and production of batteries and electrical components (motors, battery management systems, etc.). Eco-design should properly account for the relevant dismantling, recycling/disposal, and health and safety aspects of critical materials.

- For near-to-market types of lithium-based batteries, projects should focus on manufacturing processes of cells but also on their integration into manageable battery modules and packs. Advanced manufacturing processes of battery cells, should be flexible enough or reconfigurable to cope with new chemistries. Special attention should be devoted to thermal management systems and safety issues, which are critically dependant on battery system design.
- For electric drivetrains and in particular motors, the main challenge of cost reductions is to be achieved by design improvements in order to produce lighter systems with increased power density, while at the same time taking into account the availability of critical materials and their dismantling/recycling. Projects should not include design or manufacturing of the power chips themselves.

For a significant industrial benefit, it should be possible to integrate the advanced manufacturing tools, methodologies and processes developed within the project into conventional or already existing production lines or, in case of new architectures, include new methodologies. In both cases the projects are expected to cover small-scale production-line demonstrators. The environmental improvements achieved should be proven via ILCD-conform Life Cycle Assessment. The feasibility of the dismantling/recycling process for motors should be proven at least at bench/pilot scale for the most critical materials.

In order to ensure the industrial relevance and impact of the research effort, active participation of industrial partners, including SMEs, components suppliers, electrical vehicle manufacturers and component recyclers, represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

The work should be complementary to the objective GC-ICT-2011.6.8 'ICT for fully electric vehicles'.

Funding Scheme: Large scale integrating collaborative projects

Additional eligibility criterion: The EU contribution requested must be greater than EUR 4 million.

Expected impact: Establishing the basis for a world level European automotive battery and electrical components manufacturing industry. In particular production of cells, battery packs, electrical motors and components with the required performances at competitive costs. Reduction of waste production and improvement of resource efficiency through a more efficient recycling of critical materials.

GC.ENV.2011.3.1.3-2 Operational guidance for Life Cycle Assessment studies of the European Green Cars Initiative

Environmental Sustainability is a key driver for the Green Cars PPP. All the technological improvements that will be achieved within this joint action will have to be assessed and measured in a consistent and scientifically sound way. In order to obtain these objectives, the environmental gains achieved by the funded projects should be assessed using Life Cycle Assessments done according to the International Reference Life Cycle Data System (ILCD) Handbook. What is needed in the context of this PPP is(are) (i) specific operational guidance(s) that tailor(s) the general ILCD Handbook for application to future products, and (ii) related training material and courses for practitioners in industry.

The guidance(s) shall also look at items more specific to electric vehicles for a coherent benchmark framework with the other technological options: battery and electric component production process, end of life and recycling, typical vehicle utilization and associated measurement driving cycles, energy interaction between electricity storage systems and the power generation grid, etc. Dissemination of results, in particular to the green cars community and to the projects already selected in the European Green Cars Initiative, is of primary importance for the success of this action. The project will only develop the specific guidance(s) - the actual data collection and execution of the LCA(s) will be subject to separate calls. The project should be planned in order to deliver all results within maximum one year from its starting date.

Funding Scheme: Coordination and Support Actions (Supporting Action)

Additional eligibility criterion: The requested EU contribution must not exceed EUR 500 000.

Additional information: Up to 1 project will be selected.

Expected Impact: Increase in the consistency and transparency of the LCA studies carried out on electric vehicles and, more in general, on all projects performed within the green cars PPP. Support - of more solid and reproducible data - to environmental and innovation policies in fields related to the Green Cars PPP (e.g. End of Life Vehicles, Weee Directive, Sustainable and Consumption Action Plan, SET-Plan, etc)

V.3.2 "European Green Cars" (GC) – Topics covered by the Sustainable Transport (SST) sub-theme of Transport Theme.

GC.SST.2011.7-1 Specific safety issues of electric vehicles

To facilitate widespread customer acceptance and use of Fully Electric Vehicles (FEVs), a series of potentially-critical safety issues specifically need to be addressed. Therefore, an analysis of the consequences of electrification with respect to safety requirements has to be made. In particular, the presence of high voltages and potentially hazardous chemicals necessitate the definition of specific design, usage and rescue guidelines, while the absence of engine noise requires in-depth assessment regarding interior and exterior acoustic characteristics during normal operation.

Activities will focus on:

- Safe handling, rescue and maintenance including solutions to ensure safe plug-in/re-charging during normal operation, prevention of misuse/abuse, and protection against fire and electric shocks during maintenance and repair or in the event of a crash including rescue and towing operations in the post crash phase.

- Acoustic perception of the FEV, requiring solutions to warn vulnerable road users of the presence of a nearby moving vehicle while providing a means for heightening the awareness of drivers in critical situations. Including the application/adaptation of existing pedestrian protection systems (active safety) to the raised needs.

