EUROBAT

The Association of European Automotive and Industrial Battery Manufacturers

Batteries for a competitive and sustainable Europe

EUROBAT
REPRESENTING 90% OF THE EUROPEAN AUTOMOTIVE AND INDUSTRIAL BATTERY MARKET

18 BATTERY MANUFACTURING MEMBERS, AND 28 ASSOCIATE MEMBERS FROM ACROSS THE SUPPLY CHAIN

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INTRODUCING EUROBAT

90%
OF THE EUROPEAN AUTOMOTIVE AND INDUSTRIAL BATTERY INDUSTRY

31 BATTERY MANUFACTURING PLANTS

16 R&D CENTRES

OVER 30,000 EMPLOYEES IN EUROPE

16 R&D CENTRES

28 ASSOCIATE MEMBERS FROM ACROSS THE BATTERY SUPPLY CHAIN

OVER € 6 BN TURNOVER IN 2013

EUROBAT REPRESENTS ALL BATTERY TECHNOLOGIES

Pb – LEAD-BASED
KEY APPLICATIONS: *Used in over 90% of automotive and industrial applications*
ADVANTAGES: *Low production cost, proven technology*

Li – LITHIUM-BASED
KEY APPLICATIONS: *Hybrid and electric vehicles, energy storage*
ADVANTAGES: *High energy density, weight*

Ni – NICKEL-BASED
KEY APPLICATIONS: *Hybrid vehicles, specialised industrial applications*
ADVANTAGES: *Long life, reliability*

Na – SODIUM-BASED
KEY APPLICATIONS: *Energy storage, large electric vehicles*
ADVANTAGES: *High energy density, weight*

WHERE ARE BATTERIES USED?

1. AUTOMOTIVE APPLICATIONS

AUTOMOTIVE STARTER BATTERIES
used for starting a vehicle's internal combustion engine, as well as for lighting and ignition functions (SLI). Automotive batteries also provide start-stop and micro-hybrid functionality, and are used in all hybrid/electric vehicles for on-board electronics (including safety features)

E-MOBILITY BATTERIES
used to provide a certain range of electric driving in:

* *Hybrid electric vehicles*
* *Plug-in hybrid electric vehicles*
* *Electric vehicles*

60* M UNITS

Growing market segment *

2. INDUSTRIAL APPLICATIONS

STATIONARY BATTERIES
used as a source of back-up power in:

* *UPS systems*
* *Telecommunications infrastructure*
* *Railway rolling stock*
* *Oil and gas networks*
* *Marine and medical applications*

8* M UNITS

MOTIVE POWER BATTERIES
used to provide a certain range of electric driving in:

* *Forklift trucks*
* *Golf Carts*
* *Airport equipment*
* *Other commercial electric v ehicles*

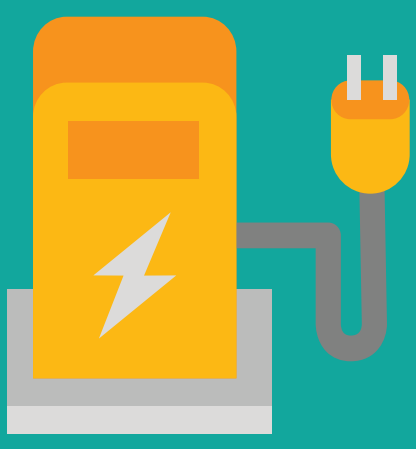
10* M UNITS

ENERGY STORAGE BATTERIES
used in grid-connected and off-grid energy storage systems (centralised or decentralised), helping to ease the integration of renewable energies and improving overall grid stability

Growing market segment *

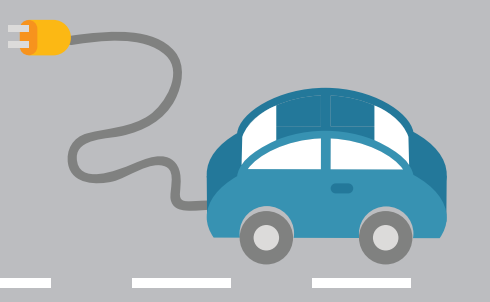
* *Approximate number of batteries sold in Europe for 2012*

AN INNOVATIVE INDUSTRY



E-MOBILITY

Batteries of various technologies are used at all levels of e-mobility to lower CO_2 emissions from transport.



