Building blocks concepts for efficient and safe multiuse urban electrical vehicles

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Carloandre Malvicino
The scenario is asking for enabling technologies and systems to minimise the fossil fuel emissions mainly in urban areas. This leads to a change of road transport paradigms where the electrification can play a relevant role.
The electrification is progressing

**Short term**
- Reduce the energy needed by the vehicle during operation
- Increase the efficiency of the internal combustion engine

**Medium term**
- Adapt the engine to fuels with low fossil carbon content

**Long term**
- Shift to new powertrains fed by new energy vectors that enable the use of non fossil energy sources

- **Start&Stop**, mini-hybrid, micro-hybrid
- **Full hybrid, plug-in** range extender
- **Full electric**
The charge while driving can enable a wider diffusion of e-vehicles. In addition to relevant investment on infrastructure, it requires:

- advanced on-board power electronics
- distributed power electronic embedded in infrastructure
- V2I communication
- suitable vehicles

Until now, the vehicle has evolved almost independently from the infrastructure context while infrastructure should contribute to an integrated development of road transport, as it was for railways network.
**Project full title:** Building blocks concepts for efficient and safe multiuse urban electrical vehicles

**Coordinator:** Carloandrea Malvicino - Centro Ricerche Fiat (I)

**Partnership**
- Dupont (CH), IFP (F), ST Microelectronics (I), Polimodel (I), Warsaw Politechnic (PL), Sheffield University (UK)

**Starting Date:** 1<sup>st</sup> December 2010

**Ending Date:** 30<sup>th</sup> November 2013

**Budget /Funding:** 3.9 MEUR / 2.6 MEUR

**Type of project:** Collaborative Project
WIDE –MOB main objectives

To develop building block concepts that could be widely applied to enable sustainable vehicle for urban mobility including:

- efficient on board photovoltaic system
- energy effective solution for on board comfort and roominess
- advanced aerodynamics
- vehicle architecture and safety cell
Main deliverables

- **a prototype vehicle conceived** based on the P-MOB concept as platform to demonstrate the applicability of the developed technology advances.

- **guidelines** for the developed concepts to be widely applied to the passengers cars domain, EVs and HEVs but also small conventional thermal cars, thus generating IPR and knowledge/experience upon which to build a world-leading EU position to track and exploit the global uptake of green mobility.
Wide Mob Concept

Small Urban Vehicle

- **Wheelbase:** 2010 mm
- **Front Track:** 1340 mm
- **Rear Track:** 1240 mm
- **Length:** 2900 mm
- **Width:** 1400 mm
- **Height:** 1520 mm
- **Frontal Area:** 1.8 sqm
- **Weight:** 640 kg w/o batteries (85 kg)

- **E-motor:** 2x5 kW
- **Battery Capacity:** 10 kWh
- **Range:** 150 km
- **Max Speed:** 120 kph
- **Tires:** 145/65 R15
Powertrain

Energy to be stored in batteries to cover 10 NDEC cycles = 100km

Common Vehicles

Two 5kW motors
Aerodynamics

Wide-MOB ergonomics and key dimensions
wheelbase: 2010 mm
front track: 1340 mm
rear track: 1240 mm
frontal area: 1.8 sqm

The under development improvements and the optimised shape allow to guarantee a low aerodynamic drag and good ergonomics.
Photovoltaic

- Photovoltaic panels allow to harvest the solar energy both driving and while parked.
- Crystalline silicone has been used due high efficiency.
- Double curvature is achieved fragmenting the solar cells to into small linear portion.
- Higher voltage is generated as more cells are connected in series while is reduced enhancing the efficiency.

![Diagram of photovoltaic panels]

At ambient temperature and 1000 W/sqm irradiation the average PV efficiency at bench is of about 20%

- Roof surface: 1.0 sqm
- Target energy: 45 kWh/year avg
In the WideMob concept two technologies will be evaluated to assure the winter thermal comfort:

- Low temperature radiative heating with e-hated interiors panels
- High temperature radiative heating

Finally, the thermoelectric heat pump technology, developed within the SmarTop Project will be evaluated also for the application on the WideMob vehicle.
The road transport scenario requires:

- to develop new concepts and design to guarantee reliable and cost effective solutions
- an integrated approach where all the stakeholders are involved and contribute
- a strong interaction with infrastructure (e.g. charge while driving, connectivity, …)
- new breakthrough technologies to pave the mobility way

WideMob is contributing to build the blocks for such task
THANK YOU!

Carloandrea Malvicino

Fuel Economy & Vehicle Systems Efficiency Program Manager

Centro Ricerche Fiat S.C.p.A.
Strada Torino, 50 - 10043 Orbassano (TO), Italia
Tel +39 011 9083260 Fax +39 011 9083898

e-mail: carloandrea.malvicino@crf.it