

Mobility Roadmap Workshop 28th of October 2021

Recycling session

Tobias Wagner, Oeko-Institut e.V., Germany Dr. Patrick Nadoll, EIT RawMaterials GmbH, Germany







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Agenda

13:40-13:45	Short break & change to Working Groups		
		Moderators:	Facilitators:
Working Groups		Stefanie Degreif (Oeko-Institut)	Marie-Theres Kügerl (Montanuniversität Leoben)
2) Cell production/OEMs		Dr. Johannes Betz	Noé Barriere
3) Recycling		(Oeko-Institut)	(Vienna University of Economics and Business)
		Tobias Wagner	Patrick Nadoll
		(Oeko-Institut)	(EIT RawMaterials GmbH)
13:45-14:00	Introduction Current state of play and major challenges	Working group mode	rators
14:00-14:30	Round of individual statements Your major inputs for the roadmap	Participants	
14:30-15:45	Roadmap development Brainstorming and prioritisation of topics, temporal arrangement	Participants	
15:45-16:00	Coffee break & change to main conference room		

Current state of play and major challenges

State of Play and Roadmap Concept: Mobility Sector

RE-SOURCING Deliverable 4.2

re-sourcing

See "State of Play and Roadmap Concept" on the RE-SOURCING website here



Why do we recycle lithium-ion batteries?

- Avoidance of uncontrolled and potentially hazardous battery waste streams
- Recovery of materials → protection of primary resources
 → reduced environmental and social impacts
- Independence of material imports



Lithium-ion battery recyclers

 Recycling plants usually located in proximity to cell manufacturing plants to facilitate management of production wastes → to date, mainly located in China, South Korea, Japan

Over 1000 tons per annum (t/a):

- SungEel (South Korea)
- Dowa (Japan)
- GEM (China)
- Ganzhou Highpower (China)

- Kyoei Seiko (Japan)
- Brunp (China)
- Huayou Cobalt (China)
- Li-Cycle Corp (US)





Recycling of lithium-ion batteries in the EU

- Lithium-ion battery recycling is established in the EU
- Recycling industry in the EU is expecting huge rise of input stream
- The reasons are:
 - Start of production of battery cell plants
 - Retraction of several thousand tons of faulty car batteries
 - Battery market rose strongly in the last years
- Disposal of batteries could get very difficult, as recycling capacities are too small





Lithium-ion battery recyclers in the EU

Over 1000 tons per annum (t/a):

- Umicore (Belgium, 7000 t/a)
- Nickelhütte Aue (Germany, 3000 t/a)
- Accurec (Germany)
- Redux (Germany, 2000 t/a)
- VW (Germany, 1200 t/a)

Companies planning lithium-containing battery recycling plants in Europe: Primobius, BASF, Northvolt (I+II), Fortum (Finland) Under 1000 t/a:

- SNAM (France)
- EDI (France)



- TES-AMM (formerly "Recupyl") (France)
- AkkuSer (Finland)
- Duesenfeld (Germany)
- Promesa (Germany)



Technical overview





Challenges

Health & Safety:

- Thermal runaway → potential fire hazards
- Hazardous substances, e.g. the electrolyte or toxic metals

Design:

- Disassembly difficult/impossible
- Partly aggravated by current trends, e.g. leave out the module by directly linking the cells into a pack with glue

Environment:

- Energy intensity
- Inadequate execution may cause emission of pollutants to air and water

Economy:

- Expensive logistics due to safety requirements
- Limited upscaling so far due to comparably small waste streams
- Changing battery chemistries imply fewer valuable materials for sale, e.g. the trend to use less cobalt



Sustainability Schemes

- There are no international standards for recycling of LIBs
- Relevant policies
 - WEEE Directive
 - ELV Directive
 - Basel Convention
- Amendment proposal for the EU Battery Directive
 - Introduction of material-specific recycling efficiencies: for copper, nickel and cobalt, 90% in 2026 and 95% in 2030 are defined; for lithium, 35% in 2026 and 70% in 2030.
 - Target for the overall battery increases to 65 % in 2025 and 70 % in 2030.
 - Policies for a CO₂ threshold for LIBs and a battery passport are added.



Vision

Vision of the Mobility Sector

International Cooperation

Harmonised reporting systems; clear global criteria for responsible and sustainable practice

Limiting Climate change to 1.5°C Carbon-neutral production and transport	 Zero human rights violations Gender equality in all stages of the 	 Sustainable and responsible investment Fair wages
 Net-positive environmental impact Net-positive contribution to biodivesity 	 Elimination of powerty & hunger 	Transparency Zero financial crime
Zero pollution of land and sea	 Secure access to food, clean air & water, social training baseline access to food, clean air & water, 	Fair compensation for land-use,
Use of renewable energy sources	Meaningful stakeholder engagement	 "Unsustainability is unnralitable"
Resource efficiency (decreasing need for primary raw materials, no use of ground- water, energy efficiency, etc.)	Support of local development Fair compensation for land-use Respect for land rights Occupational health & safety Community health & safety Local recruitment Knowledges bring & training	Companies accept their responsibility Absolute decoupling of economic growth from resource consumption & environmental impact Level playing field
Mining & Mineral Processing	Knowledgesnanng & training	
Zero hazardous tailings discharge	Formalisation of ASM sector & full inte-	Proof of origin & traceability of minerals
Re-use of tailings & waste rock	gration in the supply chain	 Transparent granting of mining licences
Better-than-before reclamation	 Cooperation between LSM and ASM 	 Use of new technologies & automation
Efficient processing, incl. energy &	Conflict free mineral supply chains	Multistakeholder governance
Efficient use of deposit	 Snanng or intrastructure (especially in remote areas) 	Local content in value chain
Remediation of abandoned mines	Ensuring water availability & quality for neighbouring communities Free prior informed consent	
	Cell Manufac turing	
Eco-design & collaboration of manufac-	 Local valuecreation 	 Abandonment of "the cheaper the
turers and recycling plants Responsible use of toxins, use of alterna- tive substances if overible	Occupational health & safety	 better" philosophy Support of responsible production
Recovery of solvents		Local sourcing where possible
Increased input of secondary materials		Process optimization
Use of renewable energy		
Reduced energy input (e.g. unlike waste heat)		Recycling
Circular economy-closed loop & zero	Maintaining air quality	Financially more attractive than
waste culture Reputing of all reputible materials and	Maintaining water quality Mealth and safety is collection, terminal	primary raw materials
in LFion batteries	 Health and safety in collection, transport and recycling Occurrent/ineral health & safety 	Innovation friendly environment
2nd life opportunity Eco-design & collaboration of manufac-	 Occupational nearth & sarety 	Adequate legal basis for recycling Local recycling & reuse
turers and recycling plants		
 No dumping of toxic materials in landfills 		

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Roadmap Development



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Joint roadmap development, with Miro board

- Goal: Discuss and compile major objectives and milestones, time frame up to 2050
- Miro white board tool: everyone please participate!
- Miro access: see link in the chat

