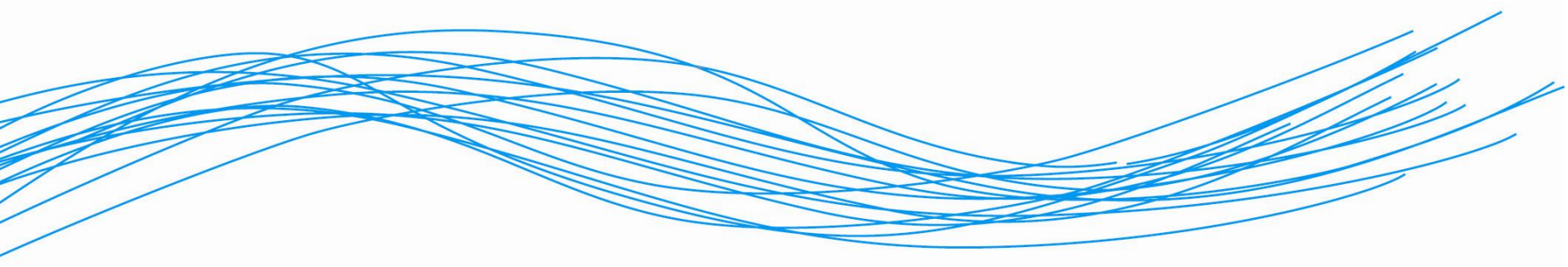
EUROPEAN COMMISSION / European Research Area / 7th Framework Programme

European Green Car Initiative
Sustainable Surface Transport WP



EU RTD Financial Support for Green Vehicles

Maurizio Maggiore
Sustainable Surface Transport
DG Research
European Commission

SEVENTH FRAMEWORK PROGRAMME

European Green Cars Initiative: how it works

- **3 main streams of actions:**
  - **EIB loans** in support of industrial innovation Budget: originally **€4 billion** (in addition to existing loans), widely exceeded
  - **PPPs for research on greening road transport:** Budget: **€1 billion** (€500 M from EC matched from industry and Member States)
  - **Demand side measures & public procurement:** e.g. reduction of circulation & registration taxes for low CO2 cars, fleets

The role of the European Investment Bank

- **Best tool for innovation support that involves greater risk**
- **A new loan instrument (ECTF) has been designed specifically for the transport industry.**
- **Can be used in addition to research grants**
- **More than 7.5 B€ to date**

European Investment Bank

Public-Private Partnerships

- Objective: **to promote the convergence of** public interest **with** industrial **commitment and leadership in determining strategic research activities**
- Quick response and smooth start: **use existing schemes & structures (**FP7 **and** ETPs**)**
- Smart investments **: to improve** competitiveness **of European industries &** environmental protection
- Implementation approach: **via** cross-thematic calls **while also exploring other possibilities**

EU Research in action

- **The research part of the EGCI has started in earnest with the launch of the first specific calls last year**
  - One in DG INFSO
  - One in DG MOVE
  - Two in DG RTD

- **The 2009 DG INFSO call**
  - The evaluation was completed in February, negotiations have been completed and the projects are running
  - Seven retained proposals covering:
    - Concepts for overall efficiency gains
    - Safe subsystems and active safety
    - Electric architectures
    - Driver assistance and V2X systems

Call Specifications

Call FP7-SST-2010-RTD-1

- Date of publication: 30 July 2009
- Deadline: 14 January 2010
- Total indicative budget: 108 M€
- Funding schemes:
  - CP: Collaborative Projects
  - CSA: Coordination Support Action

- **The 2010 DG MOVE GC topic**
  - The call targeted wide scale demonstrations of electric vehicles
  - Not only vehicles, but mainly infrastructure will be covered,
  - Standardisation, business models and user acceptance very important aspects
  - Strong links and complementarity expected both with national and regional demos and important running projects, such as the recently started ones by the RTD-Energy directorate exploring the potential of batteries on board EVs to serve as support for the electricity grid and the integration of renewables

The joint call on electrochemical storage (1)

