

EBRA
EUROPEAN BATTERY RECYCLING ASSOCIATION



TRANSPORTATION OF USED LITHIUM BATTERIES

**A WORKSHOP ORGANISED
BY
RECHARGE, PRBA and EBRA**

**Brussels
August 31st and Septembre 1st, 2010**

BACKGROUND

- DISCUSSION AT THE UN SUB-COMMITTEE MEETING OF JUNE 2010
- INTEREST FROM INDUSTRY and FROM COMPETENT AUTHORITIES TO IMPROVE THE REGULATION ON THE TRANSPORT OF USED LITHIUM BATTERIES

REPORT OF THE UN SUB-COMMITTEE MEETING OF JUNE 2010

2 DOCUMENTS were presented

Transport of used or damaged lithium cells or batteries

Documents:

1. ST/SG/AC.10/C.3/2010/7 (GERMANY)

“Transport of used or damaged lithium batteries”

2. ST/SG/AC.10/C.3/2010/36 (PRBA and RECHARGE)

Informal document: INF.88 (PRBA and RECHARGE)

“Transport of used Lithium cells and batteries for disposal or recycling” – P903

Report of the Sub-Committee of Experts on the Transport of Dangerous Goods on its 37th session (June 2010)

46. The discussions revealed the relative complexity of the issue, as various cases had to be covered, in particular: the transport of used but undamaged cells or batteries for reuse, disposal or recycling; of used cells or batteries in organized waste collection; and of damaged cells or batteries.

47. Some solutions had already been foreseen, but with no coordination, as such transport was subject to specific national or regional regulations. However, the demands of recycling, and specifically the fact that not all countries were equipped with recycling facilities, for instance in the islands of a given country, meant that the carriage of such used or damaged lithium cells or batteries in international and multimodal transport would only increase in the future. A solution must therefore be found for harmonizing conditions of transport using the Model Regulations.

Report of the Sub-Committee of Experts on the Transport of Dangerous Goods on its 37th session (June 2010)

48. It was noted that it would be difficult to find solutions to all those problems during the current biennium. The Chairman therefore proposed that, to begin with, the Sub-Committee should take stock of the situation. He invited all delegations to submit documents indicating:

- (a) A list of practical problems encountered at the national level, or for industry, encountered in disposal and recycling;
- (b) Local or regional measures already taken in the context of transport regulations;
- (c) Possible interference with other legal frameworks, for example environmental protection regulations governing waste disposal and recycling.

52. The representatives of RECHARGE and PRBA were invited to submit a new proposal for the next session, taking into account comments made by the delegations. The Sub-Committee would then decide whether it was appropriate to introduce such provisions into the Model Regulations.

OBJECTIVES

Review the existing UN Transport Regulation for used Lithium Batteries

List practical problems encountered in the transport of used lithium batteries for recycling or disposal (re-use and repair will also be considered)

Identify local, regional or national measures taken in the context of Transport Regulation of these batteries

Identify any potential area of improvement of the current UN Transport Regulation on used lithium batteries

PARTICIPANTS

BATTERY MANUFACTURING INDUSTRY

AUTOMOTIVE INDUSTRY

USED BATTERY COLLECTION ORGANISATIONS

USED BATTERY COLLECTION & RECYCLING INDUSTRY

BATTERY INDUSTRY ASSOCIATIONS

COMPETENT AUTHORITIES EXPERTS
(Transport of Dangerous Goods)

A COMPLEX EQUATION



USED LITHIUM – BATTERIES
Primary and Rechargeable

SMALL / PORTABLE

LARGE / INDUSTRIAL

From **CONSUMER**

From **B2B**

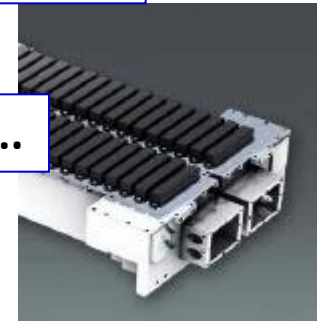
UNDAMAGED or DAMAGED

USED LITHIUM – BATTERIES
MIXED WITH OTHERS

USED LITHIUM - BATTERIES
SELECTIVE COLLECTIONS

TRANSPORTED for RE-USE, REPAIR, RECYCLING, DISPOSAL....

TRANSPORT REGULATION (UN, AIR, MARITIME, ROAD and RAIL)



A COMPLEX EQUATION IN A COMPLEX ENVIRONMENT

THE MARKET EVOLUTION

Increasing market share of Li-Ion Batteries

Increasing number of applications / commercial actors

Increasing quantity of weight & energy per battery

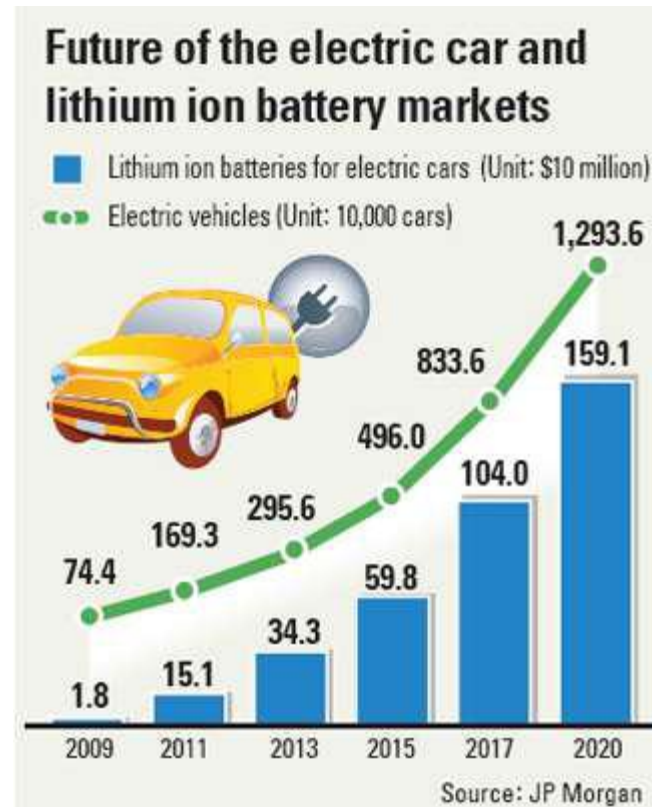
THE END OF LIFE EXPECTATIONS

Increasing number of actors at End of Life

Increasing quantity of used batteries transported

**Uncertainty about the « integrity » of the battery
(mechanical and electrical properties)**

THE MARKET TRENDS



LITHIUM
PRIMARY

UN 3090
UN 3091

1. BUTTON CELLS
2. CYLINDRICAL CELLS
3. PRISMATIC CELLS

**For PORTABLE and INDUSTRIAL
APPLICATIONS**

LITHIUM
RECHARGEABLE

UN 3480
UN 3481

1. EEEqt

CELLS & BATTERIES
PACKS (INCORPORATED)

