



The Advanced Rechargeable & Lithium Batteries Association

9.1. Collection & Recycling of Rechargeable batteries ProSUM project

WRBRF 2016 – Seoul, Rep. Of Korea
Claude Chanson

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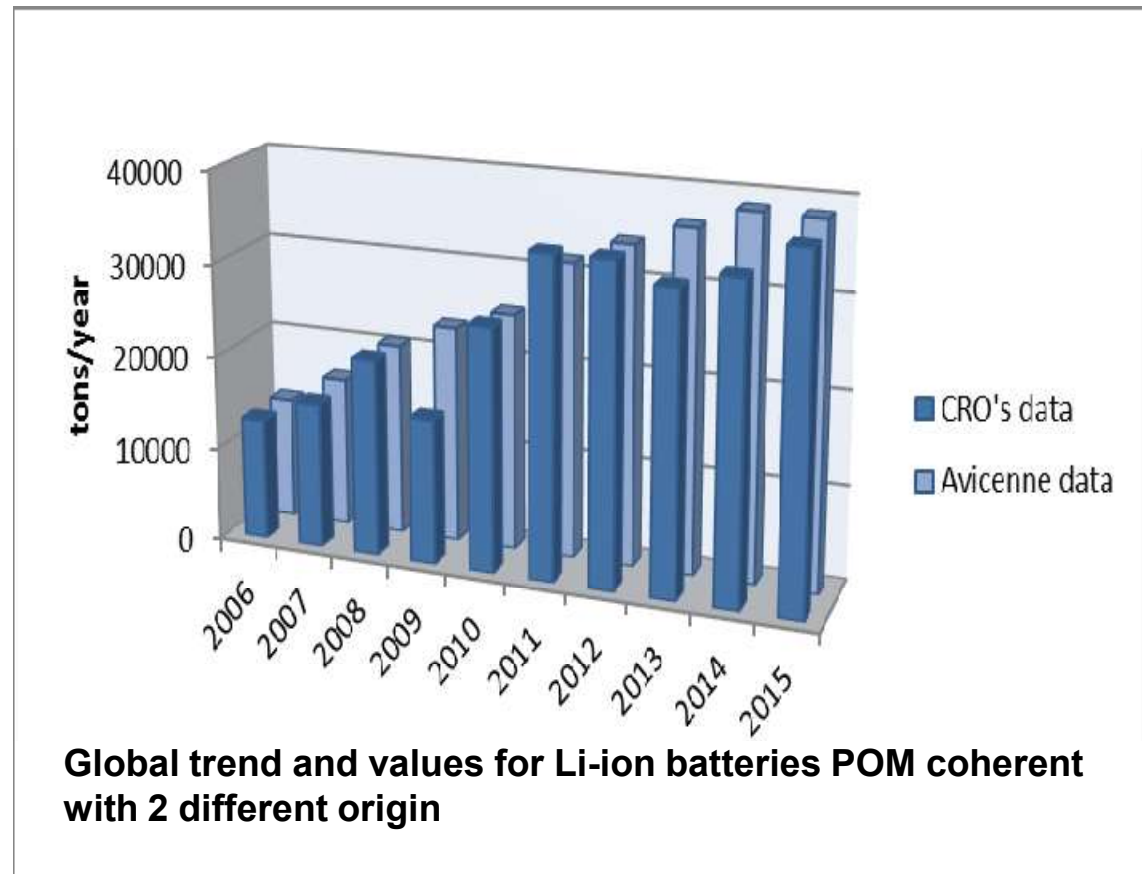
Content

1. The batteries technologies for rechargeable portable market in Europe.
2. The collection of portable batteries in Europe.
3. The calculation for collection rate according the EU legislation.
4. The recycling requirements in EU legislation.
5. Conclusion.



