



EDF Electric Transportation

The Network's Electronique Newsletter

N° 177 - May 2010

Battery recycling : A major challenge to the success of electric mobility

At a time when lithium-ion battery production facilities are beginning to surface in just about every corner of the world, questions of how to recycle these new batteries are also being asked both in terms of technology and cost. The success of electric and rechargeable hybrid vehicles will depend in part on answers to these questions.

Four major technologies are called on to produce today's batteries for electric vehicles: lead (Pb), nickel-cadmium (NiCad), nickel metal hydride (NiMH), and lithium. Three of these technologies have already reached maturity (lead, nickel-cadmium, and nickel metal hydride), with proven recycling processes available (and recycling included in the final price of NiCad and NiMH) ; in the case of lead batteries, even ones that are profitable. This is not yet the case where lithium batteries are concerned – the technology of the future – whose industrialization is set to begin near the latter part of 2010.

Manufacturers have already established a waste stream for recycling first generation lithium-ion batteries used in portable devices with profitability relying on the commodity price of cobalt. The situation is different for the traction battery packs used in electric and rechargeable hybrid vehicles. Here, the recovered metals (manganese, nickel, iron, copper, aluminum) are of lesser value. Profitability is therefore more difficult to achieve.



VARTA lithium-ion battery

The need for conservation of raw materials, like that for reducing production costs, makes the development of lithium battery recycling a major challenge to the development of electric vehicles, and one that is presently factored into national strategies designed to encourage electric mobility.

Accordingly, the *Grenelle de l'Environnement* anticipates allocating a budget of 250 million euros for "sorting and recovery of waste, clean-up, and eco-concept products" which would benefit to research focused on the end of battery life. The "European Strategy for Clean and Energy-saving Vehicles" made public on April 26, 2010 by the European Commission hopes, for its part, to "forward European research projects for recycling and reuse of batteries". And finally, President Obama announced that the federal government, under provisions within the *American Recovery and Reinvestment Act*, would offer subsidies to lithium battery recycling and reuse projects.

Battery manufacturers are also mobilizing. Pilot plant construction projects are under development in Europe. Two courses are being explored: recycling and clean disposal. The Belgian company *UMICORE* is developing a technique that is adaptable to different battery types, whatever their basic constituents. In France, *SNAM* is putting its final touches on a method for recycling lithium batteries used in rechargeable vehicles. *RECUPYL* is piloting a program for recovering lithium, but in this case, one aimed at cleaner disposal rather than recycling per se.

Over and above the question of recycling, manufacturers are also looking at a practice known as a "second life" for batteries. A method of amortizing battery cost (including their eventual recycling), it can be used to prolong useful battery life through the acceptance of a reduction in energy performance. Possible prospects might include powering vehicles used for only short distances, as well as stationary energy storage.

Contact : **Laurence Damazie-Edmond** 01 40 42 89 80 – <http://transports.edf.fr>