opportunity for getting more kilometres out of the same amount of energy by has to be fully exploited in order to arrive at a product that the customer accepts and chooses to use.

Already a multitude of innovative concepts and materials are available and used in vehicles and transport carriers today; their further market uptake has been hindered to date by the relatively high costs associated with the development and implementation of advanced materials and production technologies. So, further research is needed to improve this situation.

Considering the large scope of potential novel materials applications, this call will focus on two issues: the development of innovative materials for batteries based on nanotechnology; and the development of new lightweight materials and respective technologies for vehicle applications.

GC.NMP.2012-1 Innovative automotive electrochemical storage applications based on nanotechnology

Technical content/scope: Volume production plans for large-capacity Li-ion rechargeable batteries are being made one after another around the globe, targeting electric vehicles (EVs) and other applications. However, most car manufacturers would agree that lithium ion technology is still not satisfactory for long distance EV use. More energy density, power density, cost and safety improvements are needed. Although the development of second generation Li-ion batteries delivering roughly double the energy density (200Wh/kg to 300Wh/kg) is in progress (with a target implementation of 2015 to 2020), post Li-ion rechargeable batteries – solid-state, Li-S, or metal-air batteries, for example – are expected to provide a long term solution to current range and cost issues.

Projects shall exclusively address the development of innovative materials and technologies for battery components, material architectures and systems for automotive electrochemical storage at cell level within a responsible, sustainable and environmental-friendly approach looking at the entire life cycle. Activities shall focus on the understanding of the phenomena which affect the battery properties at the nanoscale across a full cell, including modelling and simulation. Research shall focus on innovative technologies, architectures and chemistries and should address the following issues:

- performance, safety, recyclability and cost;
- potential for fast charging without significant life reduction;
- effect of bidirectional flow at charge stations;
- availability of constituent materials;
- eco-design and material production;
- characterisation, standardisation and synergies with other applications.

Proof of concept in terms of product and/or process (not necessarily reaching the industrial scale but convincingly proving scalability towards industrial needs with cells of automotive size) is encouraged as is participation from the manufacturing industrial sector within strong interdisciplinary consortia.

Proposals for electrochemical capacitors are excluded, as these have been extensively covered in a previous Green Cars call.

Funding Scheme: Small or medium-sized collaborative projects.

Additional Eligibility Criterion: The EU contribution must not exceed EUR 3 000 000.

Expected Impact: (i) High energy densities with respect to the state-of-the art (i.e. higher than 400 Wh/kg); (ii) Overall performance, safety, recyclability and life-cycle sustainability; (iii) A minimum lifetime of 3000 cycles in a 80% DoD window in typical automotive conditions over 10 years; (iv) Establish and maintain world-class status for the European automotive battery industry.

GC.NMP.2012-2, GC.SST.2012.1-1, GC.ENV.2012-6.6.3 Innovative advanced lightweight materials for the next generation of environmentally-friendly electric vehicles – topic implemented jointly by NMP, Transport and Environment Themes

Technical content/scope: Research proposals should focus on the development of advanced materials for cars and light-duty vehicles, contributing to an accelerated market introduction of new energy-efficient electric vehicles, while ensuring sustainability and viability by rapidly achieving the appropriate economies of scale. The research proposals should address also several of the following issues or all of them:

- Reducing the structural weight, e.g. by deploying light alloys, thermoplastics, carbon or other fibre-reinforced polymers, composites, honeycombs, foams, advanced steels and tailored, multifunctional materials into the body parts, chassis and heavier interior systems, and including e.g. optimisation of structural layouts, multi-functional design, numerical simulation, testing, prototyping and/or manufacturing processes. Standardisation issues should be considered;

- Exploiting new materials characteristics in association with the innovative structural layouts made possible by new electric vehicles, in order to improve safety by enhanced energy absorbing capability. For instance, this could allow to better deal with asymmetric crash conditions (opponent of higher size and weight) in the case of very light vehicles. Fire resistance of the proposed advanced materials should be taken into account, where appropriate;

- Addressing related production process challenges, in particular developing suitable forming and joining technologies, to guarantee reliability, robustness and safety (e.g. guaranteeing that crash performance as tested does not degrade over time), reducing the cost of assembly while permitting a wide range of vehicle variants;

- Assessing the performance of the behaviour of the advanced materials and the respective components and systems under typical operational and extreme loading conditions (e.g. with respect to durability and safety) and external environment (e.g. for corrosion resistance), including the potential for accelerated lifetime testing while ensuring reliability;

- Carrying out of an appropriate life-cycle analysis of the advanced materials and the respective components and systems, including dismantling and recycling technologies; for brand new materials, a recycling method should be outlined with appropriate lab-scale experimental part;

- Carrying out an economic analysis, including material resources availability and costs, that demonstrates the real advantages of the new materials over conventional ones. Trade-offs between the extra cost of lightweight design and possible gains from lower lifetime costs for energy consumption and emission of vehicles should also be assessed.

While the focus of the proposal should be on electric cars, the potential for synergies with other types of environmentally-friendly vehicles or the cabs of heavy-duty vehicles can also be taken into account.

In order to ensure industrial relevance and impact of the research effort, the active participation of industrial partners (including SMEs) represents added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Proposals may (i) include research results validation and the physical demonstration of the performance achieved with the innovative advanced material(s), e.g. even via a complete body in white structure or vehicle demonstrator, or (ii) consist of focused research, limiting validation of the innovative advanced material(s) to substructure level.

Special Features: The proposed projects should not duplicate similar FP6 or FP7 projects, e.g. projects funded under the FP7 European Green Car Initiative. Coordination or ex-ante clustering with projects in topic GC.SST.2012.7.1-4 can be foreseen.

Funding Scheme: Large-scale integrating collaborative projects.

Additional Eligibility Criterion: The EU contribution per project must be at least EUR 4 000 000 and must not exceed EUR 10 000 000.

Expected Impact: (i) Considerable weight reduction: a 30% body in white weight reduction was already demonstrated in recent EU projects on conventional vehicles; a further 20% reduction (taking into account the higher acceptable cost) is to be demonstrated, with the relevant safety, energy efficiency and environmental benefits; and/or (ii) Overall reduction in time-to-market and development costs while increasing product flexibility; and (iii) Economic viability and technological feasibility of the advanced materials and the related processes with reference to real applications of industrial relevance; and/or (iv) Options for the use of globally available, recyclable or recycled, and carbon-neutral materials; and/or (v) Extended lifetime of durable components of a vehicle and lower life-cycle costs.

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

Area 7.2.7.1. Development of electric vehicles for road transport

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. Lightweight materials for vehicle applications (joint call) and socio-economic research are also among the issues included in this area.