

2 GIVING PRIORITY TO POSITIVE ENERGY ROADS

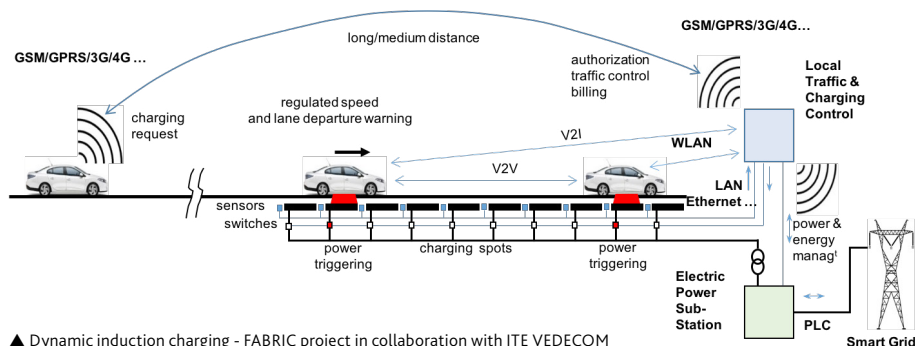
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In France, energy considerations are of prime importance in the sphere of road freight and passenger transport. The road system transports 90% of the country's freight (in tonne-kilometres) and 80% of its passengers (in passenger-kilometres). The energy transition for roads themselves, which are part of a transport system that is omnipresent in the day-to-day lives of the nation's citizens, is consequently unavoidable. R5G © clearly states its aim of making a medium-term contribution to this goal. It fosters innovative engineering solutions with the aim of making considerable reductions in the amount of external energy required by the transport system. It attempts to provide energy to vehicles more efficiently and sees roads as a potential source of energy, as has long been the case for buildings with systems such as photovoltaic panels and solar water heaters, etc.

An efficient energy supply for vehicles

The first step to take in order to improve the efficiency of the energy supply to vehicles lies in the development of electric vehicles. The most conventional way of recharging the batteries is, of course, a dedicated socket: R5G © should therefore be equipped with high performance recharging stations that are fast and reliable. This is the purpose of the project MOV'EO TREVE, conducted in collaboration with ADEME². The goal is to design a dedicated demonstrator for evaluating and conducting applied research into infrastructure for recharging electric vehicles. It also provides back-up for the "urban electric service station" concept.

But the most efficient solution is without doubt the large-scale development of dynamic, contact-free, recharging facilities that can be used by vehicles of any type: private, public transport and freight. The European FABRIC³ project will make it possible to build a demonstrator for the contact-free recharging of moving vehicles (up to 80km/h), for private electric vehicles on the Versailles-Satory test site. For urban public transport systems, such as buses or trams, several experiments to insert such technologies into pavement structures have already been carried out at IFSTTAR's Nantes site.



▲ Dynamic induction charging - FABRIC project in collaboration with ITE VEDECOM

Infrastructure that produces hot water?

Pavement surfacings are usually black and they therefore absorb energy from the sun's rays. Their surface temperature may be several tens of degrees higher than the ambient temperature. The idea of turning them into a "solar water heater" is not a new one, and has already been trialled on a number of occasions. The thermal energy recovered in this way can be used to heat buildings directly or to produce energy. The hot water can also be stored in natural or artificial underground reservoirs. It can then be re-used in the winter for melting snow or ice on the road surface or to help heat nearby facilities. The techniques that have been deployed so far required pipes to be inserted in the pavements, but simpler solutions using specifically developed materials are currently being investigated.

In favour of a solar road

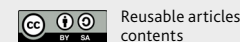
The reasons that makes roads potential water-heaters are the same that make them an excellent surface for the direct production of electricity with photovoltaic panels. The energy produced could either be used locally by the road itself, for illuminated messages, signs, or to power stationary roadside communications systems and road lighting in specific sections. The main technological limitation is the development of a semi-transparent road surfacing that will cover a display of photovoltaic cells. The technical feasibility of this has been demonstrated. It is nevertheless still necessary to set up a full-scale demonstrator to test the efficiency and robustness of this technology.

1. MAST: department Materials and Structures of Ifsttar
2. ADEME: The French Environment and Energy Management Agency
3. FeAsiBility analysis and development of on-Road charging solutions for future electric vehicles (in collaboration with the Institute for the Energy Transition (Institut pour la Transition Énergétique VEDECOM)).

Further readings

Beeldens A. (2013), "Inductive Charging: projet de charge par induction de véhicules électriques", *Revue Générale des Routes et des Aménagements*, n° 910, March.

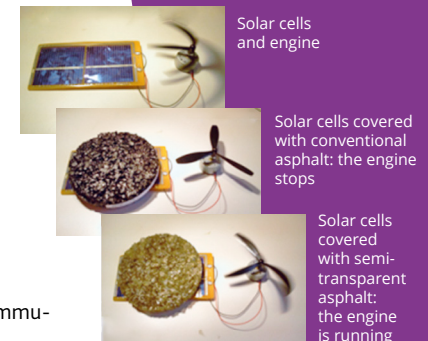
De Larrard F., Sedran T., Balay J.M. (2012), "Removable Urban Pavements: An innovative, sustainable technology", *International Journal of Pavement Engineering*, Vol. 14, Iss. 1.



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▼ The solar road principle



Consult

The hybrid solar road project

When roads produce electricity and heat...

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