1. The batteries technologies in rechargeable portable batteries in EU: data availability

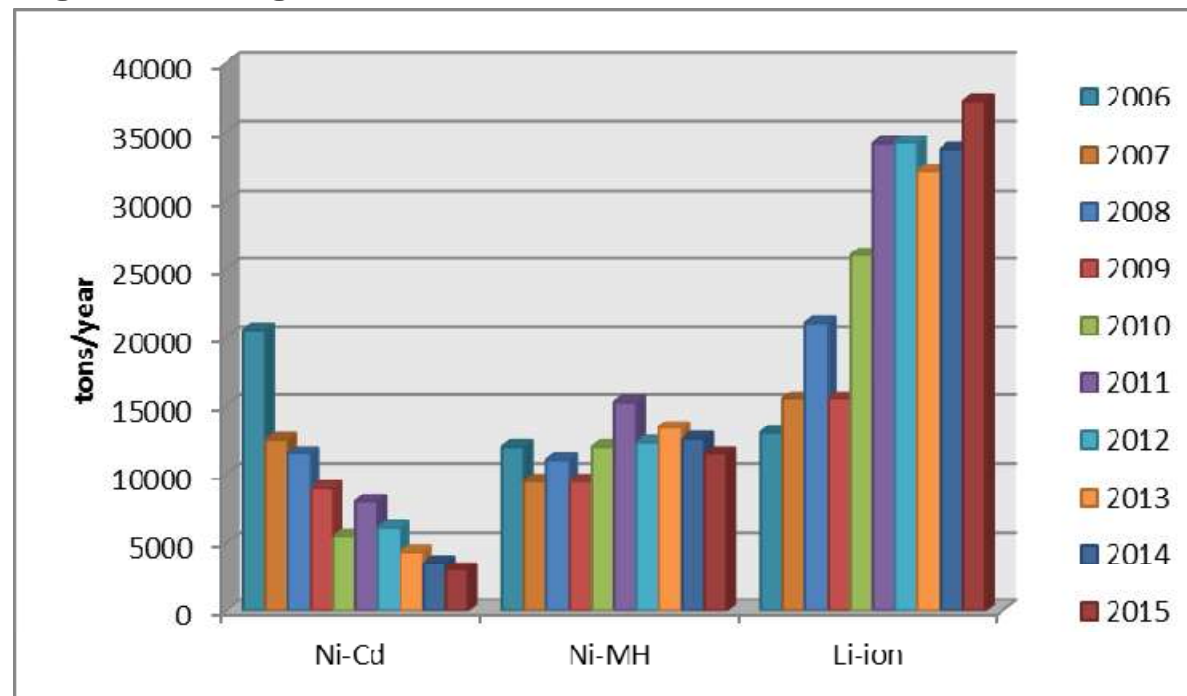
- Quantity of batteries placed POM as declared by the national **Collection and Recycling Organizations (CRO)**: based on the declaration of the German and French CRO's, completed with less detailed data from UK, Spain and Italy. It represents more than 66% by weight of the batteries placed on the market in Europe.
- Quantity calculated with the data from **Avicenne**: worldwide data with a 22% contribution attributed to the EU Market. They are based on an average of 175Wh/kg for Lithium-ion batteries, 70Wh/kg for Ni-MH and 45 Wh/kg for Ni-Cd



1. The batteries technologies in rechargeable portable batteries in EU

- Ni-Cd: trend of POM reducing
- Li-ion: increasing with new applications (IT equipments, CPT, others)
- Ni-MH: mainly rechargeable single cells, rather stable trend.

Tons of portable batteries Placed on the Market in Europe

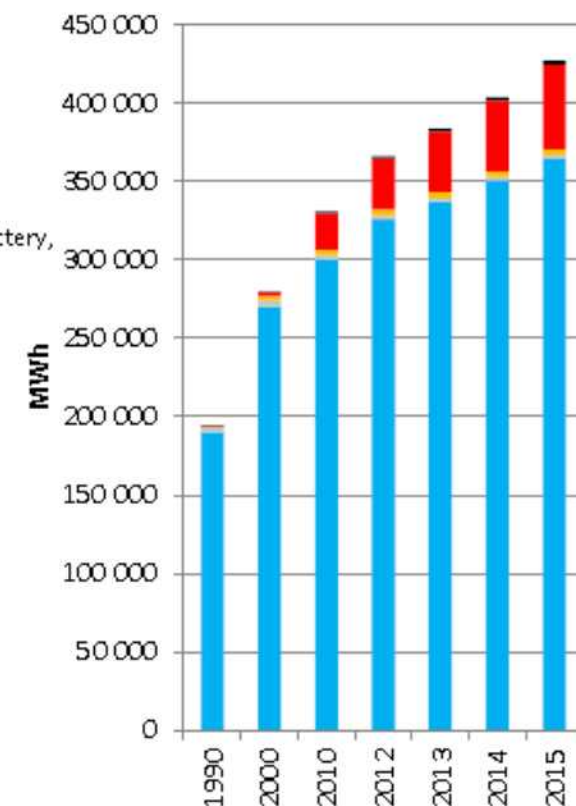
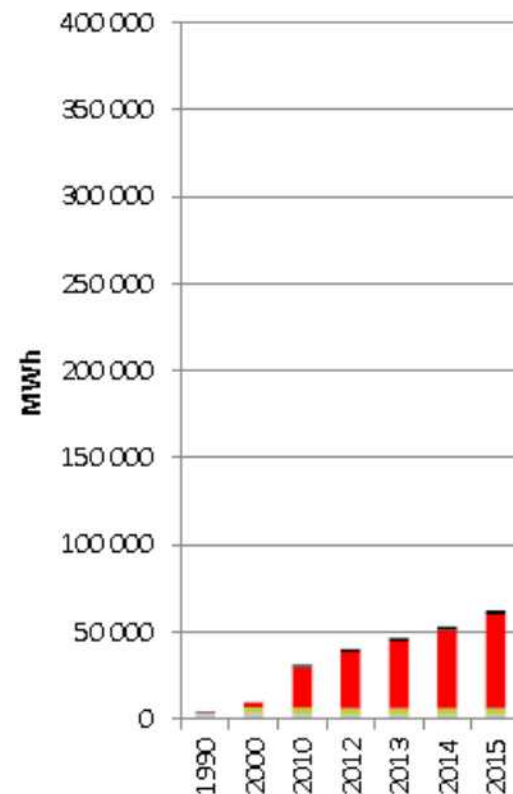


