

Stakeholder Workshop

Study on “Comparative LCA of NiCd batteries used in Cordless Power Tools (CPT) vs. their alternatives NiMH and Li-ion batteries”

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**Findings of 2009 ESWI study
on exemption for the use of cadmium in
portable batteries used in CPTs**

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Objective

- **Assess and synthesise available data and information**
- **Identify and address remaining needs...**

... based on available technical and scientific evidence

Market analysis

- **Worldwide: 1060 million cells (NiCd, NiMH, Li-ion) used in CPT**
- **EU: 436 million cells (NiCd, NiMH, Li-ion), i.e. 41 % of the world market:**
 - Used in 12.9 million CPT units
- **EU: Current shares of battery technologies applied in CPT**
 - NiCd: 55%
 - Li-ion: 36%
 - NiMH: 9%
- **Worldwide: 515 million NiCd cells used in CPT**
- **EU: 240 million NiCd cells used in CPT, i.e. 47% of the world market**

Technical assessment

- Existing NiCd-driven CPT would be replaced by NiMH power packs
- New NiCd-driven CPT would be replaced by Li-ion power packs
- Li-ion battery today is a more than good substitute for NiCd batteries in CPT
- Lifetime system costs of Li-ion batteries:
 - 49 % higher than NiCd-system costs (4.3 years average life-time for Li-ion power pack), or
 - 10 % higher (7 years average life-time for Li-ion power pack).

* Existing CPT means CPT manufactured and placed on the market prior to a possible ban of NiCd batteries for CPT

* New CPT means CPT manufactured and placed on the market after a possible ban of NiCd batteries for CPT

Impact assessment

■ Environmental impacts of NiCd ban (1)

→ NiCd batteries are an important source of Cd

- in Europe: NiCd batteries in CPTs represents 10,5 % of the total Cd content worldwide
- possible impact on human cadmium exposure
- replacement of 2,200 t/y of very toxic and carcinogenic cadmium by less hazardous substances

Impact assessment

■ Environmental impacts of NiCd ban (2)

→ Impact of NiCd ban

- NiCd batteries create a risk of releases of Cd to the environment during production and, more significantly, *disposal* of NiCd batteries
- 2,200 t Cd/year contained in NiCd-driven CPTs imported to the EU = 22 t/y released to the environment during the life cycle

Impact assessment

■ Environmental impacts of NiCd ban (3)

→ Total environmental impact for CPTs

- decreased health and environmental impacts, if NiCd batteries are replaced by NiMH and Li-ion batteries
- high uncertainty of environmental and health benefits
- however, the above benefits are 1 to 2 orders of magnitude higher than the corresponding costs

Impact assessment

■ Economic impacts (1)

- **Mining industry** - no significant impacts

- **Producers/suppliers of NiCd batteries**
 - no production in the EU anymore
 - new jobs in case of future battery technologies market (Li-ion)

- **Producers of CPTs**
 - dynamic and increasing market (cells/value)
 - costs to technical adaptation (assembly lines)
 - reduced/increased turnover (performance/charger)
 - transition towards more profitable products

- **Professional users** – no impacts expected

Impact assessment

■ Economic impacts (1)

→ Waste management sector and recyclers

- 3 NiCd battery recyclers (DE, FR) affected (loss of turnover)
- decreasing amount of NiCd batteries
- profit from the elimination of one of the most hazardous substances (cadmium)

→ Market distortion - not expected to be relevant

→ Costs

- life-cycle systems (higher for Li-ion systems)
- final consumers (additional costs)
- replacement of charging equipment
- monitoring and control (irrelevant)
- disposal of NiCd batteries as hazardous waste

Impact assessment

■ Social impacts

→ Job creation

- new jobs if competitive EU battery industry (Li-ion)
- profitable CPT industry (increased cost for consumers)
- recycling of technical substitutes

→ Job losses

- Cadmium produced as by-product
- 70-90 workplaces will be lost at EU recyclers
- no job effect in the mining sector
- no impacts on the EU batteries industry

Conclusions

- It is technically feasible today to replace NiCd batteries by existing Li-ion and NiMH battery technologies
- Potentially substantial benefit for health and environment, with very high uncertainty
- Certain technical reservations in applications should be taken into account (e.g. temperature below 0°C)
- The available data are highly uncertain to identify the possible health and environmental benefits
- The lack of cost and benefit data does not mainly relate to industry costs (of changing technology), but relates to the potential environmental impacts of future increased use of NiMH and Li-ion batteries
- A comparative LCA of three battery types used in CPTs needed to complete data gaps
- The LCA need confirmed also by stakeholders

2009 ESWI study available at: http://ec.europa.eu/environment/waste/batteries/pdf/cadmium_report.pdf

Thank you for your attention!

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For more information consult:

<http://ec.europa.eu/environment/waste/batteries/index.htm>