Different technologies and solutions shall be explored and assessed also from the perspective of overall effectiveness and acceptability, the objective being to develop FEVs which are optimized in terms of both energy efficiency and safety, a fundamental requirement to enable FEVs to become mass products in the future.

Innovative EV specific safety technologies and solutions should eliminate the risk that these new vehicles be perceived as less safe than their current equivalents, thus the safety and energy efficiency of EV use should contribute to more customer acceptance of EVs.

Given the specificity of these subtopics, small, focused projects are encouraged in particular.

The work should be complementary to the objective GC-ICT-2011.6.8 'ICT for fully electric vehicles'.

Funding scheme: Collaborative projects - small or medium-scale focused research.

Expected impact:

The expected impact of the first subtopic should be technologies and procedures that avoid additional casualties to the current level due to electrocution risks. The second subtopic should produce systems and technologies capable of giving effective warning to vulnerable users at a sufficient distance while maintaining the advantages of electric technologies in terms of improving the current road noise environment.

GC.SST.2011.7-2 Integrated thermal management

The challenge of the implementation on a wide scale of electric vehicles needs a high reliability of the electric power train including the battery, the longest possible range of the vehicle and the satisfaction of customers expectations for thermal comfort. Therefore, the thermal management of the power train and of the vehicle itself, which includes heating and cooling aspects, is an integrated important part of the future electrification of vehicles. The goal of these activities is to develop cost efficient and industrially viable integrated thermal systems for long range, reliable and comfortable electric vehicles when no waste heat source is available.

Activities will address:

- Improvement of the efficiency of the thermal control of the energy storage system, independently of the actual ambient temperature, in order to reduce the impact on vehicle range and battery life of extremely cold or high environments.
- Optimization of the impact of the thermal comfort of the users on the overall energy consumption of the vehicle through innovative, light, cost efficient, electronically controlled materials used in the vehicle and their integration aspects (e.g. new insulating materials, active glazing, local heating, etc.).
- Development of cost effective thermal management systems of the power train including the cooling and heating aspects for the battery and power electronics during charging, operation of the vehicle as well as during parking periods.
- Cooling aspects of the electric motor in combination with a ICE range extender or auxiliaries. This activity includes the integration of the electric motor either with the combustion engine (high temperature), or with the power electronics, battery and air

conditioning (low temperature) in one thermal system, and the control and optimization of the heat flows between these elements especially during heating up.

The work should be complementary to the objective GC-ICT-2011.6.8 'ICT for fully electric vehicles'.

Funding scheme: Collaborative projects - small or medium-scale focused research

Expected impact:

- Synergies in terms of energy efficiency, cost, weight, size and robustness due to optimized coolant temperature and heat load timing resulting from the integration of the electric motor with other vehicle functions in one thermal system.
- A substantial reduction of the energy requirement for the cooling, heating and demisting functions with respect to the current state of the art technologies (compressor driven AC and electric resistances)
- A significant weight reduction of the cooling circuits and equipment to achieve the same component level cooling requirements.

GC.SST.2011.7-3 Efficient long distance transport – waste heat recovery

In a current truck engine, more than about 50% of the combustion energy is lost via the exhaust and the heat rejection system. Therefore, reducing this heat loss is a clear target for further fuel consumption reduction. The further development of waste heat recovery systems and, in particular, the associated components, such as the expander (Rankine cycle), advanced heat exchanger and cooling system is therefore needed, including the investigation of more advanced waste heat recovery systems based on thermodynamic cycles (organic/non-organic) or other advanced technologies, excluding thermoelectric devices, already researched in existing projects. The integration of waste heat recovery systems with different degrees of hybridization can also be considered in order to achieve the highest levels of efficiency.

Scope of the work:

- System design for the thermodynamic cycle (organic and non-organic).
- Development of expanders, advanced heat exchangers and working fluids.
- Cooling system and integration, arrangement at the power train and vehicle.
- Development of simulation methods for future adaptation of such a system on the various power trains for heavy duty trucks.

Funding scheme: Collaborative projects- small or medium-scale focused research

Expected impact: A minimum 10% fuel consumption reduction at vehicle level (thus including the effect of any weight or performance penalties) should be demonstrated with an initial cost increase recoverable in a 5 year period.

GC.SST.2011.7-4 Urban – interurban shipments

Today, around 80% of the population worldwide lives in urban areas. Urban areas are consequently the hubs of enormous flows of goods and people with the associated problems of congestion, accidents and pollution. To deal with the multitude of challenges, a new concept of Smart Urban Freight Systems and sustainable solution for city based logistics has to be developed. The aim of this topic is to develop a comprehensive approach to provide the overall socio-economic, managerial, technical, environmental balance of such systems. The

logistics efficiency changes as well as the environmental effects shall be addressed by an impact assessment e.g. by applying planning and simulation tools.