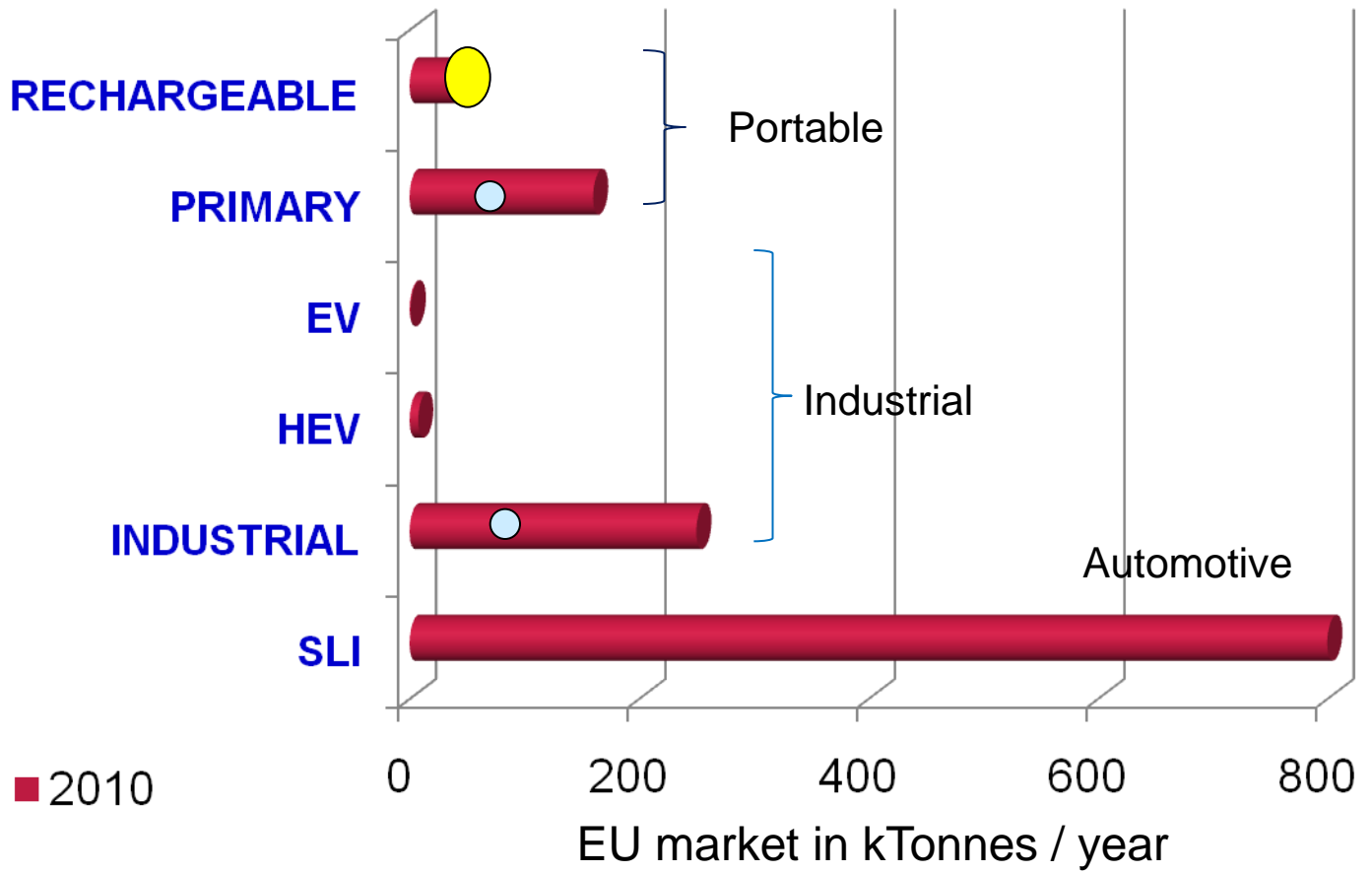
2. E-MOBILITY

MODULES

E-BIKES
SCOOTERS
HEV
EV

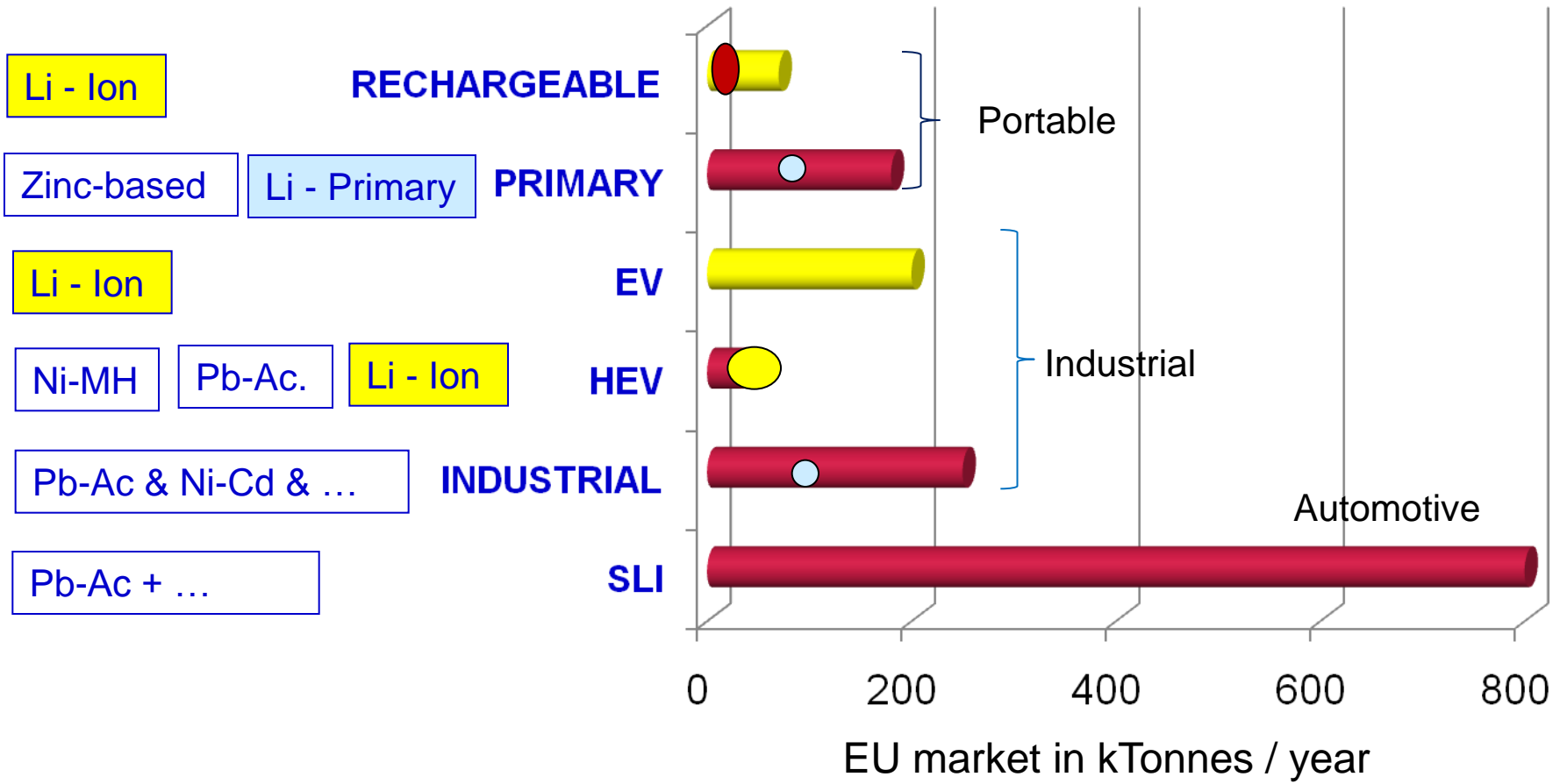
THE EUROPEAN BATTERY MARKET

- Li - Ion
- Zinc-based
- Li - Primary
- Ni-MH
- Pb-Ac & Ni-Cd
- Pb-Ac



