



SCRREEN

Coordination and Support Action (CSA)

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Results of the Knowledge Identification survey

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Summary

Results of the Knowledge Identification survey

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DELIVERABLE 9.1: RESULTS OF THE KNOWLEDGE IDENTIFICATION SURVEY

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1. INTRODUCTION

Knowledge management (KM) is the process of creating, sharing, using and managing knowledge and information. It refers to a multidisciplinary approach to achieve organisational objectives by making the best use of knowledge [1]. The primary role of KM is to connect to “knowledge nodes” both knowledge providers and knowledge seekers. It can refer to any kind of IT system that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, or captures and uses knowledge [2]. The KM objectives can be summarized as follows:

- 1) **To capture knowledge:** through the creation of KM repositories that consist of structured documents with knowledge embedded in them –reports, presentations, articles- stored in a way that they may be easily retrieved.
- 2) **To improve knowledge access:** to facilitate the processes of knowledge transfer between individuals and between organizations.
- 3) **To enhance knowledge environment:** by proactively facilitating and rewarding knowledge creation, transfer and use [3].

Before delving into knowledge management, three terms should be clarified:

- **Data:** Unstructured data refer to those that are not organised in a pre-defined manner. Examples of unstructured data are those about production, demand, results from technical tests, etc. On the contrary, structured data are data that follow a pre-defined model such as those in a database.
- **Information:** For data to become information, it must be contextualized, categorized, calculated and condensed.
- **Knowledge:** Knowledge is closely linked to doing and implies know-how and understanding. The knowledge possessed by each individual partner is a product of his experience, and encompasses the norms by which he evaluates new inputs from his surroundings. For instance, knowledge is related to the know-how acquired in R&D projects, commercial activities or the expertise that is inherent to each partner.



The first step to achieve an effective knowledge management is **knowledge mapping**. It is one of the most popular techniques used to identify knowledge in organizations. Using knowledge mapping techniques, a large and complex set of knowledge resources can be acquired and navigated more easily [4].

1.1. KNOWLEDGE MANAGEMENT IN SCRREEN PROJECT

The aim of Knowledge Management in SCRREEN project is to organise the global knowledge on CRM in Europe, through the integration of the data identified in WP2-8 in relation with the **EURMKB objective** [5] of the EIP-RM SIP and thus allowing an easy access to the information, without duplicating existing databases.

The European Union Raw Materials Knowledge Base (EURMKB) and, at its core, the Raw Materials Information System (RMIS) are established to identify and serve key information and knowledge needs of governments, business and research stakeholders, as well as to facilitate knowledge dissemination on raw materials. The RMIS 2.0, which is currently being developed by the JRC, will include a major chapter on critical raw materials that would cover the parts of methodology and assessment and which will provide material factsheets of over 70 raw materials.

2. SCRREEN KNOWLEDGE MAPPING

This section describes the procedure followed in order to accomplish the first step of knowledge management, i.e. knowledge identification and measurement. The aim of the knowledge mapping in SCRREEN was to identify the knowledge required for WP9 outputs, by listing the knowledge already existing within the consortium and the knowledge to be acquired from external sources. Besides, the knowledge mapping may help work packages leaders to distribute work within work packages according to the already existing information. Thus, a complete map of the knowledge used and to be generated has been produced, with basic information for each of the Critical Raw Metal. The terms related to the knowledge mapping in SCRREEN are defined as follows

- **Existing information:** information that an organisation holds before the start of the project (also known as “background”) in a specific area for a specific metal. This information can be divided in **structured and unstructured data**. Structured data are data from databases, and unstructured data are data from reports, books, articles, theses, abstracts, flyers, images, graphs, charts, videos, etc.
- **Partner:** the name of the partner who owns/goes to generate the specified knowledge.
- **Information to be produced:** the information aimed to be produced in the project, which is not yet available.
- **IPR status:** definition of the information availability. This concept is crucial when drafting reports and deliverables since SCRREEN outputs are deemed to be used by EU society.
- **Deliverable:** deliverable number in which the information will be available. By specifying it, the search of knowledge is easier and faster.

As already mentioned, the strategy in SCRREEN for knowledge mapping was to create a map for each critical raw commodity. Inside the map, the fields of knowledge have been divided by work packages (specifying the work package leader) and the topics have been selected according to specific tasks for each work package settled in the Grant Agreement of the project, making in this way easy and intuitive to fill the map. The templates for Knowledge Mapping have been done using Excel spreadsheets, and a blank template is shown in the next page.

When “NO DATA” is stated in a specific work package within a template, it means that no information has been received from partners regarding the whole WP, and the meaning for blank fields is the same.