The following aspects could be addressed and tested:

- New transportation solutions (electrical cars, public transport, etc.).
- New mechanisms for control on ordering, monitoring, supervising and executing city delivery.
- Decoupling of supply lines and distribution activities around cities.
- Optimization of terminals connecting long distance transport and urban distribution.
- Research on urban distribution of goods (delivery systems, delivery routes, last mile logistics organization and operation) to reduce the impact of freight movements on urban resident.
- New regulatory solutions.
- New instruments/technologies for urban freight data collection.
- The transport operation of delivery vehicles within zero-emission zones.
- Collaboration between authorities, transportation providers and major customers.

The proposal should consider previous work on urban freight financed through EU and/or national programmes or even city governments.

Funding scheme: Collaborative projects - small or medium-scale focused research

Expected impact: A more efficient urban freight distribution system and a sustainable European transport and mobility network within urban centres efficiently linked with long distance transportation. The added value of the proposed solutions must be realistically demonstrated on the basis of actual practices and measurable indicators.

GC.SST.2011.7-5 Integrated intermodal traveller services

The aim of the topic is to integrate available traveller information systems for all transport modes (rail, air, road and waterborne) in order to provide and establish an open platform for planning, booking and travelling multimodal journeys. Research should exploit the open platform concept further, and take into account the results of recent FP6 and FP7 projects on transport planning and travel information.

The trips can be long, i.e. from one country to another country, or short, i.e. within a city. The research aims at intermodal management based on up-to-date on-line information. The optimization of transport mode choices and interchanges will be based on real-time and forecast state of public and private transport as well as specific needs of users and service providers, journey purpose, cost and environmental impacts. Integrated travel information services should re-use as much as possible existing information services and allow for seamless integration of offerings of new and/or niche travel services and information providers.

These integrated travel information services shall ensure co-operation between transportation modes and improve the ability of the system to cope with unexpected scenarios. In particular, research should develop solutions to compensate for a sudden decrease of the traffic capacity in one transportation mode to ensure continuity of mobility services (for example, following unexpected hazards and natural phenomena, such as the recent volcanic ash clouds across Europe).

To ensure a seamless journey, seamless traveller information services are also required. The traveller information services can provide 'early warning' to travellers including regular updates on delays and service disruptions and will thus allow any necessary change of plan according to the actual situation.

The following aspects could be addressed:

- Creation of standardized interfaces to facilitate dynamic data exchanges among different transport modes, air, rail, water and public transport and different operators of these transport modes.
- Development of forecast mechanism to deliver a short term forecast of state of relevant transport modes. The forecast will be based on available information, e.g. weather, road traffic situation and planned large events. The forecast will be used to generate optimized intermodal exchange between different transport modes and different operators based on real-time information and forecasts to ensure a smooth journey.
- Design of standardized approach to deliver cross mode information. The information will be delivered to mobile devices with wireless communication. The information will also be integrated with e-ticket services.
- Development of recommendations on conditions on the availability of data and data exchange (metadata) between different actors.

The research activities should result in fully integrated intermodal transport services with support of traveller information services that are up-to-date, reliable, user-friendly and wide-ranging, as well as covering public transport and non-road modes.

A strong commitment from European and non-European stakeholders including research organizations, transport operators, information providers, industry associations and ITS organizations towards developing a joint platform and sharing information is essential.

Following the conclusions of the SIMBA 2 project, intermodal traveller services have been identified as a common field of research cooperation between Europe, Brazil, China and Russia, with strong commitment from non-European stakeholders, including research organizations, industry associations and ITS organizations. International cooperation is therefore encouraged, in particular with countries which are facing fast growth transport demand and/or advanced multi-modal traveller support systems (Brazil, China and Russia).

The research will support the development of specifications for compatibility, interoperability and continuity of intelligent transport systems in the area of EU-wide traveller information as foreseen by the future new Directive on the Deployment of Intelligent Transport Systems and the activities for the ITS Action Plan.

Funding scheme: Collaborative projects - small or medium-scale focused research for specific cooperation actions (CP-FP-SICA) dedicated to international cooperation partner countries.

Expected impact: Research will increase the acceptance and take up of new fully integrated intermodal traveller services and therefore contribute to a more efficient and safe transport system with reduced CO₂, pollutant emissions and noise.

GC.SST.2011.7-6. Capability of improving and exploiting capacity

Expenditures in logistics at EU level amount at roughly EUR 600 billion per year. If the loading factor in transport could be significantly improved, this would lead to substantial annual savings and contribute positively to sustainable transport. To achieve this, it is essential that a balance is found between two seemingly conflicting dilemmas: on the one

hand, the logistic process should have more frequent deliveries in order to deliver goods to the consumers; on the other hand, even very large companies do not carry enough volumes to exploit intermodal transport properly. To achieve a better balance, organizational changes are needed (in addition to those of e-logistic technologies). New ways of cooperation to reorganize and scale-up transport flows to fully exploit the transport capacity have to be found.