EU 2010 { 0.25 million HEV - 30 kg battery - 7.5 kT (Ni-MH)

THE FUTURE EUROPEAN BATTERY MARKET

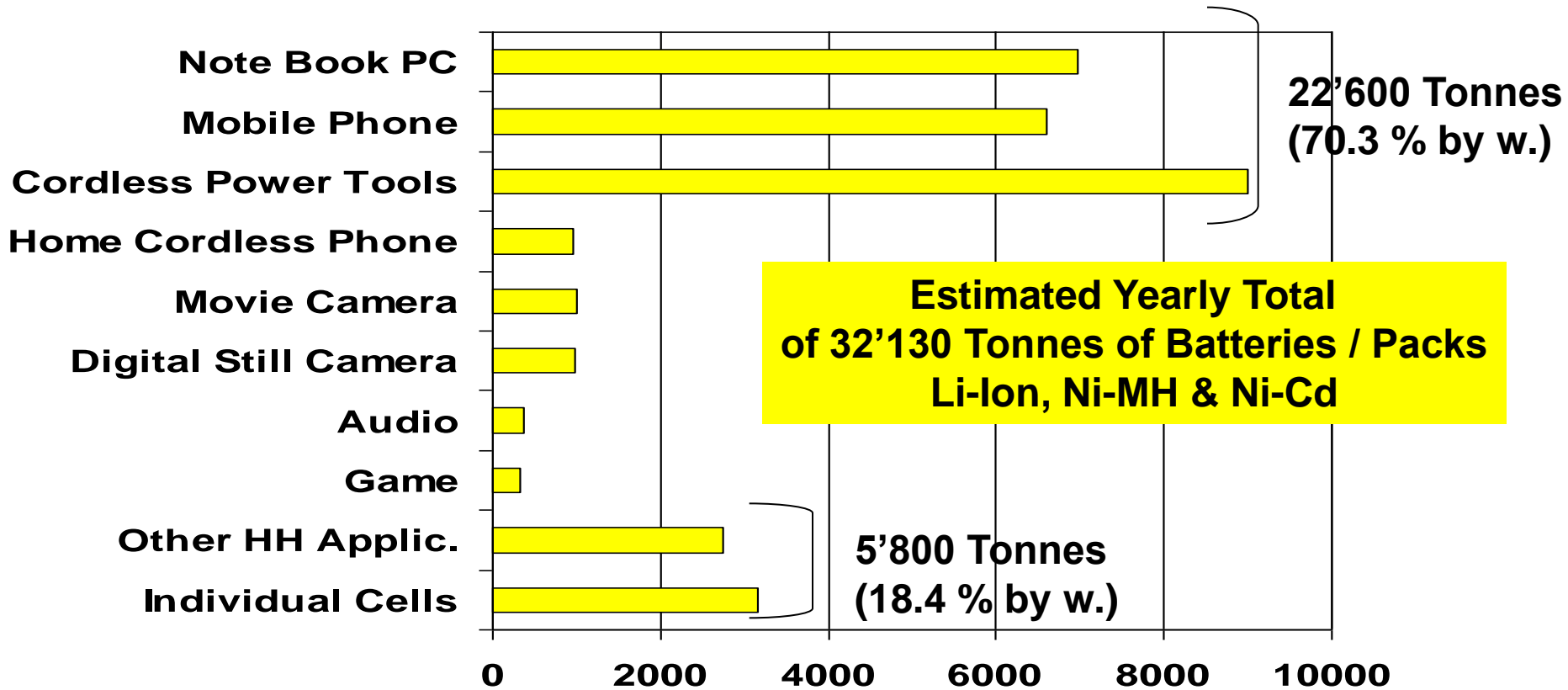


EU 2020 { 1.0 million HEV - 30 kg battery - 30 kTonnes/year
 1.0 million EV - 200 kg battery - 200 kTonnes

