



**CRITICAL
RAW
MATERIAL**

@CRMRecovery

www.criticalrawmaterialrecovery.eu



The LIFE 2014 CRM Recovery project
has received funding from the LIFE
Programme of the European Union

A Second LIFE for critical raw materials

12pm -1pm (GMT), 1pm -2pm (CET)

***Remember to click “Connect to audio” to hear as well
as see the presentation!***

***This webinar is being recorded and slides will be
made available***



PRESENTERS



Darren Hill
Knowledge Transfer
Network



Peter Sainsbury
Economist
WRAP



Norah Lewis
Technical Specialist
WRAP

OUTLINE

- CRM Recovery summary
- Infrastructure developments. Presenter: Peter Sainsbury, Economist, WRAP.
- Pan-European policy recommendations. Presenter: Norah Lewis, Technical Specialist, WRAP.
- What next?
- Questions & answers.

The slides and recording will be made available after the webinar



**CRITICAL
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**Wuppertal
Institut**



Raw Materials classified by the European Commission as “Critical” due to their high economic importance to the EU combined with a high risk associated with their supply.

Hydrogen *** H 1.008 1																	Helium *** He 4.003 2															
Lithium * Li 6.941 3	Beryllium * Be 9.012 4															Boron * B 10.81 5	Carbon * C 12.01 6	Nitrogen * N 14.01 7	Oxygen * O 16.00 8	Fluorine * F 19.00 9	Neon *** Ne 20.18 10											
Sodium * Na 22.99 11	Magnesium * Mg 24.31 12	Scandium * Sc 44.96 21															Cobalt * Co 58.93 27	Nickel * Ni 58.69 28	Copper * Cu 63.55 29	Zinc * Zn 65.38 30	Gallium * Ga 69.72 31	Germanium * Ge 72.63 32	Arsenic * As 74.92 33	Selenium * Se 78.96 34	Bromine * Br 79.90 35	Krypton *** Kr 83.80 36						
Potassium * K 39.10 19	Calcium * Ca 40.08 20	Yttrium * Y 88.91 39	Titanium * Ti 47.88 22	Vanadium * V 50.94 23	Chromium * Cr 52.00 24	Manganese * Mn 54.94 25	Ruthenium * Ru 101.07 44	Rhodium * Rh 102.91 45	Palladium * Pd 106.42 46	Silver * Ag 107.87 47	Cadmium * Cd 112.41 48	Indium * In 114.82 49	Antimony * Sb 121.76 51	Tellurium * Te 127.60 52	Iodine * I 126.90 53	Xenon *** Xe 131.29 54																
Rubidium * Rb 85.47 37	Sr 87.62 38	LANTHANIDE ▼	Zirconium * Zr 91.22 40	Niobium * Nb 92.91 41	Molybdenum * Mo 95.94 42	Technetium *** Tc [98] 43	Osmium * Os 190.23 76	Iridium * Ir 192.22 77	Platinum * Pt 195.08 78	Gold * Au 196.97 79	Mercury * Hg 200.59 80	Thallium * Tl 204.38 81	Lead * Pb 207.2 82	Bismuth * Bi 208.98 83	Polonium *** Po [209] 84	Astatine *** At [210] 85	Rn [222] 86															
Cesium * Cs 132.91 55	Barium * Ba 137.33 56	▼	Hafnium * Hf 178.49 72	Tantalum * Ta 180.95 73	Tungsten * W 183.84 74	Rhenium * Re 186.21 75	Hassium *** Hs [277] 108	Mt [273] 109	Ds [281] 110	Rg [289] 111	Cn [295] 112	Uut [283] 113	Flerovium *** Fl [289] 114	Uup [285] 115	Livermorium *** Lv [293] 116	Uus [294] 117	Uuo [294] 118															
Francium * Fr [223] 87	Radium * Ra [226] 88																															
Lanthanum * La 138.91 57	Cerium * Ce 140.12 58	Praseodymium * Pr 140.91 59	Neodymium * Nd 144.24 60	Promethium *** Pm [145] 61	Samarium * Sm 150.36 62	Europium * Eu 151.96 63	Gadolinium * Gd 157.25 64	Terbium * Tb 158.93 65	Dysprosium * Dy 162.50 66	Holmium * Ho 164.93 67	Erbium * Er 167.26 68	Thulium * Tm 168.93 69	Ytterbium * Yb 173.04 70	Lutetium * Lu 174.97 71																		
																		Actinium * Ac [227] 89	Th 232.04 90	Pa 231.04 91	U 238.03 92	Np [237] 93	Pu [244] 94	Am [243] 95	Cm [247] 96	Bk [247] 97	Cf [251] 98	Es [252] 99	Fm [257] 100	Md [258] 101	No [259] 102	Lr [262] 103



