

DATA GATHERING

To make possible the execution of all project workpackages and to achieve overall project objectives, SUBAT needs to obtain and to analyse data related to production, use and recycling of all battery technologies.

In addition to literature data, information from the relevant operators in the field of traction batteries will be gathered, covering the whole life cycle of the batteries:

- raw material suppliers
- battery manufacturers
- battery users
- material recyclers.

To allow a smooth data collection process specific questionnaires have been written. to gather technical economical and environmental data from battery manufacturers, car manufacturers and recycling operators respectively.

Furthermore, to protect intellectual property, three levels of confidentiality were defined: public, reserved and confidential. Reserved data can be published in the SUBAT public reports associated with coded names of the supplier, whereas confidential data could be used for computations and statistics in SUBAT, but will not be directly enclosed in published reports.

Any questionnaire answerer, i.e. entity supplying information to be enclosed in any of the questionnaires, is encouraged to specify the level of confidentiality of all the data.

As a partial reward for their kindness and their time, questionnaire answerer will gain access at an early stage of development to SUBAT documents that are intended to be published.

PROJECT SUMMARY

In urban traffic, due to their beneficial effect on environment, electrically propelled vehicles are an important factor for improvement of traffic and more particularly for a healthier living environment.

The electric vehicle makes use of energy sources which make it particularly suitable for use in urban or suburban areas - the traction battery.

In order to allow to make an overall assessment of the environmental benefits of the electrically propelled vehicle, it is of course necessary to take into account the environmental impact of the battery.

SUBAT aims to make a comprehensive technical, environmental and economical assessment of traction batteries for use in battery-electric, hybrid or fuel cell vehicles.

FOR MORE INFORMATION

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SUBAT



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SUSTAINABLE BATTERIES

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A SPECIFIC TARGETED RESEARCH
PROJECT FUNDED BY THE
SIXTH FRAMEWORK PROGRAMME

PROJECT PRESENTATION

The SUBAT Project is a specific targeted research project, funded by the Sixth Framework Programme of the European Commission, and set up to provide scientific basis for the decision of the Commission to maintain or not Ni-Cd batteries in electric vehicle applications.

In fact, the European end-of-life Directive (2000/53/EC) has put limits on the use of heavy metals (mercury, hexavalent chromium, lead and cadmium) in all vehicles put on the market after July 1, 2003, but the Annex II to the Directive has exempted Ni-Cd batteries for electric vehicles until December 31, 2005.

Therefore the SUBAT Project, started on January 1, 2004 with a duration of 15 months, will have to examine the advisability to maintain Ni-Cd batteries in electric vehicle applications and investigate their progressive substitution with other batteries.

To guarantee the independency of the study and a complete and neutral collection of information, a consortium of specialized organisations was built to take the relevant contacts with all parties involved in the electric vehicle industry.

The participants in the project are:

- The **Vrije Universiteit Brussel**, an institution with a long standing experience in the field of electric and hybrid vehicle who will act as coordinator of the project
- The international association **AVERE**, which through its national sections unites over 500 actors in the field of electric vehicles and batteries
- The international association **CITELEC**, which represents electric vehicle users such as municipalities
- The French association **CEREVEH**, involved in a number of research projects on electric and hybrid vehicles
- The Italian Electrotechnical Committee **CEI**,

representing through CIVES all Italian actors involved in the field of electric vehicles

- The **University of Pisa**, with its Department of Electrical Systems and Automation
- The **Université Libre de Bruxelles**, which has a considerable experience in environmental studies and life-cycle analysis.

To decide if Ni-Cd batteries can still be used in electric vehicle applications, a comprehensive and complete assessment of commercially available and forthcoming batteries will be made.

The vast range of available traction batteries will be analysed, including both batteries already in use and under development. Environmental impact will be quantified, as well as the evaluation of the economic consequences of their introduction and/or withdrawal for the European battery industry.

Therefore the overall goal of the project has been deployed in specific objectives as follows:

- analyse the offer on the basis of an exhaustive technical assessment and carrying out comparisons on different technologies available;
- analyse the demand on the basis of an economical assessment and determine the viability of the electric vehicle on the market depending on different types of batteries;
- analyse the environmental impact by mean of a complete life-cycle analysis to allocate environmental score to define them as being a sustainable solution or not.

THREE PILLARS OF THE PROJECT

The SUBAT project is logically built on three main pillars:

TECHNICAL ASSESSMENT: for all traction batteries the technical state-of-art will be analysed, focusing on the typical characteristics which are

relevant for the applications considered: the electric vehicle and the hybrid vehicle.

ENVIRONMENTAL ASSESSMENT: the environmental performance of all considered battery types will be taken into account following a life-cycle-analysis approach encompassing the following issues:

- Sustainable production and in particular investigations of availability of primary materials;
- Environmental production and in particular investigations of environmental impact of extraction and processing of primary materials and of the manufacturing of the battery;
- Environmental application and in particular investigations of emissions from the battery during use, release of components in case of accident;
- End-of-life issues and in particular investigations of recycling of active materials, production of non-recyclable waste, environmental impact of recycling processes.

ECONOMICAL ASSESSMENT: the battery system is the most expensive component of the electrically propelled vehicle. Its cost is thus a main critical item to determine the viability of the electric vehicle on the market. The economical aspects of the different battery systems will be assessed with a dual approach:

- micro-economical: investigations of production and manufacturing cost of the batteries will be performed as well as forecast cost for the consumer. Cost issues for battery producers and vehicle manufacturers to switch to new technologies will be a central point at this stage.
- macro-economical: this approach will take into account the position of battery manufacturers on the global market, assessing European vs. non-European products and influence on the European trade balance.