Critical Metal: xx	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 – Current and Future Use of xx (WP Leader: Fraunhofer)							
Current use of xx in Europe							
Possible New Applications of xx in Europe							
Future xx demand – Industrial and consumer trends							
xx global value chains							
WP3 – Mapping xx supply for EU from primary and secondary sources (WP Leader: GTK)							
xx primary resources in EU							
xx secondary resources in EU							
Challenges of xx supply in EU							
WP4 – Production (WP Leader: VTT)							
Main processing technologies for xx primary sources							
Main processing technologies for xx secondary sources							
Main processing technologies for xx recycling							
Estimated recovery rates of xx							
Estimated costs for xxs processing technologies							
Environmental and circular economy aspects concerning xx processing technologies							
Main xx producers							
WP5 – Substitution (WP Leader: KTN)							
xxs substitutability per applications							
Analysis of substitution trajectories and prerequisites							
Economic assessment of substitution trajectories							
Communication material (webinars,...) of xxs for stakeholders							
WP6 – Technology gaps/barriers and innovation pathways in xxs value chain (WP Leader: NTUA)							
Technology gaps/Barriers in xxs value chain inhibiting their extraction from primary resources							
Technology gaps/Barriers in xxs value chain inhibiting their extraction from secondary resources							
Technology gaps/Barriers in xxs value chain hindering substitution solutions in industrial applications							
Innovative pathways to supply the future EU xx demand, unlocking the technology gaps/barriers							
WP7 – Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to xxs							
Policy gaps in EU related to xx							
Policy recommendations for EU concerning xx							
WP8 – WEEE Issues (WP Leader: UNU)							
Mapping the xx in WEEE products							
Mapping of technologies and EOL infrastructures for recycling of xx							
Financing of xx recycling							
Mapping of concentrations and accessibility of xx							
Upgrade of regulations and standards							

Figure 1. SCRREEN Knowledge Mapping

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2.1. KNOWLEDGE MAPPING WORKFLOW

In order to retrieve the information in a proper and organised way and to ensure a fluent communication between all partners and knowledge mapping manager, a plan was settled at the beginning of the task. The goal of this plan is to facilitate the process, all the more so since the large quantity of critical metals to assess in SCRREEN. Due to this fact, the creation of a map per metal was chosen as the best way to build the SCRREEN knowledge mapping. The roles and associated activities in the plan are described below:

- 1) **The Knowledge Mapping manager** is responsible for the preparation of two templates. The first one is called “**Knowledge Identification Template**” (Fig 2), which role is to identify on which metal a given partner is going to work, in a specific work package, by putting a cross in front of the metal(s) of interest. The second template is “**Knowledge Mapping**” (Fig 1) which is described just above. The templates were sent beforehand to the WP9 leader for his review and validation.
- 2) Once the first template is received by **partners**, they identify their metals of interest and send the filled template back to the knowledge mapping manager.
- 3) **The Knowledge Mapping manager** then sends to partners the knowledge mapping templates according to metals previously identified and provides them precise instructions on how to fill them in a homogeneous way.
- 4) **Once partners** have completed the knowledge mapping templates, they send it back to the Knowledge Mapping manager.
- 5) **The Knowledge Mapping manager** compile the information received from work packages into the SCRREEN knowledge map, makes a synthesis and then identifies knowledge gaps.

Screen WP2	WP Leader: FhG ISI	Fraunhofer IZM	CEA	BGS	ENCO	GTK	CML	LGI	JRC
Sb									
Be									
Borates									
Cr									
Co									
Coking Coal									
Fluorspar									
Ga									
Ge									
In									
Magnesite									
Magnesium									
Natural Graphite									
Niobium									
Palladium									
Platinum									
Rhodium									
Ruthenium									
Iridium									
Osmium									
Phosphate Rock									
Europium									
Gadolinium									
Terbium									
Dysprosium									
Erbium									
Yttrium									
Lanthanum									
Cerium									
Preaseodymium									
Neodymium									
Samarium									