The topic aims at providing instruments to stimulate the cooperation between manufacturing and transport industries in the definition of innovative business models and measures, in view of increasing the load factor up to 80%. Models and measures could include share of transport capacity, new schemes of product sourcing, swapping, thus increasing reliability and efficiency of the logistic chain.

Through coordination and networking activities, studies or expert groups the following issues must be addressed:

- Promoting match-making and sharing sustainable logistics knowledge between manufacturing industries and the transport & distribution sector.
- Methodology to calculate revenues and benefits, including a legal framework to split costs and benefits in shared transportation.
- New business models for the entire supply-chain, fully based on the used of co-modality and focusing on the increase of loading factors through new practices, such as company collaboration, customer and product swapping, product sourcing, etc.
- Application and validation of business models on different configurations (supply chain, modes of transport, shippers, types of goods, etc.).

Expected outcomes of this action should be new business models developed by the industries in the direction of collaboration in managing and operating logistics, and to demonstrate - by means of use cases and comparison with baselines - that the practical application of these models improve both quality and performance of the logistics chain, expressed in terms of different indicators, such as load factor, overall costs, energy efficiency, etc.

Funding scheme: Coordination and Support Actions aiming at coordinating research

GC.SST.2011.7-8 ERA-Net Plus ‘Electromobility’

Content and scope: The main aim of this ERA-NET Plus is to pool the necessary financial resources from the participating national (or regional) research programmes and the European Union with a view to launching a single joint call for proposals for research projects in the field of Electromobility, which will be evaluated and managed jointly by the participating programmes.

An ERA-NET Plus on Electromobility research should aim at improving the coordination of national research activities and policies in the domain of transport regarding the integration of a sustainable infrastructure for Electromobility in Europe.

The joint call should focus on an interdisciplinary approach to transport research on the specific field of Electromobility.

More information about the ERA-NET PLUS actions (including eligibility criteria) can be found in Annex 4 of the work programme.

Funding scheme: Coordination and Support Actions aiming at coordinating research activities

Expected impact: As a complement to the European Green Car Initiative, a significant participation of the Member States and Associated States in shaping of the European landscape of Electromobility is expected. Better use of scarce resources and the avoidance of double funding. Reduction of fragmentation of research efforts made at national and regional level. The ERA-NET Plus can provide a basis for a long-term platform on Electromobility.

GC.SST.2011.7-9 Efficient long distance transport – future power train concepts (includes: advanced combustion and after-treatment)

The aim of this research is to contribute to the further reduction of the fuel consumption of heavy duty trucks. It is necessary to investigate the engine downsizing potentials, along with the possible integration of hybrid systems for boosting the power for acceleration and starting of heavy duty trucks on a hill. This approach also opens a potential for an emission reduction, due to reduced transient behaviour period of the truck engine. This sector is already facing the forthcoming EU VI emission legislation in 2012 and must therefore look to the further expected steps of regulation. Therefore, this aspect is also part of the objective of these research activities. To meet this challenge, it is necessary to work on the development of improved combustion systems as well as on key components, such as the turbo charging system, the thermal management for the after-treatment system and the efficiency of the Selective Catalytic Reduction (SCR) system. For the realization of this goal, advanced drive train control considering e.g. model based approaches is needed.

Scope of activities:

Engine innovation will include a suitable combination of these activities to demonstrate the expected impacts:

- Down-sizing / down-speeding with advanced turbo-charging.
- Development of a new turbo charger system with higher pressure ratio and wider area of high efficiency.
- Friction reduction: piston, crankshaft camshaft and auxiliaries (oil and water pumps).
- Faster combustion (e.g. high PCP, low EGR rate, VVA), supported by advanced injection strategies, using closed loop functionality as well as high thermal efficiency.
- Advanced air control systems for internal EGR and effective compression ratio management.

After-treatment innovation will include a suitable combination of these activities to demonstrate the expected impacts:

- Reduced thermal losses, with a possible integration of improved exhaust after treatment systems for cold start and transient conditions, considering new catalytic materials.
- Advanced NO_x after-treatment systems: SCR (Selective Catalytic Reduction) systems (e.g. new catalytic materials) and combinations with NO_x trap and particle filters/oxidat, with an additional aim of minimizing the NO₂ fraction in NO_x emissions.
- Heat management for the after-treatment system.

Funding scheme: Collaborative projects - large scale integrating projects

Expected impact: The results of the research will demonstrate a 15% efficiency improvement from the power train, based on Euro 5 power train (without considering the reduction of CO₂ through blending of bio fuels), on the WHTC and the ETC (all emissions should however be tested under both test cycles). At the same time Euro VI emission limits should be met (including measurement according to the forthcoming particle count methodology), with no

increase in the NO₂ share of the total engine-out Nox (both of the prototype and of the baseline engine). To ensure real life benefits, improvements should be confirmed with a multiplier for in-use compliance with PEMS testing reduced to 1.25. This activity will lead to new technologies for the next generation of truck power trains.