1. The batteries technologies in rechargeable batteries: comparison to rest of the world

THE WORLDWIDE BATTERY MARKET 1990-2015

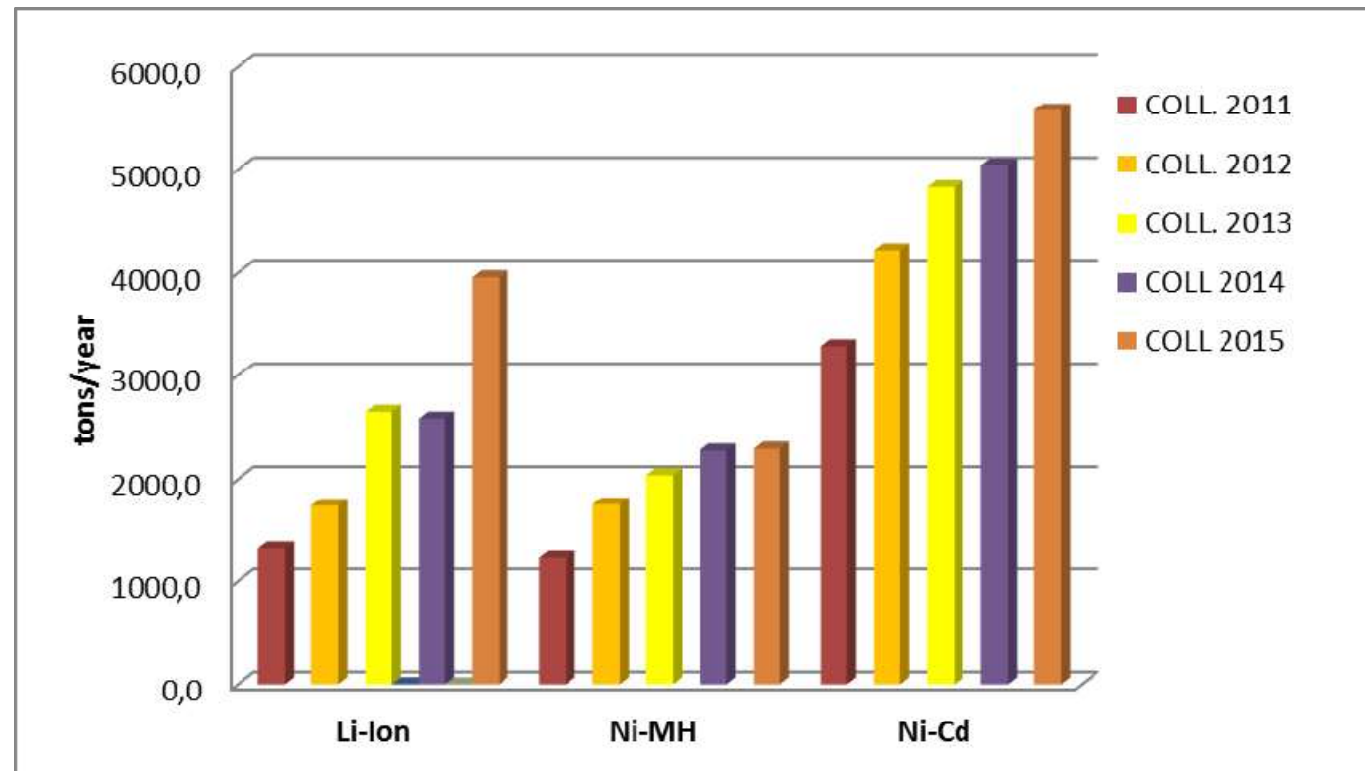
Major difference in the Ni-Cd market trend: much faster reduction in Europe due to the ban.

Lithium Ion Battery: Highest growth & major part of the investments
 Lead acid batteries: By far the most important market (90% market share)



2. The collection of portable batteries in EU:

- All collection quantities are year on year growing in 2015
- For Ni-Cd batteries, it is a very different trend compared to the POM trend