TRIALS

WEEE collection and recovery trials in four European countries with differing levels of infrastructure maturity



AIM

To test the link between collection methods and the (economic) recovery of target CRMs



POLICY

Development of policy and infrastructure recommendations using trials data

CRM Project Activities



**WEEE COLLECTION
TRIALS COMPLETED
ACROSS EUROPE**



**CRM RECOVERY
TRIALS COMPLETED
ACROSS EUROPE**



**TONNES
OF WEEE
COLLECTED**



**DIFFERENT
COLLECTION
METHODS
TRIALLED**



**ORGANISATIONS
FROM ACROSS THE
SUPPLY CHAIN
COLLABORATED TO
DELIVER THE TRIALS**



**PARTICIPANT
SURVEYS
COMPLETED**



Re-Tek

AXION

RecyclingBörse

Asekol

Ecodom



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Peter Sainsbury

WRAP Economist



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Pan-European Infrastructure Development



Innovate UK
Knowledge Transfer Network



Objective

To provide recommendations for the development of infrastructure that will result in better collection, increased re-use and improved dismantling of WEEE and increased recovery of CRMs across Europe

Methodology

- Project EU WEEE growth to 2030 by broad category, country, etc.
- Compile known infrastructure to recycle WEEE and recover CRMs; reviewing the economics of CRM recovery.
- Review lessons learned from trials in terms of scalability.
- Develop EU wide infrastructure recommendations.
- Qualitative assessment of the impact that recommendations could have on global supply chains, countries outside of the EU.