PORTABLE BATTERIES MARKET SEGMENTS



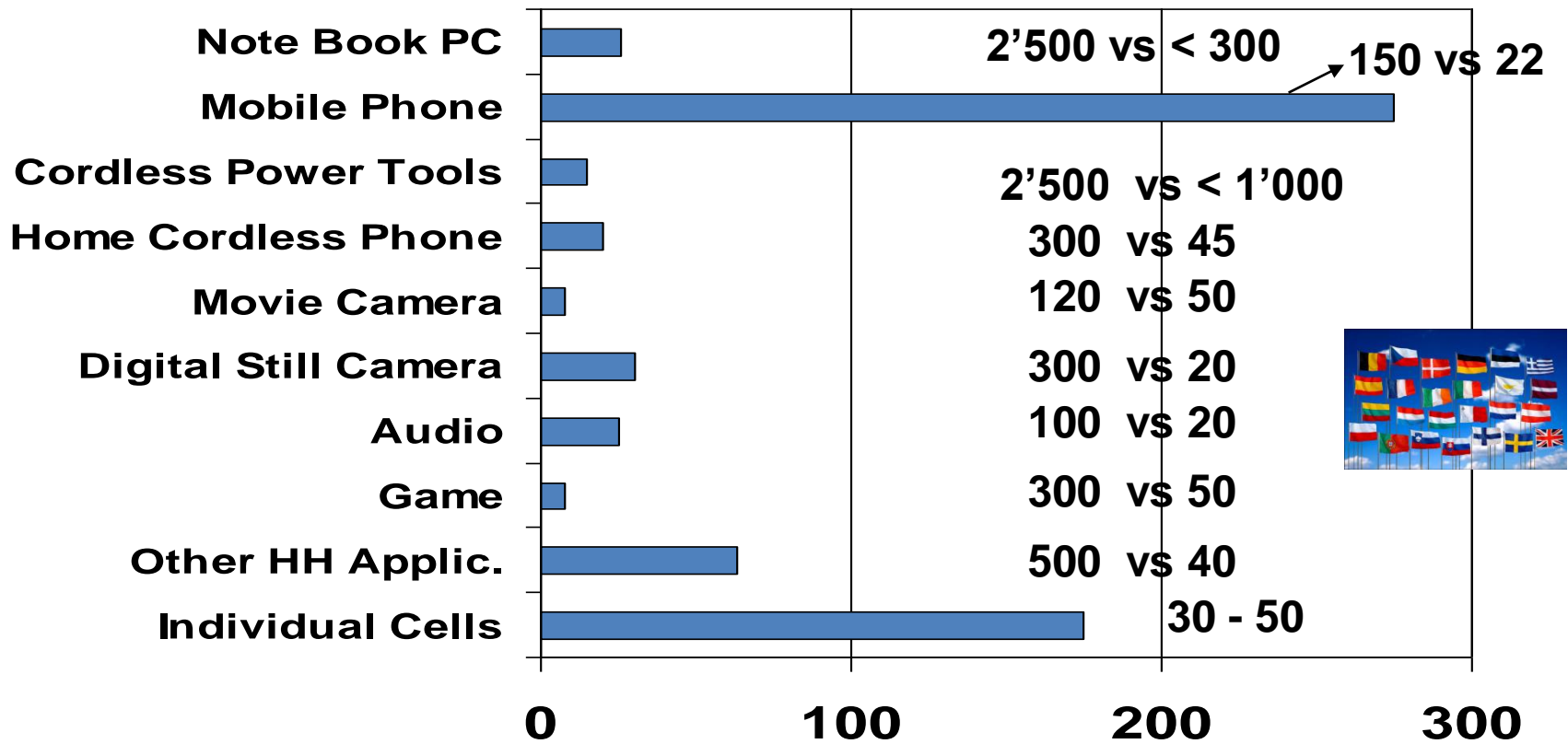
Estimated EU Market for Rechargeable Batteries Powered Appliances
(Reference Year 2007 - Basis 25 % of WW market)



In Tonnes of Rechargeable Batteries per year per application

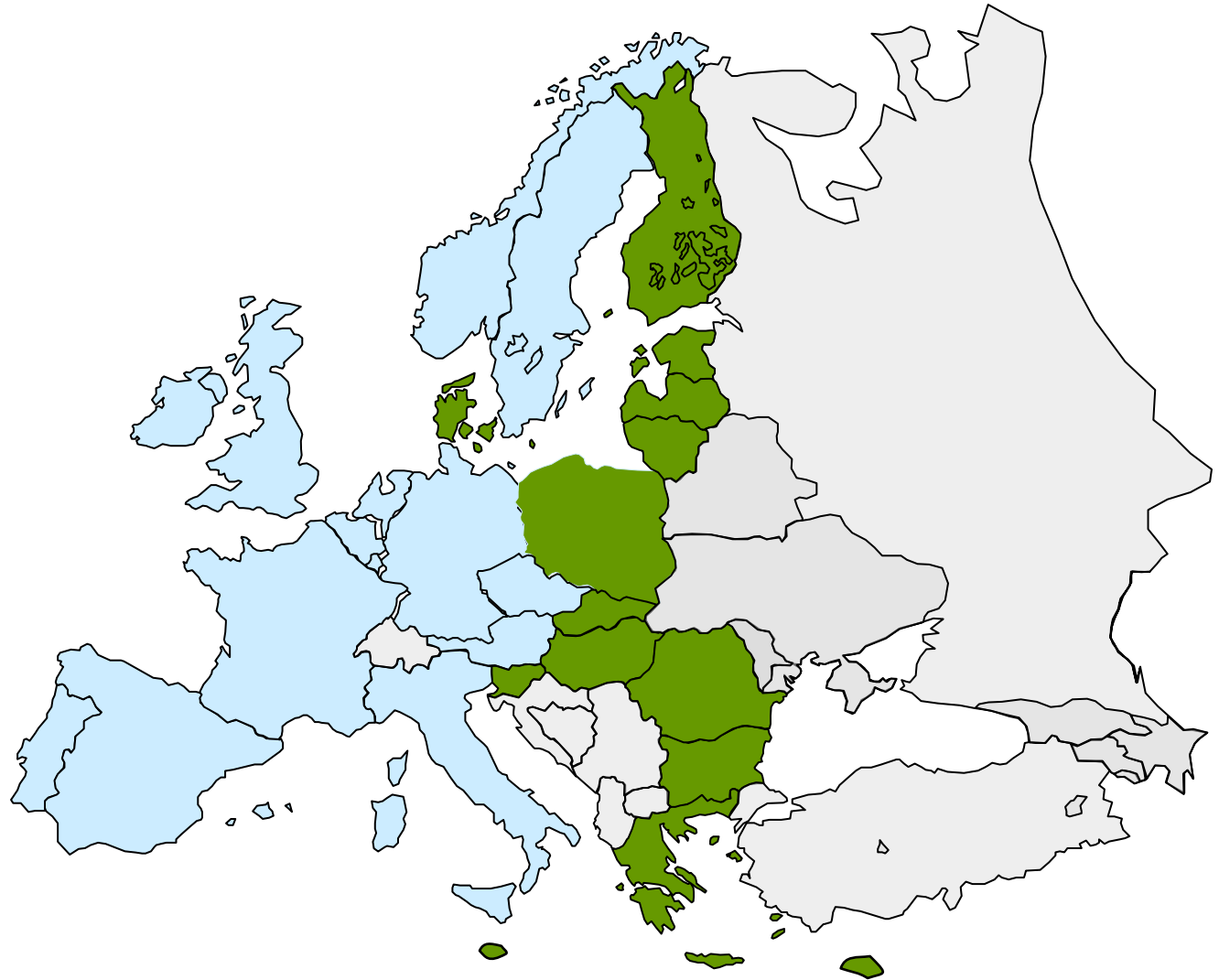
Estimated EU Market for Rechargeable Batteries Powered Appliances (Reference Year 2007 - Basis 25 % of WW market)