GC.SST.2011.7-10 Architectures of Light Duty Vehicles for urban freight transport

Electrified vehicles, which may be radically different from conventional vehicles, offer significant new opportunities in terms of functionality and construction whilst enabling further improvement of usability, energy efficiency and manufacturing processes. Whereas the architectures of vehicles currently on the market are constrained by mechanical, thermal and safety considerations due to the presence of the internal combustion engine and its transmission system, in many respects the requirements and constraints of an electrical power train are much less stringent and are yet to be fully exploited. Aiming at turning such innovative vehicles into viable products, novel architectures are needed which explore all the different aspects and requirements emerging from this new paradigm, particularly as concerns light duty vehicles (LDVs) and their usability with respect to mobility and the transportation of goods in the urban environment, e.g. last mile delivery and other applications such as the powering of tools by making appropriate use of the available source of electrical power.

Activities will focus on novel electrified LDV concepts and solutions (conversions and adaptations of existing vehicles and platforms are therefore excluded) to enable gains in their efficiency particularly with regard to:

- Usability in the urban environment.
- Optimized structural layout aiming at improving weight and crashworthiness.
- Modularization of subsystems and standardization of components for low cost and high efficiency.

These concepts should be considered in a holistic way to achieve optimized performance also with respect to safety, EMI/EMC and radiation health impact issues (particularly important given the longer driving time and therefore exposure), maintenance and repair, while exploiting the significant opportunities offered in terms of layout and packaging, functionality, and construction.

The development of complete vehicle concepts is envisioned, projects only dealing with a limited part of the topic are excluded, and a strong industrial participation is recommended in order to maximize the impact.

The work should be complementary to the objective GC-ICT-2011.6.8 'ICT for fully electric vehicles'.

Funding scheme: Collaborative Projects - small or medium-scale focused research.

Expected impact:

The proposal should quantify and demonstrate that the resulting vehicle concept would achieve higher energy efficiency (at least 40% less in terms of primary energy consumption) with respect to best of class vehicles in the same category, while achieving a range adequate to the typical daily urban mission.

GC.SST.2011.7-11 E-freight solutions and supply chain management

The European Commission in its Freight Logistics Action Plan introduces the e-Freight concept. The Freight Logistics Action Plan states the following aim: "To overcome the current and future transport problems Europe's transport system needs to be optimized by means of advanced logistics solutions that can increase the efficiency of individual modes and

their combinations". Transport administrations and the business community must share the responsibility for developing a common ICT application or e-freight framework in ways that serve transport policy goals, society's interests and have a convincing business case. From commercial, technical and business perspectives, there is a need for an open and efficient e-freight framework open to all partners in the transport supply chain. It must enable the management of goods movements into, out-of and around the Union that will operate within and across modes. It must be affordable, accessible, reliable, accountable and secure.

The aims of this topic are to:

- Demonstrate the interoperability of a wide range of e-logistic solutions that have been developed recently through various EU funded and national projects.
- Demonstrate that these solutions, while diverse in terms of concepts, information requirements and information management, fill the gap between data availability and data needs throughout the supply chain.

Specific issues to be addressed:

- To demonstrate the SME friendliness, giving SMEs access to easy-to-use and environmentally friendly co-modal transport options.
- To create a solid European transport e-logistic framework, which in its turn is a sound basis for developments on e-customs, e-health, etc.
- To analyse possible new roles, opportunities and responsibilities of stakeholders in respect of accurate data provision and management; or alternatively to describe new transportation business models.
- To develop where needed legal structures and measures required to make the intelligent cargo and supply chain management operate in an efficient, accurate and secure way, protecting users.

Scope:

- Geographically: EU and global transport & distribution.
- Door to door consignments and TEU levels.
- All inland modes, possibly with air transport linking up with IATA business.
- Large stakeholders but also SMEs.

Funding scheme: Collaborative Projects - small or medium-scale focused research

Expected impact:

The demonstration project needs to be of sufficient representative size that convincingly proves the attainability of an open e-freight framework, independent of specific technologies, and agreed among the stakeholders involved in supply chain management processes. The demonstration project must demonstrate the costs and benefits for the individual stakeholders when participating in such an e-freight framework.

V.3.3 "European Green Cars" (GC) – Topics covered by the ICT Theme.

GC-ICT-2011.6.8 ICT for fully electric vehicles

Full electric vehicles (FEV) means electrically propelled vehicles that provide significant driving range on pure battery based power. It includes vehicles having an on-board fuel based electrical generator (Range Extender based on Internal Combustion Engine or fuel cells).

Projects supported under this objective should advance the research, development and integration of major building blocks of the FEV, and integrate the FEV with infrastructures.