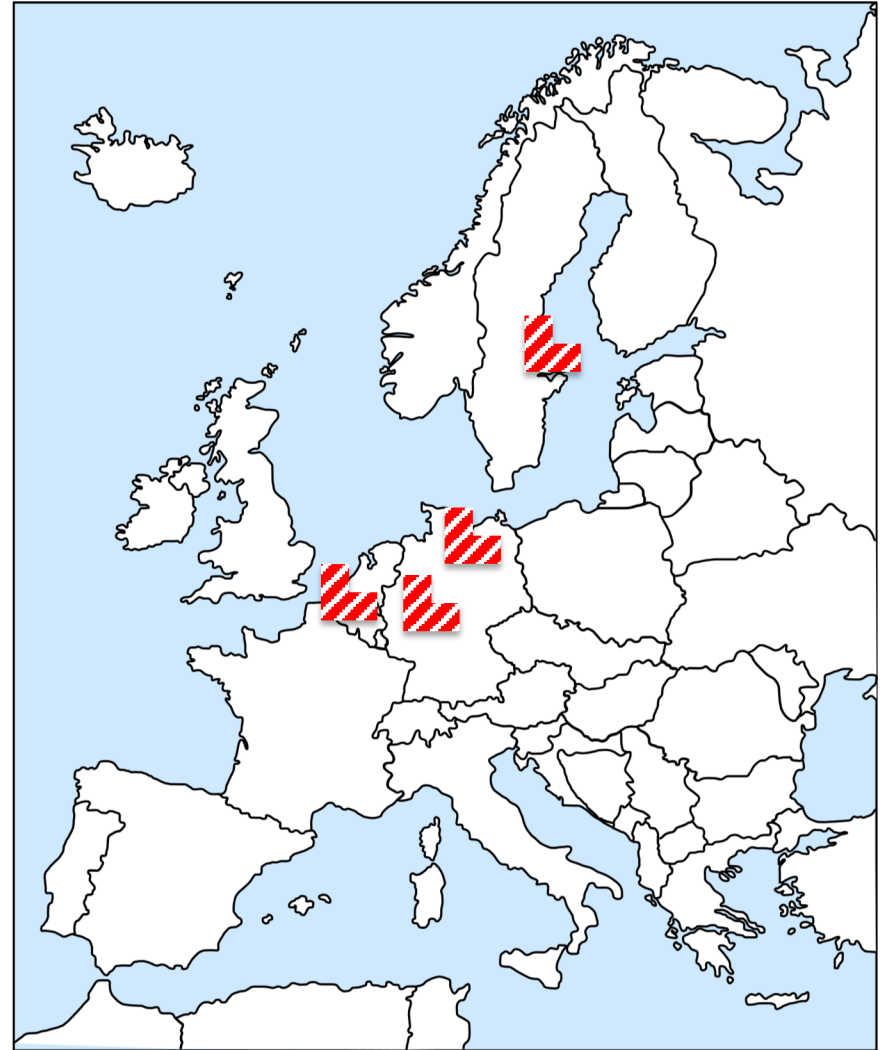
Projected EU WEEE Generation

	2015	2016	2017	2018	2019	2020	2025	2030
Temperature exchange equipment	1.6	1.6	1.7	1.7	1.8	1.8	2.0	2.2
Screens	1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.2
Lamps	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4
Large equipment	3.1	3.2	3.2	3.2	3.2	3.2	3.4	3.6
Small equipment	2.7	2.7	2.7	2.8	2.8	2.8	3.0	3.1
Small IT	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total	9.8	9.9	9.9	10.0	10.0	10.1	10.7	11.1

UNU estimates from 2015-2020; WRAP estimates from 2025-2030

CRM Recovery Capacity

- Only 4 plants in Europe that extract CRMs on a commercially significant scale
- Limited to post-production scrap and end-of-life equipment
- Unknown CRM capacity



Economics of CRM Recovery

- High cost of recycling infrastructure – significant economies of scale required
- Volatile CRM prices – closure of the Solvay plant in 2016 illustrates the risk of focusing too narrowly on the recovery of certain CRMs.
- Whole recycling process (dismantling, pre-processing, end-processing) focuses and is tailored toward the extraction of bulk materials.
- Ability to disassemble small CRM rich WEEE – CRMs often lost from collection to recovery
- Availability of CRM rich feedstock
- Meeting quality specs demanded from end market

Collection Trial Scalability



Key insights from the trials was that retailers and charity shops typically offer a convenient way to increase collection of WEEE.

- Retailers that are part of consumers' everyday habit (e.g. at small convenience stores) offer an economical way to collect small WEEE from consumers.

If the 'WEEE bring banks in stores' trial that took place in Italy were scaled up to the EU level then this could result in the collection of an additional 600Kt of small WEEE each year.

- Represents a collection rate of 80%-85%.

As small WEEE collections become more efficient over time it is likely that the collection cost could decline.

- Balanced by decline in novelty factor which could mean that collection tonnages decline

Infrastructure Recommendations



1. Improved awareness through better communication / data provision

- Data on infrastructure availability to signal to market / investors where demand is needed

2. Harmonised collections that are smarter at targeting CRM rich WEEE

- Small CRMs collected with reuse/recovery in mind.
- Consistent approach to capture economies of scale

3. Financial incentives to collect and re-use CRM rich products / recover CRMs

- Incentive scheme to encourage recovery of CRMs, as well as prominent materials present in WEEE

Global Implications

- Lower risk that WEEE ends up being exported to countries with poor waste management practices
- Potential reduction in CRM supply chain risk encouraging multinationals to base manufacturing in EU
- Lower exports of usable EEE to less developed countries may adversely affect economic activity in those destination countries by reducing the number of jobs required in electrical repair / increase the cost of access to new technology



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Pan-European Policy Recommendations



Innovate UK
Knowledge Transfer Network



Objective

Produce a suite of pan-European policy recommendations and enabling actions, made in-line with the findings of the CRM Project's CRM collection and recovery trials