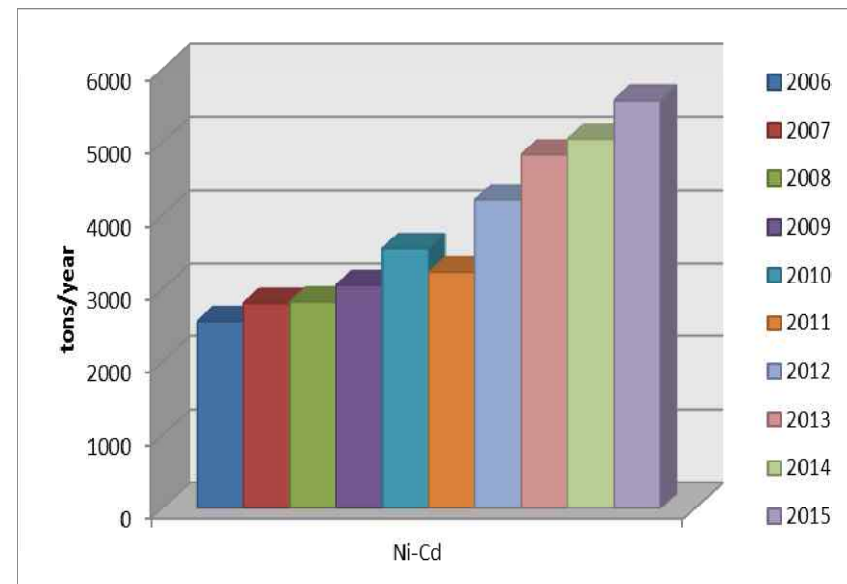
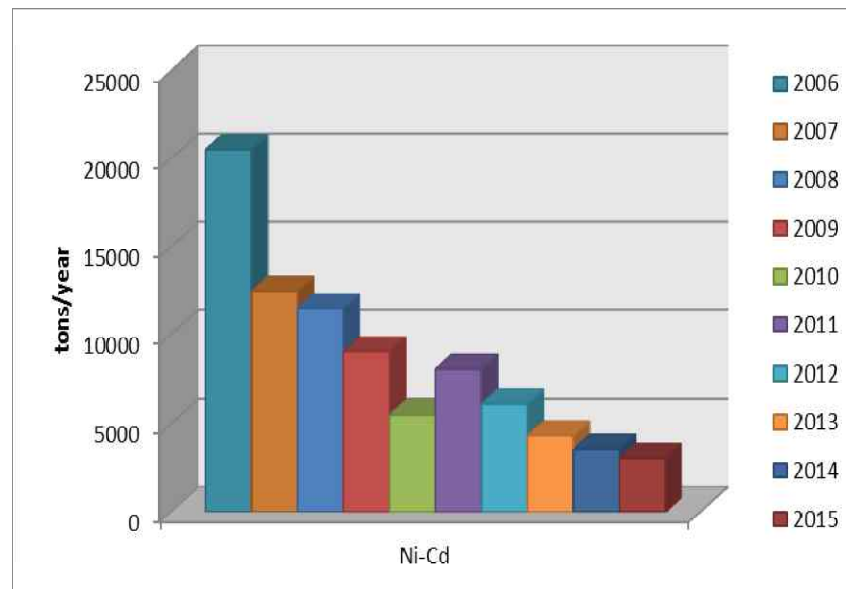


2. The portable Ni-Cd batteries collection rate:

The Ni-Cd collection rate increase despite reducing POM:

More batteries are collected than POM since 2013!

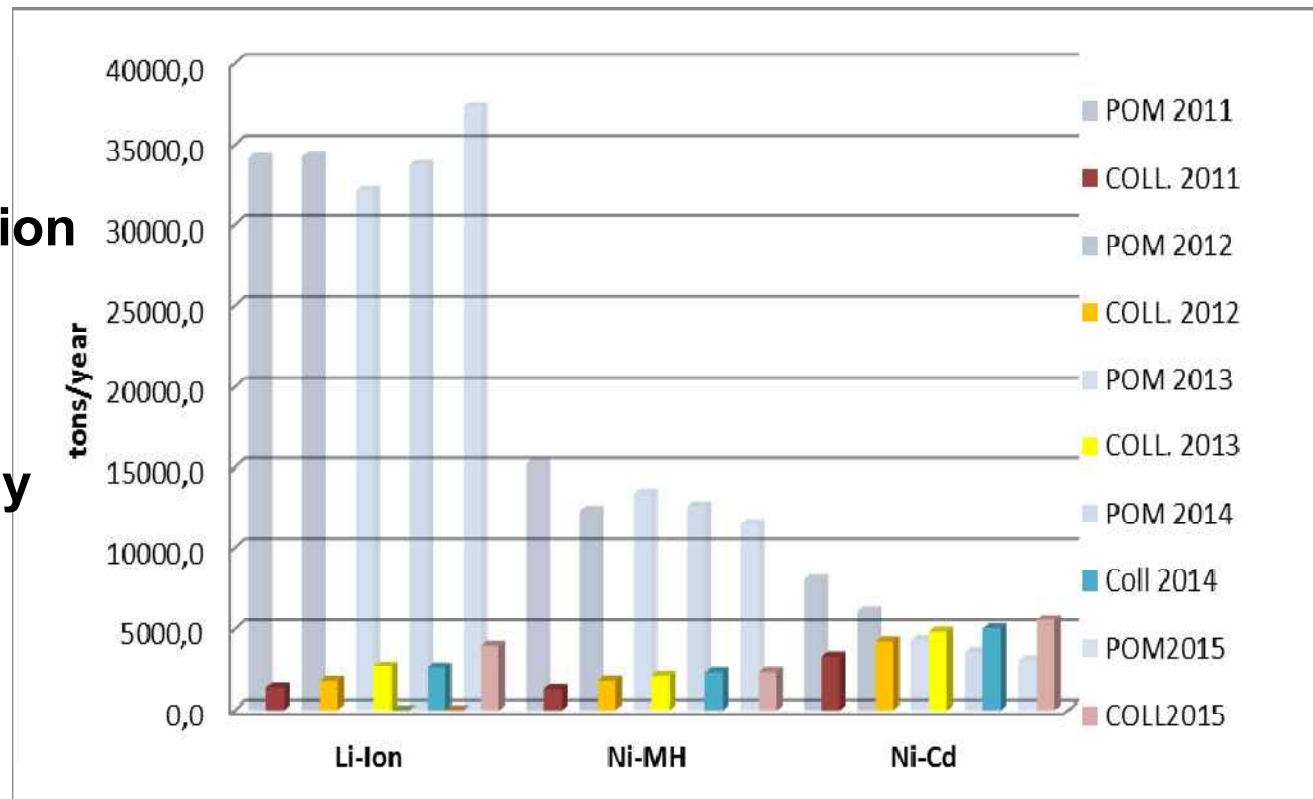
=>demonstration of the long life duration and customers hoarding effect:
in the range of 10 years at least.