Average weight of equipment versus average battery weight (in g)



Million of Units of Equipment per year

THE END OF LIFE



END OF LIFE

NEW CHALLENGES

FROM < 100 Wh
100 million units / y
< 1.0 kg / unit



TO > 10.0 KWh
1 million units / y
Up to X00 kg/unit



EXPERIENCE IN EUROPE : TRANSPORT OF SPENT BATTERIES

Cumulative quantities of spent batteries transported to recycling plants in EU

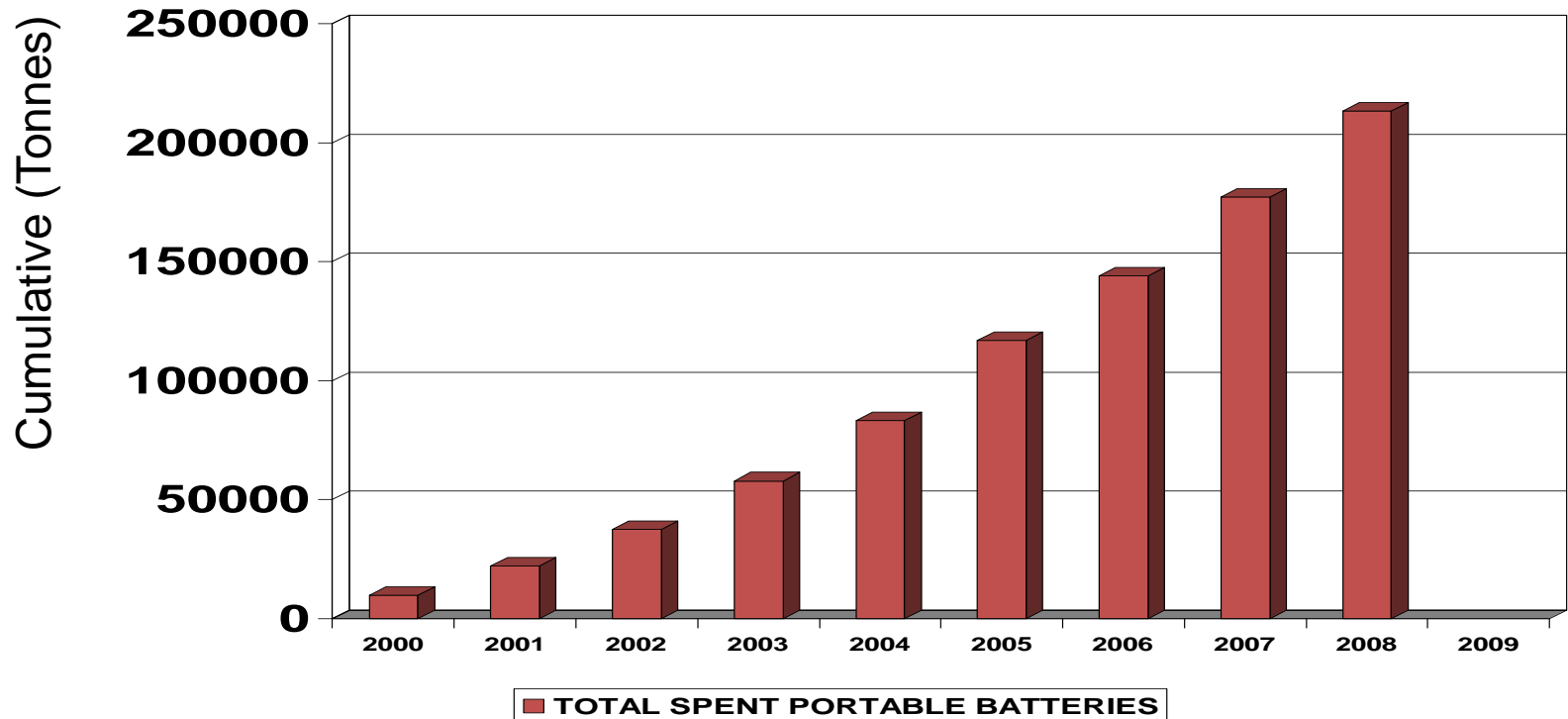
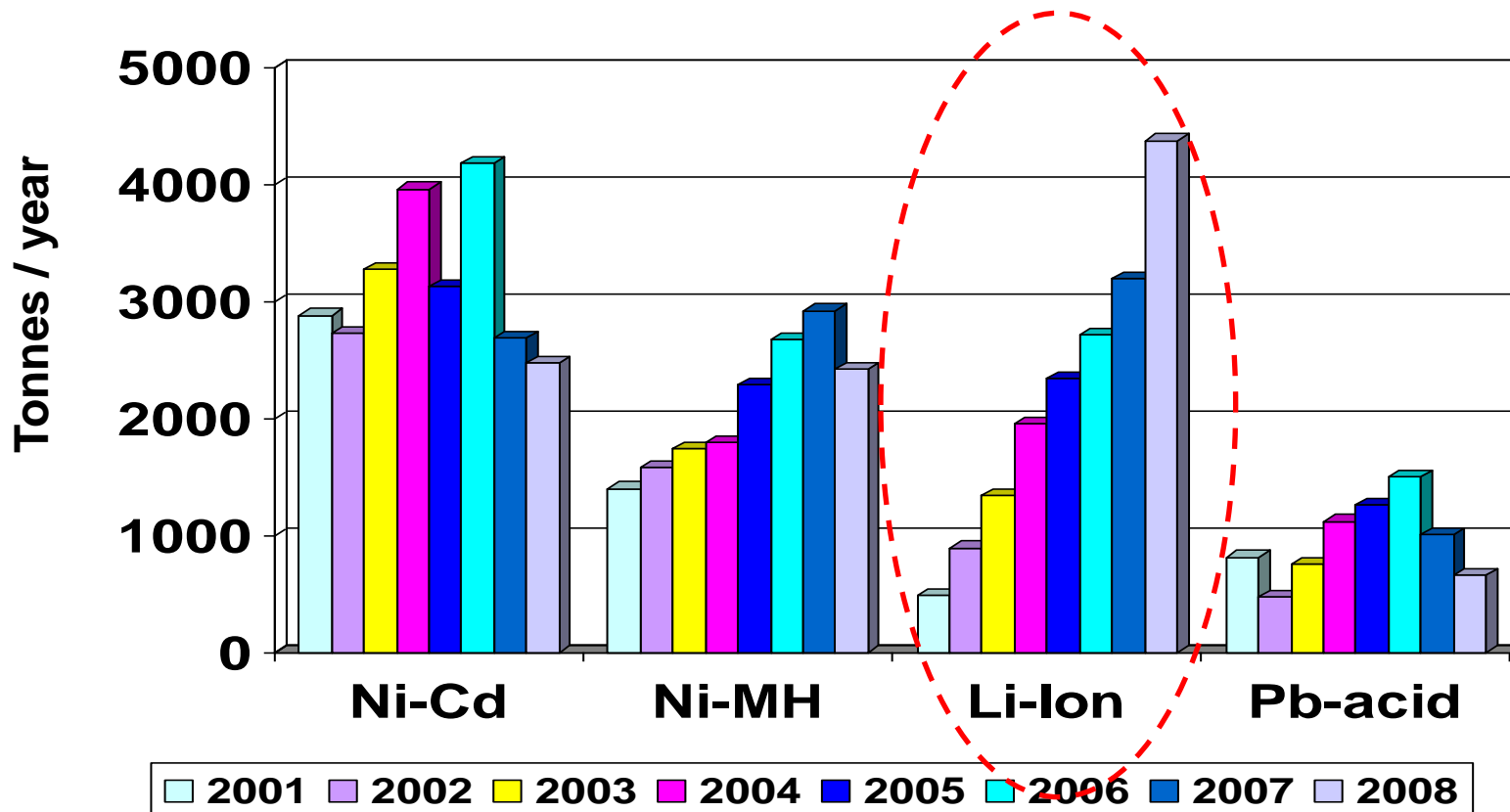


