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# Group of Topics 3

## The 'electrification' of road and urban transport

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## **Group of Topics 3**

# **The 'electrification' of road and urban transport**

## **Background**

- **Electric power can be produced by clean and renewable energy**
- **Research on electric components, their integration into vehicles and on electric vehicle concepts can drastically improve energy efficiency**
- **New system approaches and business models for battery management can lead to short to medium term large scale deployment of electric cars**
- **Further progress on Lithium-ion batteries will improve attractiveness of electric cars**



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# Green Car: 'electrification' of road and urban transport Topics Overview

→ Group Topics 3 Green Car 'electrification' 40 M€

Activity 7.2.7. THE 'EUROPEAN GREEN CARS INITIATIVE'

7 level 1 topics:  $\leq 3\text{M€}$



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# Group of Topics 3:

## 'electrification' of road and urban transport

*FP7-SST-2010-RTD-1*

### ● **TOPIC – Level 1 -GC.SST.2010.7.-1.**

#### **Electrical machines**

- Objective: development of electric machines that are at the same time cheap and highly efficient (on a wide torque/speed range) with high power to weight and volume ratios, reliable and robust, and capable to be mass-produced. Particular attention should therefore be paid to the availability of some raw materials, in particular those needed for the magnetic components, as well as to the integration with the required electronic components.
- Coverage:
  - ◆ Exploring innovative topologies and concepts (including consideration of intrinsic fault tolerance) for the various types of applications (from in-wheel to stand-alone or engine-integrated ones).
  - ◆ Researching high performance conductive, magnetic and insulating materials.
  - ◆ Defining simplified, high efficiency cooling concepts.
  - ◆ Developing advanced magnetic modelling tools.
  - ◆ Defining automated manufacturing concepts that, given the gradual introduction of these devices, are flexible enough to be capable of supporting efficient manufacturing at the different rates needed in the early and full scale phases of the electrification process.
- Transport modes: Road Transport
- Funding schemes: level 1 CP  $\leq$  3M€





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*FP7-SST-2010-RTD-1*

### ● **TOPIC – Level 1 -GC.SST.2010.7.-2.**

#### **Integrated electric auxiliaries and on-board systems**

- **Objective:** developing reliable and energy efficient electric auxiliaries to match current comfort, safety and driveability customer expectations.
- **Coverage:**
  - ◆ electrified components and subsystems (climate control, lighting, power steering, infotainment, braking systems, pumps, after-treatment, etc) optimised in terms of efficiency, size, weight and cost (design for manufacturing) In some cases, such as steering and braking, due consideration of regulations and safety, needs to taken.
  - ◆ Developing energy harvesting concepts which could compensate other auxiliaries' energy consumptions.
  - ◆ Studying other energy control devices, such as actively controlled glasses, to optimize the energy flows.
  - ◆ The development of specific auxiliaries and heat recovery systems for heavy duty vehicles (in particular buses) is also acceptable for applications where these differ significantly from light duty vehicle ones and where they represent a significant share of the vehicle's global energy requirements and therefore would provide a significant power saving potential. Synergies with other transport modes such as light rail would be preferable.
- **Transport modes:** Road Transport
- **Funding schemes:** level 1 CP  $\leq$  3M€



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*FP7-SST-2010-RTD-1*

### ● **TOPIC – Level 1 -GC.SST.2010.7.-3.**

## Optimised thermal engine development and integration

- Objective: highly efficient, compact, clean and low cost engines for advanced plug-in hybrids and electric vehicles with range extenders, aiming at significant improvements over future Euro 6 standards for noxious emissions.
- Coverage:
  - ◆ Highly innovative engines, based on alternative architectures or cycles, particularly adapted for this application.
  - ◆ Extremely downsized automotive engines with the associated gearbox if necessary.
  - ◆ Existing engines from other applications potentially well adapted to the range extender role.
- Transport modes: Road Transport
- Funding schemes: level 1 CP  $\leq$  3M€