Start-stop or micro-hybrid systems using advanced lead-based batteries now installed in the majority of new passenger cars produced in Europe, improving fuel efficiency by **5-10%**, *and contributing to* **700-1600 kg of CO^2** *savings across the vehicle lifecycle.*

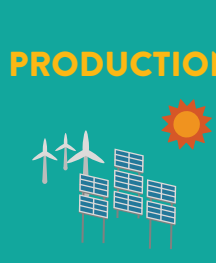
By early 2014, well **over 6 million** *full hybrids on the road globally (ZSW). Batteries of various technologies provide recuperation of braking energy and electric propulsion.*

By early 2014, **405,000** *plug-in hybrid and electric vehicles on the road globally (ZSW). Lithium-ion batteries provide a significant level of zero-emission driving.*

Sodium-nickel chloride batteries are a competitive option used in plug-in hybrids and electric vehicles in heavy applications and harsh environments.

SMART GRIDS

Flexibly battery systems are ready to provide a portolio of services at all levels of Europe's electricity grid



PRODUCTION

ENERGY & POWER

1 - 10 MW

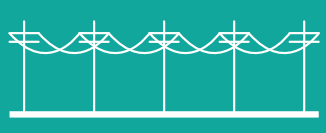
RENEWABLES
CAPACITY FIRMING
SMOOTHING, SHAVING

TRANSMISSION

HIGH POWER

10 - 50 MW

ANCILLARY SERVICES
FREQUENCY CONTROL



DISTRIBUTION

ENERGY & POWER

100 kW - 1 MW

LOAD MANAGEMENT
PEAK SHAVING
VOLTAGE CONTROL

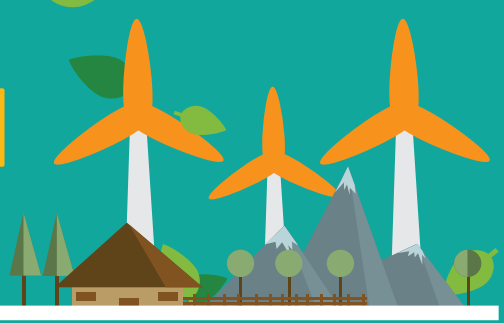
CONSUMPTION

ENERGY

5 - 50 kW

TIME SHIFTING
LOCAL ENERGY MANAGEMENT

RURAL ELECTRIFICATION



570 TWh *of mini-grid and off-grid electricity generation is required in rural areas of developing countries, to achieve universal energy access by 2030 (IEA, 2012)*

Battery systems are an integral component, used for short-term power balancing and long-term energy management

A SUSTAINABLE INDUSTRY

Towards ***a circular economy*** *with responsible end-of-life treatment of automotive and industrial batteries*

Take-back and recycling of all battery technologies lowers CO_2 emissions and improves resource efficiency

Close to **100%** *of all automotive and industrial batteries are taken back at their end-of-life for further processing.*

90% *average recycling efficiency for lead-based batteries treated in Europe, with materials used to manufacture new batteries and in other applications.*

75% *of lead in European lead-based batteries is now produced from secondary sources*

High recycling efficiency for nickel- and sodium-based batteries, with recycling processes for lithium-ion batteries developing strongly in line with their growing market share.

1000S *of tonnes of nickel, silver, copper, cobalt and rare earth elements are recovered from these battery technologies, and transformed into new applications (e.g. new batteries, stainless steel, road pavement)*