2. The collection of portable batteries in EU: how to compare to POM (rechargeable)

Comparison year on year for portable rechargeable batteries: very different trends

- **Same users**
- **Same collection streams**
- **But large differences by technology**



2. The collection of portable batteries in EU: how to compare to POM (primary)

Comparison year on year for portable primary batteries

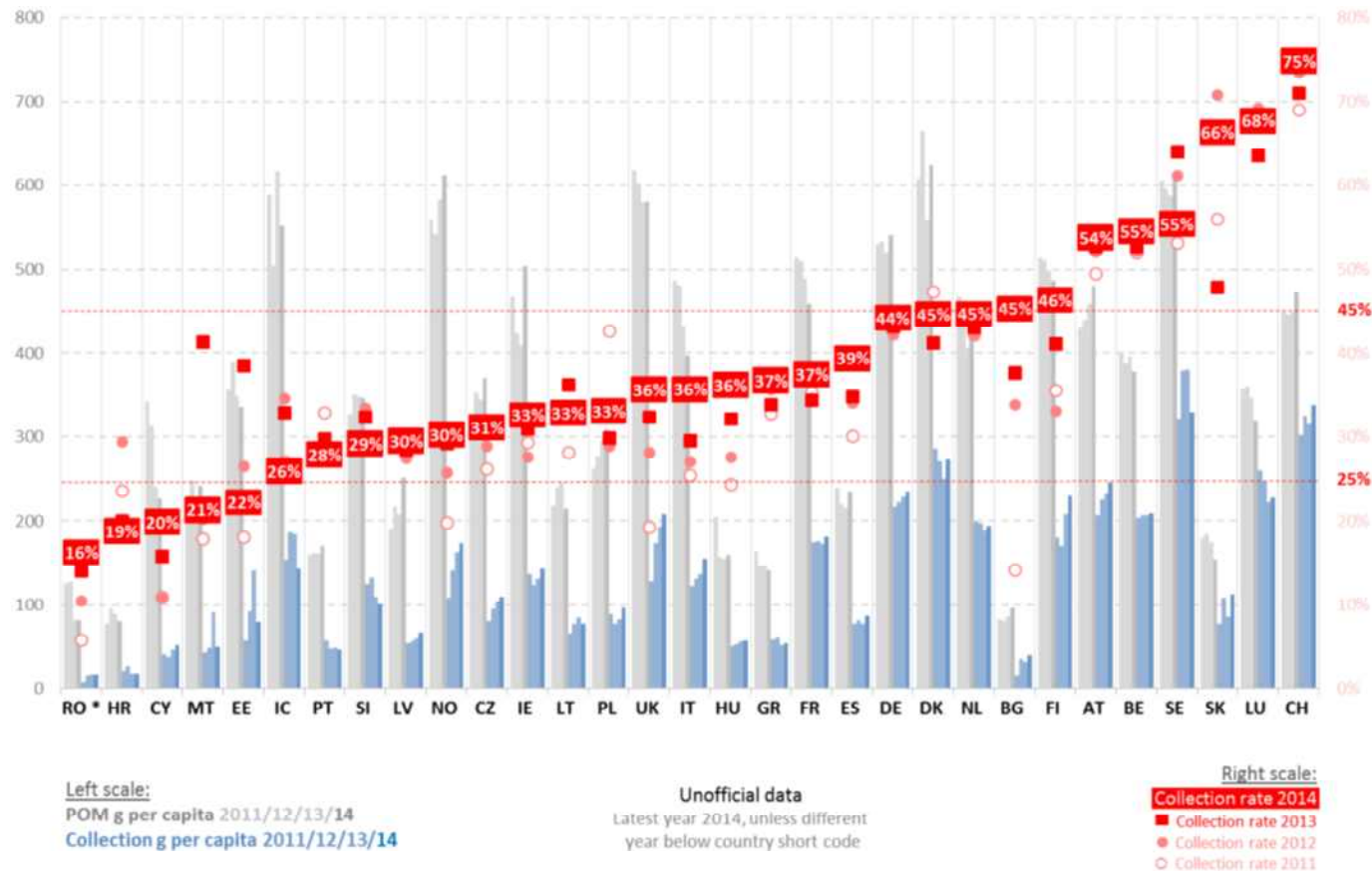