Figure 2. Knowledge identification template of a work package

2.2. RESULTS OF KNOWLEDGE IDENTIFICATION AND KNOWLEDGE MAPPING SURVEY

2.2.1. KNOWLEDGE IDENTIFICATION TEMPLATE

Metal	VP2	VP3	VP4	VP5	VP6	VP7	VP8
Sb	BGS, CML, LGI, JRC	GTK, Amphos21, BGR, BGS, GEUS	YTT, IMN, TUDelft	KTN, IMN	ENEA, TUDelft	KTN, CML, SGU	UNU, IMN
Be	BGS, LGI, JRC	GTK, Amphos21, BGS	Teconalia	KTN	Amphos21	KTN, SGU	UNU
Borates	LGI, JRC		Teconalia				
Cr	GTK, LGI, JRC	GTK, Amphos21, BGR, GEUS	YTT, MEFOS	ICCRAM, MEFOS	Amphos21, BRGM, ICCRAM, MEFOS, VTT		
Co	FhG, CEA, BGS, GTK, CML, LGI, JRC	GTK, Amphos21, BGR, BGS, GEUS	YTT, IMN, Tecnoalia, TUDelft	KTN, CEA, FhG, VTT	CEA, Amphos21, BRGM, ENEA, VTT, TUDelft	KTN, CML, SGU	UNU, FhG, ECODOM
Coking Coal	LGI, JRC	BGR	MEFOS	ENEA, MEFOS	MEFOS		
Fluorspar	BGS, LGI, JRC	BGR, GEUS		KTN		KTN, SGU	
Ga	FhG, CEA, BGS, CML, LGI, JRC	Amphos21, BGR, BGS	YTT	KTN, CEA, FhG	CEA, Amphos21	KTN, CML, SGU	UNU, BRGM, FhG
Ge	FhG, CEA, CML, LGI, JRC	Amphos21, BGR	Idener, IMN	KTN, CEA, IMN	CEA, IDENER	KTN, CML, SGU	UNU, IMN
In	FhG, CEA, CML, LGI, JRC	GTK, Amphos21, BGR	IMN, TUDelft	KTN, CEA, ENEA	CEA, Amphos21, ENEA	KTN, CML, SGU	UNU, BRGM, IMN
Magnesite	LGI, JRC	GTK	MEFOS	MEFOS	MEFOS		
Magnesium	FhG, LGI, JRC	Amphos21	YTT, MEFOS	KTN, MEFOS	MEFOS, VTT	KTN	
Natural Graphite	CEA, CML, LGI, JRC	GTK, GEUS	MEFOS, TUDelft	KTN, CEA, MEFOS	CEA, Amphos21, MEFOS	KTN, CML, SGU	ECODOM
Niobium	CEA, BGS, CML, LGI, JRC	GTK, Amphos21, BGR, BGS, GEUS	YTT, Chalmers, Idener, TUDelft	ICCRAM, CEA, VTT	CEA, Amphos21, Chalmers, ENEA, ICCRAM, IDENER, VTT, TUDelft	CML, SGU	BRGM
Palladium	FhG, CEA, BGS, GTK, CML, LGI, JRC	GTK, Amphos21, BGR, BGS, GEUS	GTK, Tecnoalia, IMN	KTN, CEA	CEA, Amphos21, ENEA	KTN, CML	UNU, IMN
Platinum	FhG, CEA, BGS, GTK, CML, LGI, JRC	GTK, Amphos21, BGR, BGS, GEUS	YTT, GTK, Tecnoalia, IMN	KTN, CEA, ENEA	CEA, Amphos21, ENEA	KTN, CML	IMN, ECODOM
Rhodium	CEA, BGS, GTK, CML, LGI, JRC	Amphos21, BGS, GEUS	YTT, GTK, Tecnoalia	KTN, CEA	CEA, Amphos21	KTN	
Ruthenium	CEA, BGS, JRC	Amphos21, BGS, GEUS	Chalmers, GTK, Tecnoalia	KTN, CEA	CEA, Amphos21	KTN	
Iridium	BGS, JRC	BGS, GEUS	GTK, Tecnoalia	KTN		KTN	
Osmium	BGS, JRC	BGS, GEUS	GTK, Tecnoalia	KTN		KTN	
Phosphate Rock	CEA, GTK, LGI, JRC	GTK, Amphos21, BGR	YTT, MEFOS	MEFOS, CEA	CEA, MEFOS	SGU	
Europium	CEA, BGS, CML, JRC	GTK, Amphos21, BGR, BGS, GEUS	Chalmers GTK	CEA	CEA, Amphos21, Chalmers, ENEA	KTN, CML	UNU, BRGM, ECODOM
Gadolinium	CEA, BGS, CML, JRC	GTK, Amphos21, BGR, BGS, GEUS	Chalmers GTK	CEA	CEA, Amphos21, Chalmers, ENEA	KTN, CML	UNU, ECODOM
Terbium	CEA, BGS, CML, JRC	GTK, Amphos21, BGR, BGS, GEUS	Chalmers GTK	CEA	CEA, Amphos21, Chalmers, ENEA	KTN, CML	UNU, BRGM, ECODOM
Dysprosium	FhG, CEA, BGS, CML, JRC	GTK, Amphos21, BGR, BGS, GEUS	Chalmers GTK, Idener, MEFOS, TUDelft	MEFOS, CEA	CEA, Amphos21, Chalmers, MEFOS, TUDelft	KTN, CML	UNU, BRGM, ECODOM
Erbium	BGS, CML, JRC	GTK, BGR, BGS, GEUS	Chalmers GTK		CEA, Amphos21, Chalmers	KTN, CML	UNU, ECODOM
Yttrium	CEA, CML, JRC	GTK, Amphos21, BGR, GEUS	Chalmers GTK, Idener	CEA	CEA, Amphos21, Chalmers, ENEA	KTN, CML	UNU, BRGM, ECODOM
Lanthanum	CEA, BGS, CML, LGI, JRC	GTK, Amphos21, BGR, BGS, GEUS	Chalmers GTK, Idener		CEA, Amphos21, Chalmers, ENEA	KTN, CML	ECODOM
Cerium	FhG, CEA, BGS, CML, JRC	GTK, Amphos21, BGR, BGS, GEUS	GTK, Idener	CEA	CEA, Amphos21, ENEA	KTN, CML	UNU, ECODOM
Praseodymium	CEA, BGS, CML, JRC	GTK, Amphos21, BGR, BGS, GEUS	GTK, TUDelft	CEA	CEA, Amphos21, ENEA, TUDelft	KTN, CML	UNU, BRGM, ECODOM
Neodymium	FhG, CEA, BGS, CML, JRC	GTK, Amphos21, BGR, BGS, GEUS	Chalmers, GTK, Idener, MEFOS, TUDelft	CEA, MEFOS	CEA, Amphos21, Chalmers, ENEA, MEFOS, TUDelft	KTN, CML	UNU, BRGM, ECODOM
Samarium	CEA, BGS, CML, JRC	GTK, Amphos21, BGR, BGS, GEUS	GTK	CEA	CEA, ENEA	KTN, CML	ECODOM
Silicon Metal	CEA, LGI, JRC		MEFOS	CEA, ENEA, MEFOS	CEA, MEFOS		ECODOM
Tungsten	CEA, BGS, CML, LGI, JRC	GTK, Amphos21, BGR, BGS, GEUS	YTT, Chalmers, GTK, Idener, IMN, TUDelft	KTN, CEA, ICCRAM, MEFOS, IMN, VTT	CEA, Amphos21, Chalmers, ICCRAM, IDENER, MEFOS, VTT	KTN, CML, SGU	IMN, ECODOM

