Electric vehicles are set to power much of Europe's future road transport networks. Alfons Westgeest, secretary general of EUROBAT, the Association of European Automotive and Industrial Battery Manufacturers, explains why it is essential to support the technology driving electric vehicles forward

Powering the future of transport

Electro mobility appeared in the beginning of the automotive industry with the first cars being electric vehicles. A fleet of electric taxis produced by Electric Carriage and Wagon Company began to circulate in New York City in 1897. In 1899 an electric vehicle reached a speed of over 100km/h for the first time. Since the 1990s, the R&D for electro mobility gained importance in view of concerns over increased emissions, in combination with the rapid growth of emerging economies. In addition, the volatility of crude oil prices, future scarceness and impact on geopolitical scenarios have pushed government authorities and companies to consider alternative solutions and promote electrification of vehicles on the roads.

Looking ahead, mobility will continue to increase globally. In 2011 over 60 million road vehicles were sold on the market globally. By 2020 it is expected that number will increase to 100 million and by 2050 up to 200 million.

BATTERY TECHNOLOGIES	CHARACTERISTICS
Lead based (Pb)	Proven in application, low production cost
Nickel based (Ni)	Proven off-shore & harsh environments, long life
Lithium based (Li)	High energy density, small and light
Sodium based	High energy density, light

Battery technologies and their complementarity for various e-mobility applications

Batteries have a key role to play in reducing emissions from transport by the electrification of vehicles. There are numerous varieties of rechargeable batteries, available in different shapes and sizes, from small cells with a few mAhs of output, to those in stationary applications of several megawatts. Rechargeable batteries are crucial in transportation (road, train, maritime, aviation) and industrial applications such as forklifts, standby power, grid and off-grid renewable energy storage.

A broad range of different systems and battery technologies exist today and the four main battery families represented within EUROBAT correspond to the battery technologies dominating the automotive and industrial battery market.

EUROBAT is closely collaborating with the different EU institutions on how to enhance the R&D and manufacturing of batteries in Europe. This involves matters such as the availability of materials, design for applications and a closed loop recycling. There are only a limited number of metals available for energy storage. All battery technologies have specific characteristics and serve a specific purpose. The battery industry therefore advocates the co-existence of battery technologies for both R&D and placing on the market. Where substitution between technologies would be possible, this should be left to the market manufacturers of applications, so that they can choose the most suitable batteries for their products.

Alfons Westgeest, Secretary General of EUROBAT

Vehicle architectures outlook

According to EUROBAT research, the electrification of vehicles is expected to develop in the mid-term as follows:

- Starter-Lighting-Ignition (SLI): will provide continuation for efficient Internal Combustion Engines (ICE) engines;
- Start-stop systems (micro-hybrid): in the short-term; by 2015 the vast majority and by 2020 virtually all ICE cars will include this application in Europe;
- Mild, full and plug-in Hybrid Vehicles (HEV): will strongly develop in the mid-term;
- Electric Vehicles (EV), also named Battery Electric Vehicles (BEV), will provide the longer-term solution and eventually capture mass market position.

Reports of consulting companies and major stakeholders in the research and customer organisations (ERTRAC, ACEA) predict that different vehicle architectures will co-exist. While the ICE architecture will become more electrified, its role will remain important in the coming decades.

Battery Energy Storage (BES) systems are flexible and can be adapted to high power or high energy applications. When correctly

selected or tailored, they are also very efficient both during use and at stand-by functions. BES and smart grid systems will increasingly contribute to the overall efficiency of current and future road vehicle applications.

Consumer confidence is crucial

In many ways is it important to build consumer confidence in electrical vehicle technology. Consumer acceptance will depend on the driving-profile, whether urban or motorway commuter or using fleet operations. Other factors include reducing the anxiety about the range you can drive with an electric or hybrid vehicle and the availability of charging points. Another aspect is support through fiscal incentives.

There will be no single solution and, more broadly, EUROBAT believes that governments should provide guidance to the market and design programmes to encourage the adoption of new technology. Eventually, the combination of both government and industry is the future.

Role of government and private sector

The evolution of the different vehicle architectures and their markets will depend on various incentives and technological evolutions. EUROBAT strongly believes that increasing sustainable transport is not a one sided deal: government and private sector collaboration is essential to achieve the roadmap ahead.

So what is the role of government? How can the European Union and member states adequately support the development of electric vehicle infrastructure?

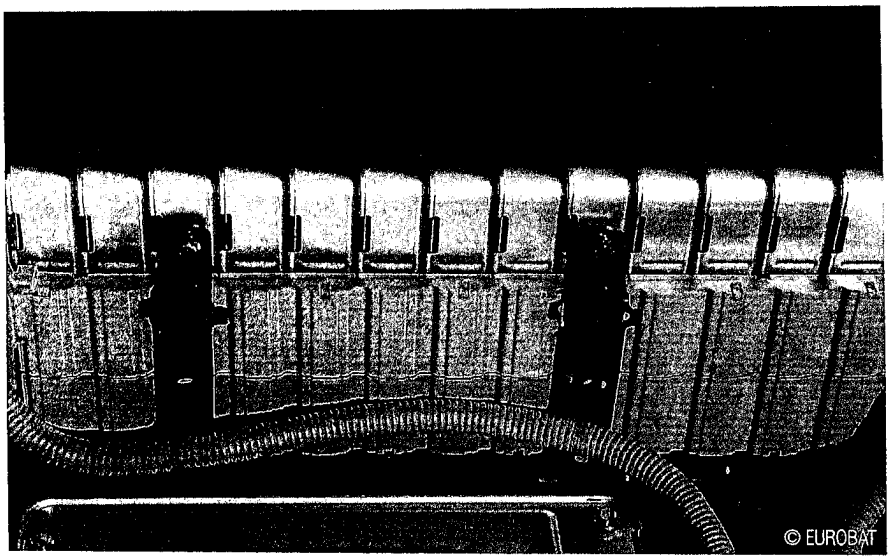
The European Commission increasingly understands that regulation and incentives need to be balanced. On the regulatory side, the EU has initiated standard processes and legislation for safety, as well as collection and recycling through End-of-Life Vehicle and Battery Directives.