Data from Perchards/EPBA report 2015



2. The collection of portable batteries in EU: how to compare to POM (primary)

Collection rate slowing progressing, but stable market

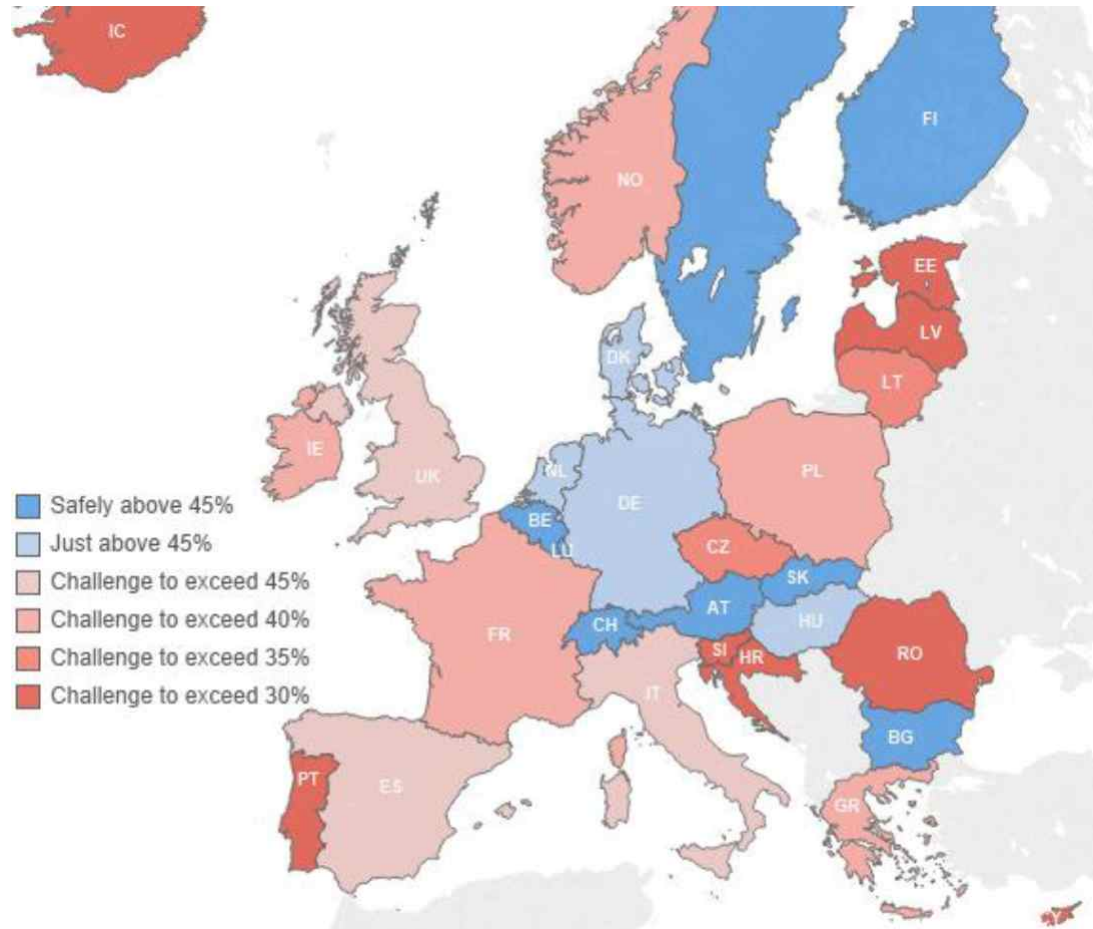


Data from Perchards/EPBA report 2015



2. The collection of portable batteries in EU: how to compare to POM (primary)

Collection rate absolute value often linked to the date of implementation of the collection targets in the country.