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2.2.2. KNOWLEDGE MAPPING

2.2.2.1. ANTIMONY

Critical Metal: Antimony	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Antimony (WP Leader: Fraunhofer)							
Current use of Antimony in Europe	Transport, building, packaging, engineering		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but large passages will need permission from publisher	D2.1
			Reports, articles... from European Commission	LGI		No IPR issues	D2.1
	Total current European use, by application.		Reports, articles... from European Commission	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
Possible New Applications of Antimony in Europe							D2.3
Future Antimony demand - Industrial and consumer trends	Moderate growth driven by flame-retardants		Reports, articles... from European Commission	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Antimony global value chains	Extraction, processing, manufacturing, use...		Reports, articles... from European Commission	LGI			D2.1
WP3 - Mapping Antimony supply for EU from primary and secondary sources (WP Leader: GTK)							
Antimony primary resources in EU	Global distribution of antimony mines, deposits and major occurrences		Chapter in Critical Metals Handbook (Figure 4.2)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Antimony secondary resources in EU	Production of 2 nd resources containing metal...mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of Sb secondary resources	No IPR issues	D3.2
Challengues of Antimony supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
Main processing technologies for Antimony primary sources	State of the art processing techniques in mines		Reports, books, articles, theses	IMN		No IPR issues	D4.1
Main processing technologies for Antimony secondary sources	State of the art processing techniques with tailings		Reports, books, articles, theses	IMN, TUDelft	Identificaion of new processing technologies for Antimony secondary sources	No IPR issues	D4.2
	Recovery and purification by hydrometallurgy (see WP8) * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
Main processing technologies for Antimony recycling	State of the art processing techniques with industrial waste		Reports, books, articles, theses	IMN		No IPR issues	D4.2
	Recovery and purification by hydrometallurgy (see WP8) * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
Estimated recovery rates of Antimony	Recovery rate from EoL		Reports, books, articles, theses, statistics	IMN, TUDelft	Identificaion of new processing technologies for Antimony recycling	No IPR issues	D4.2
Estimated costs for Antimonys processing technologies	Cost for recovery from EoL vs. from primary resources		Reports, books, articles, theses	IMN		No IPR issues	D4.2
Environmental and circular economy aspects concerning Antimony processing technologies	Gaps that limit environmental performance of the processing chains			TU Delft	Identificaion of environmental and circular economy aspects concerning Antimony processing technologies	No IPR issues	D4.3
M+A1:H24ain Antimony producers	Producer companies and their location, annual production		Statistics, reports	IMN		No IPR issues	D4.1