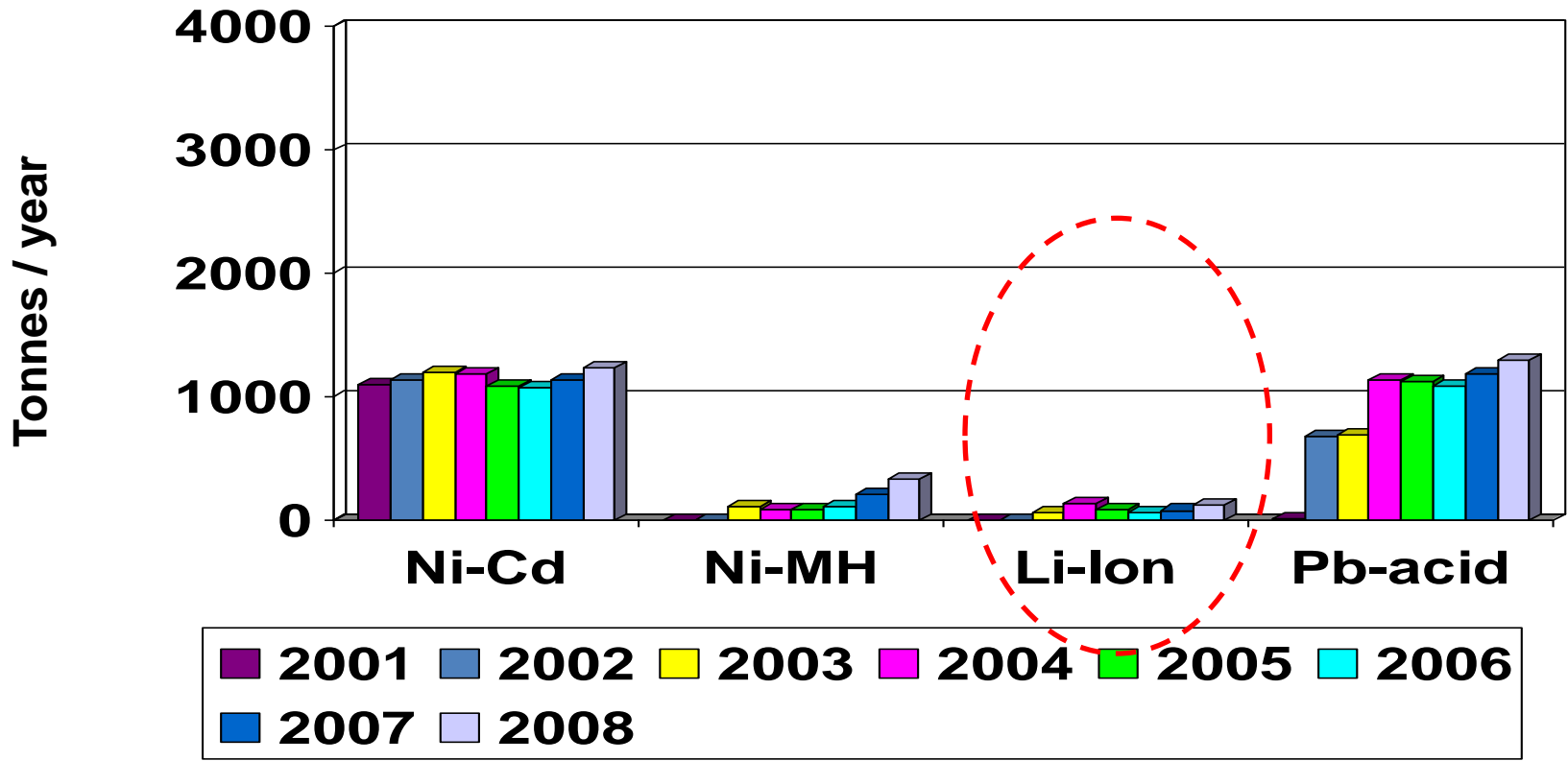
Figure 2

Market Data – Historical by chemistry –
NB data by weight Portable Batteries



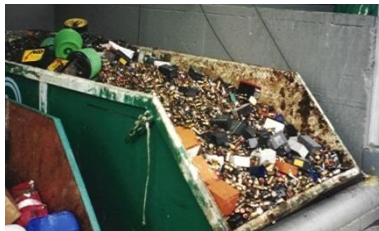
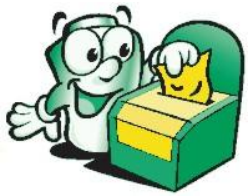
Data for Germany : consolidated from GRS + Bosch Rec. Centre + VfW.

Collection Data (GERMANY)
Quantities of Portable Rechargeable Batteries collected per year



Data for Germany : consolidated from GRS + Bosch Rec + VfW.

FROM COLLECTION



KEEP IT SAFE!



TO RECYCLING

OTHER MAJOR SOURCES of PRB from WEEE

1. B2B

- * Production Rejects
- * Leasing Contracts
- * Large Offices & Administration
- * Communication Equipment



2. REFURBISHING (For Re-use)

- * Private C°
- * CHARITY



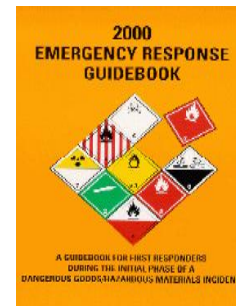
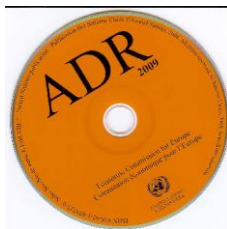
Incident Causes

Many incidents are caused by an improper preparation of batteries for shipment



KEEP IT SAFE!

THE ROLE OF THE UN MODEL REGULATION



LITHIUM BATTERIES - SPECIAL PROVISIONS & PACKING INSTRUCTIONS IN VARIOUS TRANSPORTATION MODES

UN Nb.	UN 3090		UN 3091		UN 3480		UN 3481	
Name	Lithium Metal Batteries		Lithium Metal Incorporated + Packed with Eqt.		Lithium-Ion Batteries		Lithium-Ion Incorporated + Packed with Eqt.	
	Class 9		Class 9		Class 9		Class 9	
	UN	ADR	UN	ADR	UN	ADR	UN	ADR
NEW Batteries	188	188	188	188	188	188	188	188
	230	230	230	230	230	230	230	230
	310	310			310	310		
		636		636 a		636		636 a
USED Batteries		636 b		636		636 b		636
	P903+ a,b		P903+ a,b		P903+ a,b		P903+ a,b	



SHIPMENT OF USED LITHIUM BATTERIES

SP 636 LITHIUM CELLS TRANSPORTATION & other non-lithium cells or batteries

(a) Cells contained in equipment shall not be capable of being discharged during carriage to the extent that the open circuit voltage falls below 2 volts or two thirds of the voltage of the undischarged cell, whichever is the lower.

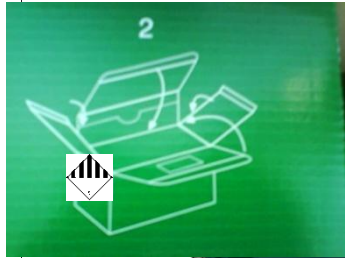
(b) **Used lithium cells and batteries** with a gross mass of not more than 500g each collected and presented for carriage for disposal between the consumer collecting point and the intermediate processing facility, together with other non-lithium cells or batteries, are not subject to the other provisions of ADR if they meet the following conditions:

- (i) The provisions of packing instruction P903b are complied with;
- (ii) A quality assurance system is in place to ensure that the total amount of lithium cells or batteries per transport unit does not exceed 333 kg;
- (iii) Packages shall bear the inscription: "USED LITHIUM CELLS".

P 903 LITHIUM CELLS TRANSPORTATION
(& other non-lithium cells or batteries under SP 636)

FINAL TEXT : ECE-TRANS-WP15-AC21

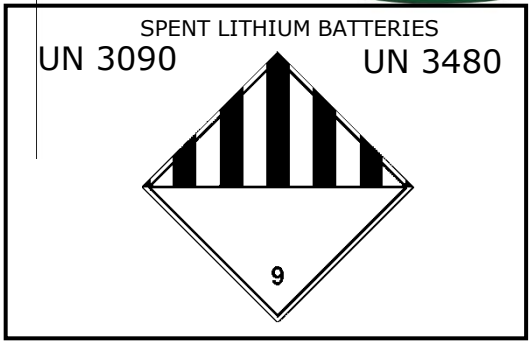
P903b	PACKING INSTRUCTION	P903b
This instruction applies to used cells and batteries of UN Nos. 3090 and 3091.		
<p>Used lithium cells and batteries, with a gross mass of not more than 500 g collected for disposal, together with other used non-lithium batteries or alone, may be carried, without being individually protected, under the following conditions:</p> <p>(1) In 1H2 drums 4H2 boxes conforming to the packing group II performance level for solids or</p> <p>(2) In 1A2 drums 4A boxes fitted with a PE bag and conforming to the packing group II performance level for solids. The PE bag shall : have an impact resistance of at least 480 grams in both parallel and perpendicular planes with respect to the length of the bag, have a minimum of 500 microns of thickness with electrical resistivity of more than 10 M ohms and low water adsorption rate over 24 hours at 25°C lower than 0.01% the PE bag may be used once only.</p> <p>(3) In collecting trays with a gross mass of less than 30 kg made from non-conducting material meeting the general conditions of 4.1.1.1, 4.1.1.2 and 4.1.1.5 to 4.1.1.8.</p>		
<p>Additional requirement: The empty space in the packaging shall be filled with cushioning material. The cushioning may be dispensed when the package is entirely fitted with a plastic bag and the bag is closed.] Hermetically sealed packaging shall be fitted with a venting device according to 4.1.1.8. The venting device shall be so designed that an overpressure caused by gases does not exceed 10 kPa.</p>		



Marked with Level „indicator“, If the drum is filled up to the marking line, the lid screws in to fix the batteries in their position.