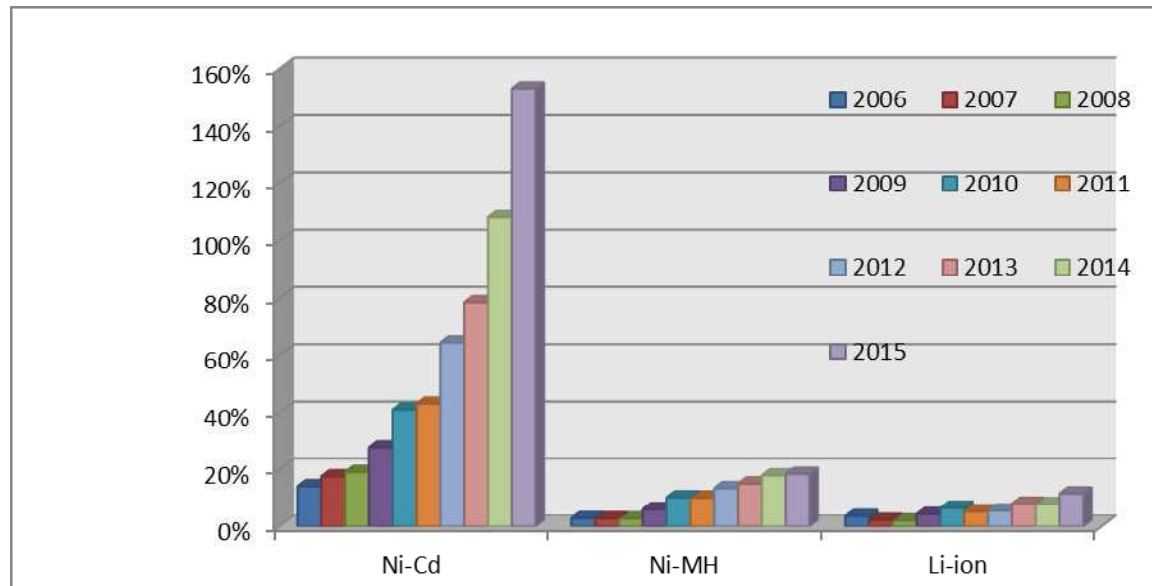


Data from Perchards/EPBA report 2015



3. The collection rate calculation: question

The collection rate calculated according the Battery Directive 2006/66 EC. It compares the quantity of waste batteries collected in a given year with the last 3 years average amount of batteries placed on the market, for the 3 technologies. It is a waste to sales comparison.



Why is Ni-MH collection rate lower than the primary batteries (same single cells market)?

Why is rechargeable batteries collection rate lower than primaries in general?



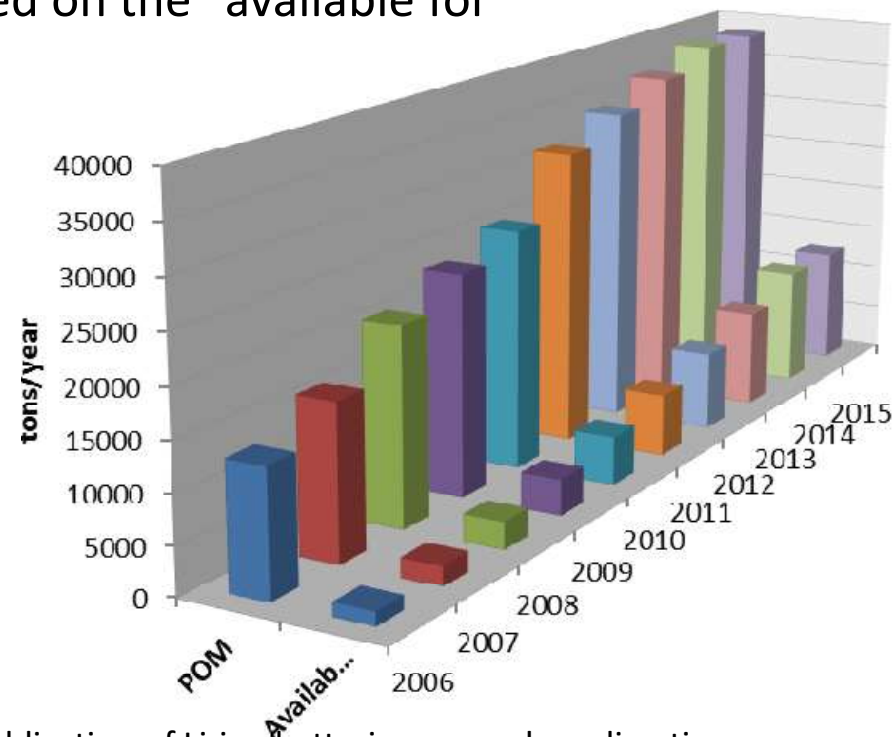
3. The collection rate calculation: fitting calculation

Based on the portable Ni-Cd and Ni-MH batteries collection rate:

- **life duration and hoarding effect have a very important effect on collection.**

A more realistic comparison could be based on the “available for collection” amount of batteries.

- **Portable Li-ion: Comparison of « Placing on the Market » and « Available for collection »**



Data calculation by RECHARGE, based on BEBAT 2014 publication of Li-ion batteries usage+hoarding time.