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WP5 - Substitution (WP Leader: KTN)							
Antimonys substitutability per applications	<i>Distribution of end uses and corresponding substitutability assessments</i>		Reports, books, articles, theses, Reports from CRM Innonet and updates	IMN, FhG	CRM Profile Reports	Information freely available	D5.1
Analysis of substitution trajectories and prerequisites	<i>Options for substitution</i>		Reports, books, articles, theses	IMN, CEA	Substitution strategy guide	Information freely available	D5.2
Economic assessment of substitution trajectories	<i>Relevance of substitution for the European economy</i>		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
Communication material (webinars,...) of Antimonys for stakeholders	<i>Material to raise awareness of opportunities for substitution</i>		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4
WP6 - Technology gaps/barriers and innovation pathways in Antimonys value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Antimonys value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Antimonys value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21, IMN	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	<i>review on existing LCA studies on extraction from secondary resources</i>			ENEA			D6.2
Technology gaps/Barriers in Antimonys value chain hindering substitution solutions in industrial applications	<i>Technology gaps/Barriers exist</i>			TU Delft	Identificaiton of technology gaps/Barriers in Antimonys value chain hindering substitution solutions in industrial applications	No IPR issues	D6.3
Innovative pathways to supply the future EU Antimony demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Antimonys	<i>EU Critical Raw Materials list</i>	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Antimony			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Antimony		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Antimony in WEEE products	<i>In printed wiring boards (PWB)</i>	x	x	UNU, FhG IZM	Mapping of CRM-related products		D8.1
Mapping of technologies and EOL infrastructures for recycling of Antimony	<i>Available</i>		PhD Otmar Deubzer, report, articles	FhG IZM, UNU	Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM	Public	D8.1
	<i>Hydrometallurgy for recovery/purification of Sb from exhausted fluorescent lamps</i>			ENEA			
Financing of Antimony recycling	<i>None</i>				Potential cost/benefit, financing of recycling if relevant		D8.1
Mapping of concentrations and accessibility of Antimony	<i>In higher concentrations in printed wiring boards</i>				Mapping of concentrations and accessibility		D8.1
Upgrade of regulations and standards					Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

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2.2.2.2. BERILIUM

Critical Metal: Be	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV
		Structured data	Unstructured data				
WP2 - Current and Future Use of Be (WP Leader: Fraunhofer)							
Current use of Be in Europe	Electrical equipment, electronics & IT, road transport, aircraft...		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but large passages will need permission from publisher	D2.1
			Reports, articles	LGI			D2.1
Possible New Applications of Be in Europe	New types of Be alloys...		Reports, articles	LGI			D2.3
Future Be demand - Industrial and consumer trends	Strong growth in defence app, x-ray, semiconductors...		Reports, articles	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Be global value chains	Ore, acid-soluble form, oxide, chloride/fluoride, alloys...		Reports, articles	LGI			D2.1
WP3 - Mapping Be supply for EU from primary and secondary sources (WP Leader: GTK)							
Be primary resources in EU	Number of mines..location..annual production in EU..		Chapter in Critical Metals Handbook (Figure 5.6)	BGS		Information is quotable for free, but reproduction of the figure will need	D3.1
	Names of significant deposits globally and in EU						D3.1
Be secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21	Identification and quantification of Be secondary resources	No IPR issues	D3.2
			Reports, unpublished thesis	SGU	Identification and quantification of Be secondary resources		D3.2
Challengues of Be supply in EU							D3.3
WP4 - Production (WP Leader: VTT)							
Main proccesing technologies for Be primary sources							D4.1
Main proccesing technologies for Be secondary sources				TECNALIA	State of the art processing techniques with tailings	No IPR issues	D4.2
Main processing technologies for Be recycling				TECNALIA	State of the art processing techniques with industrial waste	No IPR issues	D4.2
Estimated recovery rates of Be				TECNALIA	Recovery rate from EoL	No IPR issues	D4.2
Estimated costs for Be processing technologies				TECNALIA	Cost for recovery from EoL vs. from primary resources	No IPR issues	D4.2
Environmental and circular economy aspects concerning Be processing technologies				TECNALIA	Gaps that limit environmental performance of the processing chains	No IPR issues	D4.3
Main Be producers				TECNALIA	Producer companies and their location, annual production	No IPR issues	D4.1