Barriers

- Missing state action for accelerating CRM recovery
- Lack of reliable secondary materials market
- Missing disposal infrastructure / incorrect disposal of products containing CRMs
- Missing knowledge on CRM flows and recovery technology
- Missing focus on CRM recovery within policy and at the point of collection
- Missing conceptualization of global circular product value chain



Policy Recommendation 1

Redesign and Harmonise WEEE Collection Infrastructure

- Build on the infrastructure already in place and to allocate funding to ensure that an increase of collection and recovery infrastructure can be built, that is tailored for collection to include CRM recovery.
- Counteract the currently missing disposal infrastructure for CRM-rich WEEE and lack of recovery infrastructure tailored specifically to recover CRMs.



Policy Recommendation 2

Increase Awareness

- Increase awareness amongst policymakers, organisations and citizens to convey the importance of CRM recovery to ensure their successful recovery.
- Missing knowledge on the potential supply risks and the associated impacts may be due to a lack of available information or research in this area but an online platform for knowledge exchange would be one practical method counteract this.



Policy Recommendation 3

Create Incentives

- Incentives must be created for each of the various stakeholders involved to ensure CRMs are recovered. Incentivised trade-in for example is a proven method to encourage citizens to donate high-quality CRM-rich electrical items in a good condition for re-use and targeted recovery.
- Prohibitive financial or administrative burdens placed on organisations seeking to invest in CRM-collection infrastructure may have a knock-on effect reducing the number of available collection points or stop collection initiatives completely.



Policy Recommendation 4

Foster innovation, research and international collaboration

- Continuing support for research projects to keep up with technology and policy developments that specifically relate to CRMs would help to progress the recovery of CRMs from WEEE.
- International and cross-sectorial collaboration, funding and a sustained platform to exchange knowledge and research being undertaken in this field. Due to the time between product sale and disposal, product stewardship initiatives and innovation in designing products for disassembly and recycling should be encouraged.



Policy Recommendation 5

CRM-specific requirements added to new and existing standards

- If CRM-specific collection and recovery is not embedded within policies, there is little incentive for organisations to prioritise them.
- Without explicit allocation of responsibilities, stakeholders across the value chain can become confused or misinformed about their obligations.
- Missing legal frameworks for CRM-specific collection and recovery means those responsible are not empowered to issue penalties or sanctions in the case of non-compliance.

Summary



The EU is largely reliant on imports of CRMs from non-EU countries, it is important to ensure CRMs are recovered from WEEE so as to continue their circulation within European markets, reducing the need to extract more resources.

Engaging consumers and waste handlers with targeted actions and campaigns highlighting the importance responsibly disposing of CRM-rich WEEE will be vital in catalysing change.

Ensuring traceability and transparency of the recovery process will increase citizen trust, especially for personal data-bearing products such as mobile phones, where data protection is a concern.

Authorities and policy makers must play an active role in the redesign and implementation of infrastructure that supports the collection and preparation of CRM-rich WEEE for re-use.

Products must be designed with end-of-life in mind to ensure the CRMs locked up inside are recoverable.

Questions?

- If you have a question please type it into the Q&A box.

What Next?

More detail on the CRM Recovery project and its activities, outcomes and platforms can be found at the following links:

- CRM Recovery website: www.criticalrawmaterialrecovery.eu
- LinkedIn site: www.linkedin.com/groups/8438910/
- Twitter: www.twitter.com/crmrecovery
- Trial case studies - www.criticalrawmaterialrecovery.eu/home/casestudies
- Policy Recommendations - www.criticalrawmaterialrecovery.eu/wp-content/uploads/2018/10/5-policy-recommendations-infographic.pdf
- Project podcast: www.criticalrawmaterialrecovery.eu/wp-content/uploads/2019/01/A-Second-LIFE-for-Critical-Raw-Materials-Dif-without-background.mp4
- Project Layman's Report: www.criticalrawmaterialrecovery.eu/wp-content/uploads/2019/02/KTN-Laymans-Report-Final.pdf .

Thank you

For more information please contact:

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