Target outcomes:

- a) **Energy/Power Storage Systems**, targeting control system solutions for batteries only as well as batteries and super-capacitors integrated either at a pack-to-pack or at cell-to-cell level. Electronic architectures have to manage optimal charging and discharging rates of the cells in relation to their typology and operating temperatures. Sensors and networking capabilities should be developed for monitoring and controlling the energy/power storage system's efficiency, lifetime, reliability and safety, including monitoring and early warning of fault conditions environmental monitoring, temperature conditioning and shock protection/spark avoidance. Furthermore, high voltage switches and interconnects and system interfaces need to be developed. Electro-chemical material developments are excluded.
- b) **Architectures for Energy, Communication and Thermal Management** Energy optimised systems are an essential element to ensure maximum FEV range. With a multiple voltage system, an optimised distribution of functions is necessary:: power-train, bilateral grid connection, on-board energy harvesting, heating and cooling conditioning systems, vehicle stability and comfort, lighting, driving assistance sensors, on board information and entertainment and other auxiliaries. Each layer requires its own optimisation and operated by real-time and fail-safe standard communication to assure the best compromise between safety, driving and comfort.
- c) **Vehicle-to-grid Interface (V2G)**
Focus is on connection of the vehicle to the grid by enabling controlled flow of energy and power through safe, secure, energy efficient and convenient transfer of electricity and data. Related issues to consider include E/M compatibility, robustness, reliability, safety, security and impact on health and grid stability. Solutions should be independent of a specific platform, be based on pan-European consensus and conform to interface standards for Smart Grids.
- d) **Vehicle Stability Control**
Focus is on control architectures with 2, 3 or 4 electrical motors for stability of the electric power train thus providing safety, comfort and fun-to-drive. Vehicle dynamics simulation and robust E/M compatibility have also to be addressed as well as generic and standardized, safe and redundant bus-based solutions for communication and control. Regenerative braking, system faults like maximum torque / oscillating torque at a single wheel /two wheels and issues like controlled shut down procedures in case of a crash should be taken into account.
- e) **Electric Drive and Electronic Components**
Partitioned and highly efficient power electronics devices, converter and inverter and electrical interconnects that simplify packaging and cooling, EMI-EMC designs, the management of high voltages, currents and temperatures and hardware-in-the-loop technology for algorithm and component testing. Projects should target the level of integration between the drive and the motor while maximising the efficiency of the drive over a wide range of operation of the motor as well as in relation to temperature excursions and voltage variability and fail safe tested components.
- f) **Integration of the FEV in the cooperative transport infrastructure**
ICT-based interaction between the driver, the vehicle and the transport and energy infrastructures, for FEV trip planning and optimization including energy use and charging.

In order to compensate for the limited autonomy range, gains in energy efficiency, charging strategies and route optimisation by using of traffic information are needed to turn the FEV into a mass market product. Adaptive strategies, algorithms and operation modes are needed for the charge and discharge management of the FEV's that balance, predict the range and adapt to the energy needs of the user in respect of the properties of vehicle's battery and the grid. Research should also address opportunities for improving energy efficiency provided by automated driving and driver training.

g) Functional Safety and Durability of the FEV

Electrical and electronic components affect vehicle dynamics, safety and durability. Fail-safe concepts are an essential element of the system. Requirements and standards related to electromagnetic compatibility and health impacts of electromagnetic fields should be developed. Continuous improvements are expected against low frequency electromagnetic fields as well as on local sensing of currents and electromagnetic fields, on safe and robust components and subsystems. Research will also address adaptation and improvement of in-vehicle active safety for FEVs, integrated driver-vehicle – infrastructure safety, protection of vulnerable road users, and FEV emergency handling procedures. Moreover, test methods will be required.

h) Coordination and Support Action “FEV made in Europe”

One action for the coordination of a FEV Strategic Research Agenda for ICT, components and systems, for the clustering of R&D projects in the field, and for training, education and dissemination activities. The agenda should also investigate new usages for the FEV (e.g. last mile delivery and mobility for the elderly and disabled); it should cover standardisation measures; it should propose measures for harmonisation of national research policy measures and programmes, and also propose actions for international collaboration. The action should involve relevant electrical vehicle stakeholders.

Funding Scheme: Collaborative projects (STREP) for targeted outcomes a), b), c) and d)

Indicative budget: a),b),c),d): EUR 30 million

Expected impacts:

- Improved energy efficiency and extended driving range of the FEV
- Reduced costs of the electronic components and the overall FEV at increased performance
- Mitigated constrains for the user of the FEV versus the Internal Combustion Engine vehicle
- the FEV seamlessly implemented in the smart grids and existing infrastructure
- Significant improvement of FEV's safety, comfort and new information and comfort services for FEV users.
- Strengthened global competitiveness of the European automobile, ICT and battery sectors. Market penetration of key components of FEVs.