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WP5 - Substitution (WP Leader: KTN)							
Be substitutability per applications	<i>Distribution of end uses and corresponding substitutability assessments</i>		Reports from CRM Innonet	FhG	CRM Profile Reports	Information freely available	D5.1
Analysis of substitution trajectories and prerequisites	<i>Options for substitution</i>		Reports and articles	CEA	Substitution strategy guide	Information freely available	D5.2
Economic assessment of substitution trajectories	<i>Relevance of substitution for the European economy</i>		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
Communication material (webinars,...) of Be for stakeholders	<i>Material to raise awareness of opportunities for substitution</i>		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4
WP6 - Technology gaps/barriers and innovation pathways in CRMs value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Be value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Be value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
Technology gaps/Barriers in Be value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Be demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Be	<i>EU Critical Raw Materials list</i>	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1, D7.2, D7.3
Policy gaps in EU related to Be							D7.1, D7.2, D7.3
Policy recommendations for EU concerning Be		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Be in WEEE products			x	UNU	Mapping of CRM-related products		D8.1
Mapping of technologies and EOL infrastructures for recycling of Be			x	UNU	Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM		D8.1
Financing of Be recycling			x	UNU	Potential cost/benefit, financing of recycling if relevant		D8.1
Mapping of concentrations and accessibility of Be			x	UNU	Mapping of concentrations and accessibility		D8.1
Upgrade of regulations and standards			x	UNU	Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

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2.2.2.3. BORATES

Critical Metal: Borates	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Borates (WP Leader: Fraunhofer)							
Current use of borates in Europe	Glass, Frits & Ceramics, Agriculture, Chemicals, Metallurgy...		Reports, articles...	LGI			D2.1
Possible New Applications of borates in Europe							D2.3
Future borates demand - Industrial and consumer trends	Surplus, strong growth for borosilicate glass, agriculture		Reports, articles	LGI	Report on major trends affecting future demand for critical raw materials	No IPR issues	D2.2
borates global value chains	Extraction, processing, manufacturing, use, EoL...		Reports, articles	LGI			D2.1
WP3 - Mapping Borates supply for EU from primary and secondary sources (WP Leader: GTK)							
NO DATA							
WP4 - Production (WP Leader: VTT)							
Main processing technologies for borates primary sources							D4.1
Main processing technologies for borates secondary sources				TECNALIA	State of the art processing techniques with tailings		D4.2
Main processing technologies for borates recycling				TECNALIA	State of the art processing techniques with industrial waste		D4.2
Estimated recovery rates of borates				TECNALIA	Recovery rate from EoL		D4.2
Estimated costs for boratess processing technologies				TECNALIA	Cost for recovery from EoL vs. from primary resources		D4.2
Environmental and circular economy aspects concerning borates processing technologies				TECNALIA	Gaps that limit environmental performance of the processing chains		D4.3
Main borates producers				TECNALIA	Producer companies and their location, annual production		D4.1
WP5 - Substitution (WP Leader: KTN)							
NO DATA							
WP6 - Technology gaps/barriers and innovation pathways in CRMs value chain (WP Leader: NTUA)							
NO DATA							
WP7 - Policy Issues (WP Leader: MINPOL)							
NO DATA							
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