4. The recycling requirements in EU legislation

In addition to the collection requirements, the Batteries Directive describes the “Recycling efficiency” requirements:

A minimum percentage in weight of the battery must be reached with the recycled materials:

- **for lead acid batteries: 65%**
- **for Ni-Cd batteries: 75%**
- **all others: 50%**

The calculation is based on the ratio of the recycled material weight (output) to the waste battery weight (input).

These requirements are applicable to all batteries categories (Portable, Industrial and Automotive).



4. The recycling requirements in EU legislation

Example of Recycling Efficiency reporting

The first battery recycler has the duty to report the RE to the Competent Authorities of the Member State

Form A					
Recycling Efficiency of a Battery Recycling Porcess (other batteries)					
Report for calendar year:	2011				
Facility:					
Name:	EBRA				
Street:	Koningsstraat 80				
City:	Brussles				
County:	Belgium				
Contact Person:	Alain Vassart				
Email:	a.vassart@arcadisbelgium.be				
Tel:	+32 492 97 23 30				
Description of the complete battery recycling process:					
One step process. The input is made of spent batteries and another material stream mixed with the batteries. The output is made of 2 recovered streams, some final waste and emissions to the environment					
Input into the complete battery recycling process					
Waste batteries & accumulators	EWC Code	Mass	Average composition		
Verbal dessioncription		t/y	element or compound	mass%	
Alkaline batteries	16.06.04	1000	impurities		
			pack components		
			H ₂ O	9,00%	
			Dry Basis	A	15,00%
				B	25,00%
				C	10,00%
				D	30,00%
				E	20,00%
				100,00%	
Recycling Efficiency (R _E)	60,83%				
	Dry/Dry		tpy dry	910	



4. The recycling requirements in EU legislation: First data

First data published by ADEME 2014 about recycling efficiency in France (weighted average of the results of French recycling companies):

Batteries type	European target	Recycling efficiency (France 2014)
Ni-Cd	75%	77%
Lead acid	65%	>70%
Others	50%	58%

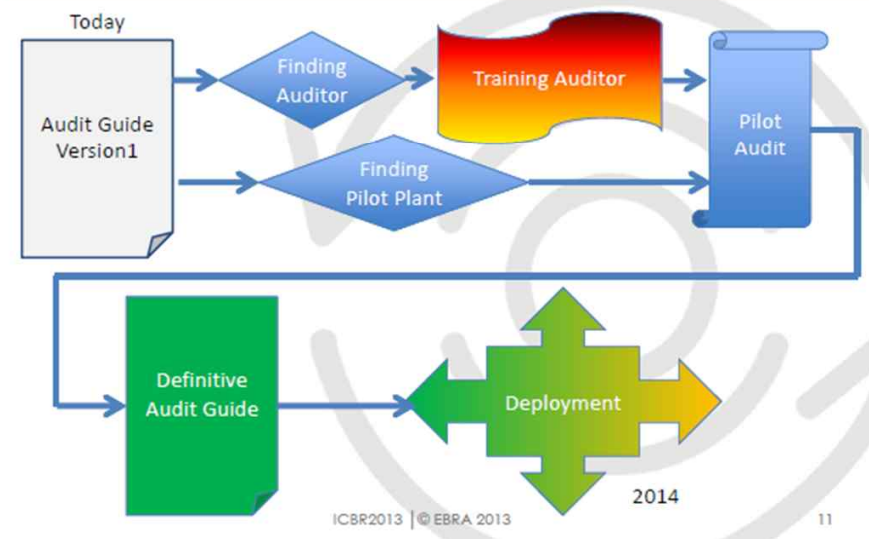


4. The recycling requirements in EU legislation: Considerations

- "Other batteries" global objective: 50% may be difficult to reach for some Li-ion chemistries (or become an economic issue).

- Quality process certification may be useful.

Third Party Certification Of Battery Recycling Plants (3)



Recharge supports the implementation of these new standards



5. Conclusion

The control of the health and environmental risks of batteries in Europe is achieved both with the reduction of the POM of the “heavy metals” containing batteries, and the collection increase. A revision of the Batteries Directive is announced in 2017, with new targets expected.

Ni-Cd portable batteries usage is decreasing in Europe much faster than in the rest of the world, partly due to the ban as of Jan 1, 2017.

The different trends in portable primary and rechargeable batteries collection have been analyzed. It is expected that proposals to improve the calculation of collection rates are discussed and proposed during the Batteries Directive review.

The recycling efficiency: first published results are online with the European objectives. Changes proposal are also expected for the Li batteries recycling efficiency.



Thank you for your kind attention !



The Advanced Rechargeable & Lithium Batteries Association

www.rechargebatteries.org

Avenue de Tervueren, 168 - Box 3

B - 1150 Brussels, Belgium

Tel. +32 2 777 05 67

Fax +32 2 777 05 65