Calls for proposals Public-Private Partnerships

Public-Private Partnership "Factories of the Future" - **Cross-Thematic call implemented between NMP and ICT**

Call title: "Factories of the Future" - 2011

- Call identifier: FP7-2011-NMP-ICT-FoF
- Date of publication: 20 July 2010⁵⁷
- Deadline: 2 December 2010⁵⁸ at 17.00.00 (Brussels local time).
- Indicative budget^{59 60}: EUR 160 million from the 2011 budget of which:
 - EUR 80 million from Theme 4 – Nanosciences, Nanotechnologies, Materials & New Production Technologies
 - EUR 80 million from Theme 3 – Information and Communication Technologies (ICT)
- **Topics called:**

Activity/ Area	Topics called	Funding Schemes	Budget (Million EUR)
NMP – Nanosciences, nanotechnologies, Materials and new Production			
FoF.NMP.2011-1	The eco-factory: cleaner and more resource-efficient production in manufacturing	<i>Collaborative Projects (Large-scale projects)</i>	80
FoF.NMP.2011-2	Cooperative machines and open architecture control system	<i>Collaborative Projects (small or medium-scale focused research project)</i>	
FoF.NMP.2011-3	Robots for automation of post-production and other auxiliary processes	<i>Collaborative Projects (small or medium-scale focused research project)</i>	
FoF.NMP.2011-4	High-tech solutions in the production processes for customised healthy, green and safe consumer products	<i>SMEs targeted collaborative projects</i>	

⁵⁷ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication

⁵⁸ The Director-General responsible may delay this deadline by up to two months

⁵⁹ The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:

- the final budget of the call may vary by up to 10% of the total value of the indicated budget for the call; and
- any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call

⁶⁰ Under the condition that the draft budget for 2011 is adopted without modification by the budgetary authority

FoF.NMP.2011-5	Towards zero-defect manufacturing	<i>Collaborative Projects (Large-scale projects)</i>	
FoF.NMP.2011-6	Manufacturing chains for nano-phased component and coatings	<i>Collaborative Projects (Large-scale projects)</i>	
ICT – Information and Communication Technologies			
FoF-ICT-2011.7.3	Virtual Factories and enterprises	<i>Collaborative Projects (IP and STREP)</i>	
FoF-ICT-2011.7.4	Digital factories: Manufacturing design and product lifecycle management a) and b) targeted outcomes	<i>Collaborative Projects (IP and STREP)</i>	
FoF-ICT-2011.7.4	Digital factories: Manufacturing design and product lifecycle management c) targeted outcome	<i>Collaborative Projects (IP and STREP) & Coordination and Support Actions (CSA)</i>	80

- **Eligibility conditions:**

The general eligibility criteria are set out in Annex 2 to this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country.

For Coordination and Support Actions, the minimum conditions shall be:

- Coordination and Support Actions – **coordinating actions**: at least 3 independent legal entities, each of which is established in a Member State or Associated Country, and no 2 of which are established in the same Member State or Associated Country.
- Coordination and Support Actions – **supporting actions**: at least 1 independent legal entity.

- **Additional eligibility criteria**

For the following topics, implemented via large scale projects: the **EU funding requested must be greater than EUR 4 million**:

- **FoF.NMP.2011-1** The eco-factory: cleaner and more resource-efficient production in manufacturing;
- **FoF.NMP.2011-5** Towards zero-defect manufacturing;
- **FoF.NMP.2011-6** Manufacturing chains for nano-phased.

For the topics: **FoF.NMP.2011-2** Cooperative machines and open-architecture control systems and **FoF.NMP.2011-3** Robots for automation of post-production and other auxiliary processes, implemented via small and medium scale focused research projects have specific eligibility criteria: the **EU funding requested must not exceed EUR 4 million**.

For the topic: **FoF.NMP.2011-4** High-tech solutions in the production processes for customised , green, safe and healthy consumer products, implemented via SME targeted collaborative projects: SME-targeted Collaborative Projects will only be selected for funding on the condition that the estimated EU contribution going to SME(s) is 35% or more of the total estimated EU contribution. ***This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.***

For the ICT topics, each proposal must indicate the type of funding scheme used (IP or STREP for Collaborative Projects where applicable; CA or SA for Coordination and Support Actions). See Appendix 2 to the ICT chapter of the Cooperation work programme for further details.

- **Evaluation procedure:**

A one-stage submission procedure will be followed.

Proposals will be evaluated in a single-step procedure. Proposals could be evaluated remotely with the consensus sessions being held in Brussels.

Each Theme will remain responsible for its own budget and for the implementation of the respective call topics. This includes drawing up ranking lists per Theme and subsequent negotiation and follow-up of the grant agreements resulting from proposals selected under the respective call topics.

For this call the following criteria and thresholds are applied: **1. S/T quality; 2. Implementation; 3. Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	3/5
Implementation	3/5
Impact	3/5
Overall threshold required	10/15

Further information on elements to be taken into account in the evaluation is given under the respective topic descriptions.

See also Annex 2: Eligibility, Evaluation criteria for proposals and priority order for proposals with the same score⁶¹.