On the incentive side, the EU project named Green eMotion is the largest public-private project that is part of the EU Green Car Initiative. It combines technology development for e-mobility with learning from the initiatives by cities around Europe. Car manufacturers and the entire supply chain, as well as the emergence of smart grids, are moving in a new direction to build confidence.

EU sustainable transport policy development

How can developments in the technology sectors aid green growth and economic development? Several EU policies are being rolled out, as a result of the Climate Change Package agreed upon during the EU summit of 2007. Firstly, EU Directive 2009/28/EC promotes the use of energy from renewable sources. The directive requires each member state to adopt a national renewable energy action plan. It aims at detailed targets for the share of energy from renewable sources consumed in transport, electricity, heating and cooling by 2020 and adequate measures for achieving these targets. In 2010, the member states started to present their national renewable energy action plans.

Secondly, the overall EU transport policy promotes mobility that is efficient, safe, secure and environmentally friendly. Road transport is often cited as the most significant contributor to man-made CO_2 emissions. They contribute around 12% of total CO_2 emissions in Europe, with overall transport producing 26%. In this context, the European Commission plans strict targets to halve the urban usage of ICE vehicles by 2030 and phase them out by 2050, according to the EU white paper for transport, issued on 28 March 2011. These objectives will also play a role in achieving the more comprehensive target of cutting CO_2 emissions from transport by 60% by 2050. The objective of ICE-vehicle-free cities will be pursued through fiscal measures, promotion of



An example of a hi capacity battery

alternative transport systems, and building of the necessary infrastructure to move to a widespread use of more electric and clean cars. As a first step, the EU decided, in 2009, to reduce CO_2 emissions from cars, with the objective of reaching 120g/km in 2012 and 95g/km in 2020 (Regulation (EC) No 443/2009).

Thirdly, under the Seventh Research Framework Programme (FP7), the EU is committed to reducing environmental impacts and noise pollution, including:

- Reduction of greenhouse gases through technological and socio-economic measures;
- Development of clean and efficient engines and power-trains including hybrid technologies;
- Implementation of vehicles with electric drivetrains: hybrid electric vehicle, plug-in hybrid, full electric vehicle, Battery EV and Fuel Cell EVs;
- Taking into account cost-efficiency and energy-efficiency considerations;
- Developing end-of-life strategies for vehicles and vessels.

EUROBAT is currently advising on the new R&D framework programme named HORIZON 2020. The programme is now under discussion and will cover R&D funding for the period 2014-2020.

Industry collaboration moving forward

The various European policies are an opportunity for the European battery industry to strengthen battery energy storage solutions, which can contribute in many ways to a better and more efficient use of road vehicles.

These ambitious packages, and the resulting legislative framework, have led to the development of many platforms for the exchange of knowledge on technologies in the field of renewable energies and transportation. EUROBAT has engaged with European associations (ACEA, EUCAR, CLEPA, EARPA) and Technology platforms (ERTRAC and ERRAC) to ensure that the role of battery energy storage as a key element for energy sources and management inside the vehicle is well understood.

EUROBAT and its members are contributing or directly participating in EU FP7 projects. EUROBAT joined the External Stakeholder Forum of Green eMotion and takes part in the board of advisors of the EU Project, ELVA (Advanced Electric Vehicle Architectures). The latter will focus on the development of three detailed vehicle concepts to undertake the respective qualitative assessments. Furthermore, EUROBAT is the co-convener of the Batteries Project Team within the CEN-CENELEC focus group on electro mobility.

Global co-operation

European battery manufacturing companies and many of EUROBAT's members are operating in a global market. Increasing EU competitiveness at global level will be key to achieving the EU's environmental targets. EUROBAT, therefore, encourages the EU to increase funds for co-ordinated battery research, and solutions for efficient energy applications as part of the development of the EU's strategic energy and co-ordinated R&D approach.

What relative strengths does the European battery market have in the international context? Innovation is a strength of European R&D. The examples include a high quality start-stop system that has made it successful in Europe as well as in fast growing markets such as China. With strengths in automotive power, hybrid and EV technology, it has become clear that Europe is assuming leadership in CO_2 reduction. It should therefore be the region to launch large scale demonstration projects to prove that Europe can act in a co-ordinated way.

Europe is also a key driver for standardisation and innovation manufacturing. EUROBAT is therefore a key initiator in the IEC and ISO and is also involved in the EU-US and EU-China dialogue on similar topics, proposing a stronger collaboration on electric vehicle standards.

Alfons Westgeest
Secretary General of EUROBAT, the Association of European Automotive and Industrial Battery Manufacturers

email eurobat@eurobat.org
browse www.eurobat.org