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*FP7-SST-2010-RTD-1*

### ● **TOPIC – Level 1 -GC.SST.2010.7.-4.**

#### **Smart storage integration**

- Objective: physical on-board integration of smart battery packs for pure electric and plug-in vehicles, for both fixed and removable solutions, providing adequate level of electrical and fire safety in normal and abuse conditions.
- Coverage:
  - ◆ Developing innovative concepts for the physical integration in the vehicle structure.
  - ◆ Smartly integrating the battery pack in the various on-board systems (electric, cooling, monitoring).
  - ◆ Considering the implications of both the above points in the case of removable packs and assess the benefits and disadvantages, and therefore the feasibility of the quick-change concept (if possible also in view of its environmental, cost, logistic and life cycle impacts)
- Transport modes: Road Transport
- Funding schemes: level 1 CP  $\leq$  3M€



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*FP7-SST-2010-RTD-1*

### ● **TOPIC – Level 1 -GC.SST.2010.7.-5.**

#### **Advanced electric vehicle concepts**

- Objective: holistic development of innovative vehicle concepts and architectures to achieve optimised performance with as little as possible cost, weight, comfort and performance penalties compared to today's vehicles while optimizing environmental performance, particularly for urban vehicles.
- Coverage:
  - ◆ Innovative concepts for light weight and crashworthy architectures.
  - ◆ Optimised aerodynamic bodies for the new packaging constraints.
  - ◆ Ergonomic on board passenger space and for assembly/maintenance/repair accessibility.
  - ◆ Modular vehicle architectures that benefit from the absence of many mechanical constraints in the current vehicles both in the construction and use phases.
  - ◆ EMI/EMC aspects of the new electric vehicle to ensure the successful integration of novel drive systems into complete vehicles.
- Transport modes: Road Transport
- Funding schemes: level 1 CP  $\leq$  3M€







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*FP7-SST-2010-RTD-1*

### ● **TOPIC – Level 1 -GC.SST.2010.7.-6.**

## Implementing Public-Private Partnership in the 'European Green Cars Initiative'

- ➔ Objective: support the realisation of a Public Private Partnership (PPP) , by developing, in particular, research priorities within FP7 and a roadmap of R&D activities for Europe
- ➔ Coverage:
  - ◆ coordination with public authorities both at the level of the implementation of FP7 and national schemes.
  - ◆ coordination of efforts at the level of the different European Technology Platforms linked to the "European Green Cars Initiative" (ERTRAC, EPoSS and Smart Grid)
  - ◆ coordination of research supported by MS/AS
- ➔ Transport modes: Road Transport
- ➔ Funding schemes: level 1 CSA-Coordination Action  $\leq 3\text{M€}$





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*FP7-SST-2010-RTD-1*

### ● **TOPIC – Level 1 -GC.SST.2010.7.-7.**

#### **Raising awareness of potential job opportunities related to the electrification of road transport**

- Objective: inform and stimulate the interest of young people for the job creation opportunities and future prospects deriving from the emergence of electrification as an important research and development trend in the automotive sector.
- Coverage:
  - ◆ Encourage young people to seek for high skilled jobs in sectors related to road transport electrification with special focus on science, research and innovation.
  - ◆ Evaluate and demonstrate the potential of research outputs, outcomes and impacts to create and maintain jobs giving special consideration to opportunities for young people and gender balance.
  - ◆ Extensive and broad communication and stimulation campaigns targeting young people of different ages (from high school to university). These could be: travelling workshops, competitions, animations and broad media actions directed to a young target, etc
  - ◆ coordination of research supported by MS/AS
- Transport modes: Road Transport
- Funding schemes: level 1 CSA-Coordination Action  $\leq 3\text{M€}$



# The Joint Call on Batteries

**NMP, Energy, Environment and Transport Themes**



**Note: Separate joint call, not part of SST call**

- **TOPIC – FP7-2010-GC-ELECTROCHEMICALSTORAGE**

**Materials, technologies and processes for sustainable automotive electrochemical storage applications**

- Objective: establishing a world level European automotive storage industry, within a responsible, sustainable and environmental-friendly approach
- Coverage:
  - ◆ innovative lithium-based technologies improving safety and energy density
  - ◆ completely different technologies, architectures and chemistries, such as open cells for higher energy densities
  - ◆ electrochemical capacitors
  - ◆ recycling, recovering and re-use of materials for Li batteries
  - ◆ comprehension, modelling and management of degradation to extend life
  - ◆ environmental sustainability assessed via life cycle assessment studies.
  - ◆ cost, recyclability and safety issues, as well as proof of concept (product and/or process) to be covered. The effect of bidirectional flow at charge stations, as well as the potential for fast charging should be taken in due account.
- Funding schemes: CP



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# Thank you for your attention !