⁶¹ For the NMP Programme, and in contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- **Indicative evaluation and contractual timetable:**

Evaluation of proposals: January 2011. It is expected that the grant agreement negotiations for the shortlisted proposals will start as of March 2011.

- **Consortia agreements**

Consortia agreements are required for *all* actions.

- **Particular requirements for participation, evaluation and implementation:**

As a result of the evaluation, a ranked list of proposals retained for funding will be drawn up by each Theme as well as a reserve list of proposals that may be funded in case budget becomes available during negotiations.

The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

- **Use of flat rates for subsistence costs:**

For topics FoF.NMP.2011-1, FoF.NMP.2011-2, FoF.NMP.2011-3, FoF.NMP.2011-4, FoF.NMP.2011-5, FoF.NMP.2011-6 and in accordance with Annex 3 to this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

Public-Private Partnership "Green Cars": Cross-Thematic call jointly implemented between NMP, ENVIRONMENT (including Climate Change), and TRANSPORT (including Aeronautics)

Call title: Sustainable automotive electrochemical storage

Call identifier: FP7-2011-GC-ELECTROCHEMICAL-STORAGE

Date of publication: 20 July 2010⁷³

Deadline: 2 December 2010⁷⁴ at 17.00.00 (Brussels local time).

Indicative budget ⁷⁵ ⁷⁶: EUR 25.5 million from the 2011 budget of which:

- EUR 10 million from Theme 4 – Nanosciences, nanotechnologies, materials and new production technologies (NMP)
- EUR 5.5 million from Theme 6 – Environment (including Climate Change)
- EUR 10 million from Theme 7 – Transport (including Aeronautics).

The budget for this call is indicative. The final budget of the call may vary by up to 10% of the total value of the indicated budget for the call.

In case the budget can not be consumed (totally or partially), the remaining budget will be returned to each FP7 theme according to its respective contribution.

Topics called

The topic on **Advanced eco-design and manufacturing processes for batteries and electrical components** is identical in each theme. Hence, each proposal must be submitted only **once** either to topic GC.NMP.2011-1 or to topic GC.ENV.2011-3.1.3-1 or topic GC.SST.2011-7.7, **but not to all**.

Activity/ Area	Topics called	Funding Schemes	Budget Million EUR
GC.NMP.2011-1	– Advanced eco-design and manufacturing processes for batteries and electrical components	<i>Collaborative projects (Large-scale projects)</i>	25.5
GC.ENV.2011-3.1.3-1			
GC.SST.2011-7.7			
GC.ENV.2011-3.1.3-2 ⁷⁷	- Operational guidance for Life Cycle Assessment studies of the European Green Cars Initiative	<i>Coordination and support action (Supporting action)</i>	

- **Eligibility conditions:**

⁷³ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

⁷⁴ The Director-General responsible may delay this deadline by up to two months.

⁷⁵ A single reserve list will be constituted if there are a sufficient number of good quality proposals. It will be used if extra budget becomes available.

⁷⁶ Under the condition that the draft budget for 2011 is adopted without modification by the budgetary authority.

⁷⁷ Up to one project can be funded

The general eligibility criteria are set out in Annex 2 to this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country

For Coordination and Support Actions, the minimum conditions shall be:

- Coordination and Support Actions – **coordinating actions**: at least 3 independent legal entities, each of which is established in a Member State or Associated Country, and no 2 of which are established in the same Member State or Associated Country.
- Coordination and Support Actions – **supporting actions**: at least 1 independent legal entity.

- **Additional eligibility criterion:**

For the topic **Advanced eco-design and manufacturing processes for batteries and electrical components**, implemented via large scale collaborative projects: **the EU funding requested must be greater than EUR 4 million.**

For the topic: **Operational guidance for Life Cycle Assessment studies of the European Green Cars Initiative**, implemented via coordination and support action (supporting action): **the EU funding requested must not exceed EUR 500 000.**

- **Evaluation procedure:**

A one-stage submission procedure will be followed.

Proposals will be evaluated in a single-step procedure. Proposals could be evaluated remotely with the consensus sessions being held in Brussels.

For this call the following criteria and thresholds are applied: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	3/5
Implementation	3/5
Impact	3/5
Overall threshold required	10/15

Further information on elements to be taken into account in the evaluation is given under the respective topic descriptions.

Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- **Indicative evaluation and contractual timetable:**

Evaluation of proposals: January 2011. It is expected that the grant agreement negotiations for the shortlisted proposals will start as of March 2011.

- **Consortia agreements**

Consortia agreements are required for Collaborative projects.

- **Particular requirements for participation, evaluation and implementation:**

As a result of the evaluation, a single ranked list of proposals retained for funding will be drawn up as well as a single reserve list of proposals that may be funded in case budget becomes available during negotiations.

The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

- **Use of flat rates for subsistence costs:**

In accordance with Annex 3 of this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.