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2.2.2.4. CERIUM

Critical Metal: Cerium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Cerium (WP Leader: Fraunhofer)							
Current use of Cerium in Europe	Total current European use (grouped as part of Light Rare Earths), by application.		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR Issues	D2.1
	Polishing slurries, additives for alloys, catalyst for car industry	Structured data BRGM		CEA			
Possible New Applications of Cerium in Europe	Electroceramics	Structured data BRGM		CEA			D2.2
Future Cerium demand - Industrial and consumer trends		Structured data BRGM		CEA			D2.3
		Model results: Tonnages per end use through 2030, global		Fraunhofer ISI	Update of scenarios	No IPR Issues	
Cerium global value chains		Structured data RARE		CEA			D2.1
		Tonnages per end use		Fraunhofer ISI	None	Collected and harmonised information, quotable	
WP3 - Mapping Cerium supply for EU from primary and secondary sources (WP Leader: GTK)							
Cerium primary resources in EU	Global distribution of rare earth deposits		Chapter in Critical Metals Handbook (Figure 13.4)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Number of mines..location..annual production in EU..	Mineral deposit database of GTK, FODD database covering Finland, Sweden and Norway	GTK Report Archive	GTK	Update on REE deposits in the Fennoscandia area (GTK) and EU (all WP partners)	Copyright GTK (Finland), SGU (Sweden), NGU (Norway)	D3.1
	Global distribution of rare earth deposit; names and descriptions of major deposits		Mineral Profile: Rare Earth Elements	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Cerium secondary resources in EU	Production of 2 nd resources containing metal..mapping of resources...		Reports, articles	Amphos21	Identification and quantification of Cerium secondary resources	No IPR issues	D3.2
			Reports, articles	SGU	Identification and quantification of REEs secondary resources		
Challenges of Cerium supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
Main processing technologies for Cerium primary sources	Bastnaesite and monazite ores processing		Technical books, reports and articles	MEFOS, IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission	D4.1
Main processing technologies for Cerium secondary sources	Recovery of REE from spent Ni-MH batteries		Reports, REE4EU project reports (ongoing)	IDENER	Review of SoA main processing technologies for Dy extraction from secondary sources	No IPR issues	D4.2
	Recovery and purification by hydrometallurgy * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
Main processing technologies for Cerium recycling	Recovery of REE from spent Ni-MH batteries		Reports, REE4EU project reports (ongoing)	IDENER	Review of SoA main processing technologies for Dy extraction from secondary sources	No IPR issues	D4.2
	Recovery and purification by hydrometallurgy * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
Estimated recovery rates of Cerium							D4.2
Estimated costs for Cerium processing technologies							D4.2
Environmental and circular economy aspects concerning Cerium processing technologies							D4.3
Main Cerium producers							D4.1

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WP5 - Substitution (WP Leader: KTN)							
Cerium substitutability per applications		ERECON (2015)	Reports, previous project results	Fraunhofer ISI	Overview of information in existing literature	None expected	D5.1
Analysis of substitution trajectories and prerequisites		ERECON (2015)		CEA	Substitution analysis		D5.2
Economic assessment of substitution trajectories		ERECON (2015)		CEA	Substitution analysis		D5.3
Communication material (webinars,...) of Cerium for stakeholders		ERECON (2015)		CEA	Substitution analysis		D5.4
WP6 - Technology gaps/barriers and innovation pathways in Cerium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Cerium value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Cerium value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	<i>Review on existing LCA studies on extraction from secondary resources</i>			ENEA			D6.2
Technology gaps/Barriers in Cerium value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Cerium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Cerium	<i>EU Critical Raw Materials list</i>		CRM Factsheets	SGU	Pan-EU policy framework/conflict minerals		D7.1, D7.2, D7.3
Policy gaps in EU related to Cerium							D7.1, D7.2, D7.3
Policy recommendations for EU concerning Cerium		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Cerium in WEEE products	<i>Used in white LEDs (converter)</i>			UNU, Fraunhofer IZM	Mapping of CRM-related products		D8.1
Mapping of technologies and EOL infrastructures for recycling of Cerium	<i>Currently no recycling, technologies possibly available but not implemented</i>	x		UNU, Fraunhofer IZM	Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM		D8.1
Financing of Cerium recycling	<i>No financing in place, rough cost-benefit analysis available</i>	x		UNU, Fraunhofer IZM	Potential cost/benefit, financing of recycling if relevant	Public	D8.1
Mapping of concentrations and accessibility of Cerium	<i>Very low concentration in converters of some white LED</i>	x		UNU, Fraunhofer IZM	Mapping of concentrations and accessibility	Public	D8.1
Upgrade of regulations and standards				UNU, Fraunhofer IZM	Necessary upgrades of regulations and (treatment) standards in order to enable		D8.2

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2.2.2.5. COBALT

Critical Metal: Cobalt	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Cobalt (WP Leader: Fraunhofer)							
Current use of Cobalt in Europe	Batteries, superalloys, hard materials, pigments, catalysts, magnets...		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but large passages will need permission from publisher	D2.1
			Mineral Profile: Cobalt	BGS		Information is quotable for free, but large passages will need permission from BGS	
			Reports, articles from EC	LGI, CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	
		ProSum database	Reports, articles	Fraunhofer IZM		Information is quotable and can be used for free by end of 2017	
Possible New Applications of Cobalt in Europe	Catalysis of gas to liquid...		Reports, articles	LGI			D2.3
Future Cobalt demand - Industrial and consumer trends	Growth in batteries superalloys (aerospace)		Reports, articles	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Future demand - Quantitative scenarios	Estimates of tonnages for main end-use sectors	Model results: Tonnage per end use, global		FhG ISI	Update results	No IPR issues	D2.3
Cobalt global value chains	Extraction, processing, manufacturing, use, EoL...		Reports, articles	LGI			D2.1
WP3 - Mapping Cobalt supply for EU from primary and secondary sources (WP Leader: GTK)							
Cobalt primary resources in EU	number of mines..location..annual production in EU..		Chapter in Critical Metals Handbook (Figure 6.2)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Names of mahor producing mines and districts globally and in EU		Mineral Profile: Cobalt	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Cobalt secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21	Identification and quantification of Co secondary resources	No IPR issues	D3.2
			Reports, articles	SGU	Identification and quantification of Co secondary resources		D3.2
Challengues of Cobalt supply in EU	Imports, exports, deficit, recycling, gaps..			GTK			D3.3
	Mines, annual production, exploration, processing, fefining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3