EXAMPLES OF GOOD PRACTISE



ADR label No 9 and the remark to UN 3090 and UN 3480 and "Spent batteries/ spent lithium batteries" are on the other site

No venting device necessary because the drum is licensed without rubber gasket in the lid and it is no more sealed

EXPERIENCE IN THE TRANSPORT OF USED INDUSTRIAL BATTERIES



UN MODEL REGULATION FOR THE TRANSPORTATION OF DANGEROUS GOODS

SHIPMENT OF USED LITHIUM BATTERIES

Shipment of spent batteries as Dangerous Goods (ADR)

LITHIUM BATTERIES

> 333 Kg per load

Li-ION CPT



≈ 1.0 Kg (> 0.5 kg)

Li-ION e-bike



≈ 2.0 Kg

Batteries Damaged

(for Repair)

Batteries Damaged

(after testing)

SHIPMENT AS
DANGEROUS GOODS



Absence of Regulation

OBJECTIVES

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REVIEW THE AGENDA

Time (am)	#	PRELIMINARY AGENDA - DAY 2 - September 1, 2010 (Meeting between Competent Authorities and Industry)	SPEAKERS
9.30	1 2	Introductory Remarks Scope and Objective of the Meeting Short review of the discussions between Industry Partners (Day 1)	Organizers RECHARGE & PRBA
PORTABLE BATTERIES			
10.00	3	Safety aspects of Lithium-ion cells and batteries : protection against external short circuit.	Mr A. AWANO (BAJ)
10.20	4	Shipment of cells and batteries with protection against external short circuit: Lithium-Ion cells and batteries	Mr H. SHIMA (BAJ)
10.40	5	International Transport regulation of new Portable Lithium Batteries	Mr G. KERCHNER (PRBA)
11.00	6	Transport of used lithium portable batteries: collected selectively or in bulk with other chemistries (current packaging, marking and labelling requirements for transport)	
11.20	6.a.	Japan	JBRC Mr C. SMITH (RBRC & PRBA)
11.40	6.b.	USA and Canada	
11.40	6.c.	Europe (ADR) - 1) Contribution of Batteriretur (Norway) 2) UK Carriage of Spent Batteries as Dangerous Goods under ADR Rules	Mr Miles FREEMAN (EBRA)
12.00	7	Conclusion A : Portable Batteries - Proposal for improvement of SP 903	PRBA & Participants
12.45 to 1.30	LUNCH will be served next to the meeting room		

Time (pm)	INDUSTRIAL BATTERIES and E-Mobility		
1.30	8	1) The evolution of the Lithium Battery market for E-mobility and Energy Storage applications. 2) Safety and tests of large format batteries.	Mr. E. Fahlbush and Mr Tim Schäfer.
2.00	9	Transport conditions of new Industrial Lithium batteries	Mr Rainer Kern
2.30	10	Transport and Storage of Used Industrial Batteries: anticipation of issues/problems	Mr J-P Wiaux
3.00	11	Conclusions B : Transport of Used Industrial/Automotive Batteries: open questions	Mr R.Kern and participants
3.45	COFFEE BREAK		
PROTOTYPES and DAMAGE BATTERIES			
4.00	12	Packaging conditions for prototypes and damaged batteries - Proposal from Germany to UNSCETDG	Mrs Gudula SCHWAN
	13	Comments raised after the DAY 1 workshop	Mr G. Kerchner (PRBA)
4.30	14	Conclusion C : Recommendation for Prototypes and Damaged Batteries	All Participants
5.30	End of the workshop (second day)		

QUESTIONNAIRE or COMMENTS FORM

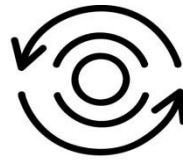
USED LITHIUM BATTERIES TRANSPORTATION REGULATION
In NORWAY (Batteriretur – Mr Frode Hagen)

PARTICIPANTS LIST / LIST OF PRESENCE

PARKING TICKET

PLEASE USE THE HANDY MICROPHONE / Name + Affiliation

RECHARGE



EBRA

EUROPEAN BATTERY RECYCLING ASSOCIATION



RECHARGE
European Portable Battery Association

PRBA
Rechargeable Battery Association
(North America)

EBRA
European Battery
Recyclers Association

BAJ
Battery Association of Japan

PRBA + RECHARGE PROPOSAL

IN REFERENCE TO ADR SP 636,

**QUESTIONS ABOUT THE TRANSPORT OF USED LITHIUM
BATTERIES MIXED WITH « CONSUMER » BATTERIES**

**VARIOUS APPROACHES THAT CAN BE EVALUATED
IN DEDICATED WORKING GROUP**

<LIMIT OF 500 G

QUALITY CONTROL FOR 333 KG

DAMAGED BATTERIES

PROTOTYPE

**>>> NOT UN TESTED
DAMAGED PROTOTYPES
SHOULD BE CONSIDERED
AS DAMAGED BATTERIES**

USED BATTERIES

**= NEW BATTERIES
BUT DEFINITION OF USED BATTERY ?**

**MAY BE A NEED TO DISTINGUISHED
BETWEEN PORTABLE & INDUSTRIAL ?**

**COMMON UNDERSTANDING OF
THE REFERENCE TO SP 230
BECAUSE SP 230 REQUIRES UN TESTING
& ADDITIONAL DESIGN REQUIREMENTS**

DAMAGED

WORDING OF « ICAO TI SP A154 » AS A BASIS

**> WORK ON ILLUSTRATIONS
OF « DAMAGED BATTERIES » REQUIRED**

FOLLOW-UP

1. INF PAPER SUBMITTED TO UN SUB-COM of Dec 2010

INFORMING ABOUT THE RESULTS OF THIS WORKSHOP

2. INDUSTRY POSITION FIRST QUARTER 2011

In parallel

UN INFORMAL WORKING GROUP

**3. USED Ni-MH (*) WILL BE FULLY REGULATED AS DG
FOR SEA TRANSPORT FROM 2012**

(*) Above 100 kg / consignment