- Four directorates involved, jointly developing the call and evaluating the proposals
- A remarkable success, attracting 25 high level proposals of which seven have been funded
- A clear trend was towards metal air battery, with chemistries capable of delivering greatly improved range vs the best current Lithium cells. One such proposal was selected.
- Four selected proposals on significantly improving lithium performance, cost, safety and environmental features (getting away from costly/risky nickel, cobalt, organic electrolytes…)
- In one cases the objective is to recycle active electrochemical compounds
- Two of the selected projects propose to improve supercaps performance. One will look into graphene for a breakthrough

- **The 2010 Transport directorate call (1)**
  - A total of 49 proposals have been submitted. Two were deemed out of scope, 17 of the remaining 47 have been selected (plus one in the reserve list). Currently under negotiation, first projects launched in one-two months
  - Some trends can be already extracted, looking at the main technical topics
  - Electric machines
    - Large interest in this topic, 11 proposals received
    - The strongest interest was for very compact, innovative permanent magnet motors with work on reducing strategic materials content and optimised design for production to reduce costs.
  - Electric Auxiliaries
    - Only three proposals received
    - High quality, looking at cooling and heating, clearly the dominating issue on auxiliaries for pure EVs for the proposers.
    - One dealing also with PV integration for energy harvesting

The 2010 Transport directorate call (2)

- ICEs for range extender/plug in hybrid applications
  - Good interest (seven proposals), but two diametrically opposed trends
  - On one end, application of traditional engines
  - On the other, very innovative applications with no or little previous work and therefore high risk
  - One proposal selected, plus one in the reserve list

- Battery integration
  - Good number of proposals (six), looking at how better to physically integrate both fixed and removable batteries.
  - Mostly interest in crashworthiness to protect this very valuable item
  - Thermal control another point of interest
  - Battery swap technology also well covered

- **The 2010 Transport directorate call (3)**

  - Advanced vehicle architectures
    - The highest number of proposals, 14 in all
    - Very wide topic description, open to both system level concepts (new vehicles) and detailed technologies (lightweight materials, aerodynamics, EMC issues, crashworthy concepts etc)
    - Good proposals of both types received, and some integrating both general and detail aspects
    - Some looking at a wide level exploration of possible vehicle architectures
    - Small urban vehicles dominating as a whole
    - Some in the light vehicle (quadricycle) category, where crash and other requirements are less stringent

Call Specifications

Call FP7-SST-2011-RTD-1

- Date of publication: 20 July 2010
- Deadline: 2 December 2010
- Total indicative budget: 67M€ (all topics)
- Funding schemes:
  - CP: Collaborative Projects

DG RTD
SST 2011 Call

Transport Theme

- **TOPIC – GC.SST.2011.7-1**

  Specific safety issues of electric vehicles

  - Objective: The presence of high voltages and potentially hazardous chemicals and the absence of engine noise pose specific problems to EVs. 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.
  - Coverage:
    - Innovative topologies and concepts (including fault tolerance or mitigation) for various applications.
    - Safe plug-in/re-charging, prevention of misuse/abuse, protection against fire and electric shocks during maintenance or after a crash
    - Acoustic perception of the FEV, raising awareness of vulnerable users including the application/adaptation of existing pedestrian protection systems (active safety) to the raised needs.
  - Funding schemes: CP Small/Medium scale – Level 1– Funding < 3M€

DG RTD
SST 2011 Call

Transport Theme

- **TOPIC – GC.SST.2011.7-2**

  Integrated thermal management

  - Objective: develop cost efficient and industrially viable integrated thermal systems for long range, reliable and comfortable electric vehicles when no waste heat source is available.
  - Coverage:
    - Improvement of the efficiency of the thermal control of the energy storage system, independently of the actual ambient temperature.
    - Optimization of the impact of the thermal comfort of the users on energy consumption through innovative, light, cost efficient, electronically controlled materials and their integration aspects (new insulating materials, active glazing, local heating, etc.).
    - Development of cost effective thermal management systems of the power train 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.
  - Funding schemes: CP Small/Medium scale – Level 1– Funding < 3M€

DG RTD
SST 2011 Call

Transport Theme

- **TOPIC – GC.SST.2011.7-10**

  Architectures of Light Duty Vehicles for urban freight transport

  - Objective: novel electrified LDV concepts and solutions (conversions are excluded) to enable efficiency gains for mobility and the transportation of goods in the urban environment, e.g. last mile delivery and other applications such as the powering of tools. The development of complete vehicle concepts is envisioned and a strong industrial participation is recommended. Higher energy efficiency (at least 40% reduction in terms of primary energy consumption) should be demonstrated with respect to best of class vehicles in the same category, while achieving a range adequate to the typical daily urban mission
  - Coverage:
    - 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
    - The above considering safety, EMI/EMC and radiation health impact issues, maintenance and repair, while exploiting the significant opportunities offered in terms of layout and packaging, functionality, and construction
  - Funding schemes: CP Small/Medium scale – Level 2– Funding < 3M€

All other EGCI Call

- **TOPIC – GC.SST.2011.7-7**

  Advanced eco-design and manufacturing processes for batteries and electrical components – total budget 25.5 M€

- **TOPIC – GC.SST.2011.7-8**

  ERA-Net Plus 'Electromobility' - included in 67 M€

- **All logistics/urban topics - included in 67 M€**

- **TOPIC – GC.SST.2011.7-8**

  ICT for fully electric vehicles– total budget 30 M€

DG RTD
2011 Joint Call

NMP, Environment, Transport Themes

- **TOPIC GC.SST.2011.7-7/GC.NMP.2011-1/GC.ENV.2011-3.1.3-1**
- **Advanced eco-design/manufacturing processes for batteries/electrical components**
  - Objective: Support low cost large scale production of batteries and electrical components addressing the whole value chain including the eco-design, assembly/integration and production of batteries and electrical components (motors, battery management systems, etc.) as well as dismantling, recycling/disposal, and health and safety aspects of critical materials.
  - Coverage:
    - For near-to-market types of lithium-based batteries, focus on manufacturing processes of cells, their integration into modules and packs. Processes should be flexible enough or reconfigurable to cope with new chemistries. Special attention to thermal management systems and safety issues.
    - For electric drivetrains and in particular motors, focus on cost reductions by design improvements to achieve higher power density, taking into account the availability of critical materials and their dismantling/recycling. No work on power chips
    - 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.
    - Active participation of industrial partners, including SMEs, components suppliers, electrical vehicle manufacturers and component recyclers, represents an added value.
  - Funding schemes: CP Large scale – Funding > 4M€

DG INFSO 2011 Call

- **TOPIC – FP7-2011-GC.ICT.2011.6-8a**
  Control system solutions for batteries and/or super-capacitors
  - Electronic **architectures** for managing optimalcharging and discharging rates
  - **Sensors and networking capabilities** for monitoring and controlling the energy/power storage system's efficiency, lifetime, reliability and safety, including monitoring and early warning of fault conditions environmentalmonitoring, temperature conditioning and shock protection/spark avoidance
  - High voltage **switches and interconnects** and system interfaces.
  - Funding schemes: STREP

DG INFSO 2011 Call

- **TOPIC – FP7-2011-GC.ICT.2011.6-8b**

  Architectures for Energy, Communication and Thermal Management

  - Optimised distribution for **multiple voltage systems** for:
    - power-train, bilateral grid connection, onboard energy harvesting, heating and cooling conditioning systems, vehicle stability and comfort, lighting, driving assistance sensors, on board information and entertainment and other auxiliaries.
  - **Real-time and fail-safe** standard communication systems
  - Funding schemes: STREP

DG INFSO 2011 Call

- **TOPIC – FP7-2011-GC.ICT.2011.6-8c**
  Vehicle-to-grid Interface (V2G)
  - **Controlled flow of energy**
    - safe, secure, energy efficient and convenient transfer of electricity and data
    - E/M compatibility, robustness, reliability, safety, security and impact on health and grid stability
  - **Platform-independent solutions** based on pan-European consensus and conform to interface standards for Smart Grids
  - Funding schemes: STREP

DG INFSO 2011 Call

- **TOPIC – FP7-2011-GC.ICT.2011.6-8d**
  Vehicle Stability Control
  - Stability control **architectures with 2, 3 or 4 electrical motors**
  - Vehicle **dynamics** simulation
  - **E/M compatibility**
  - **Bus-based solutions**
    - standardised, safe and redundant
  - **Regenerative braking**
  - **System faults** like maximum torque / oscillating torque at a single wheel / two wheels
  - Controlled **shut-down procedures** in case of crash
  - Funding schemes: STREP

- **Thank you for your attention!**
- **Questions?**