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WP4 - Production (WP Leader: VTT)							
Main processing technologies for Cobalt primary sources	State of the art processing techniques in mines		Reports, books, articles, theses	IMN		No IPR issues	D4.1
Main processing technologies for Cobalt secondary sources	Recovery and purification by hydrometallurgy from Industrial catalysts * (possible input from participation in EGs, not direct contribution)			ENEA			D4.1
	State of the art processing techniques with tailings		Reports, books, articles, theses	TU Delft	Further identification of main processing technologies for Cobalt secondary sources	No IPR issues	D4.2
			Reports, books, articles, theses	IMN		No IPR issues	
Main processing technologies for Cobalt recycling	State of the art processing techniques with industrial waste		Reports, books, articles, theses	TU Delft	Further identification of main processing technologies for Cobalt recycling	No IPR issues	D4.2
	Recovery of Cobalt from batteries		Reports	TECNALIA		No IPR issues	D4.2
	Recovery and purification by hydrometallurgy from Industrial catalysts * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
	Co extraction from spent Li-ion batteries		Patent, thesis, articles	CEA			D4.2
Estimated recovery rates of Cobalt	Recovery rate from EoL		Reports, books, articles, theses, statistics	TU Delft	Extracting and summarising recovery rates of Cobalt from the public literature	No IPR issues	D4.2
Estimated costs for Cobalt processing technologies	Cost for recovery from EoL vs. from primary resources		Reports, books, articles, theses	TU Delft	Extracting the estimated costs for Cobalt processing technologies	No IPR issues	D4.2
Environmental and circular economy aspects concerning Cobalt processing technologies	Gaps that limit environmental performance of the processing chains		Reports, books, articles, theses	VTT		No IPR issues	D4.3
Main Cobalt producers	Producer companies and their location, annual production		Statistics, reports	IMN		No IPR issues	D4.1

WP5 - Substitution (WP Leader: KTN)							
Cobalt substitutability per applications	<i>Alternative battery technologies</i>		From literature. CRM Innonet and updates	Fraunhofer ISI	CRM Profile Reports	Information freely available	D5.1
	<i>Novel active material for Li-ion batteries without or with less Co inside</i>		Patent, thesis	CEA		Information freely available	D5.1
Analysis of substitution trajectories and prerequisites	<i>Options for substitution</i>		Reports and articles	CEA	Substitution strategy guide	Information freely available	D5.2
Economic assessment of substitution trajectories	<i>Relevance of substitution for the European economy</i>		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
Communication material (webinars,...) of Cobalt for stakeholders	<i>Material to raise awareness of opportunities for substitution</i>		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4
WP6 - Technology gaps/barriers and innovation pathways in Cobalt value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Cobalt value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
	<i>Cobalt recovered as co-product of by-product in base metals metallurgy. More products means more unit operations and more recycle streams, greater complexity of engineering and operation</i>		Presentations from the International Conference on "EXCHANGE OF GOOD PRACTICES ON METAL BY-PRODUCTS RECOVERY. TECHNOLOGY AND POLICY CHALLENGES".	BRGM		Public	D6.1
Technology gaps/Barriers in Cobalt value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	<i>Review on existing LCA studies on extraction from secondary resources</i>			ENEA			D6.2
Technology gaps/Barriers in Cobalt value chain hindering substitution solutions in industrial applications				TU Delft	Identification of technological gaps/barriers in Cobalt value chain hindering substitution solutions in industrial applications	No IPR issues	D6.3
Innovative pathways to supply the future EU Cobalt demand, unlocking the technology gaps/barriers						No IPR issues	D6.4

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WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Cobalt	<i>EU Critical Raw Materials list</i>	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Cobalt							D7.1 D7.2 D7.3
Policy recommendations for EU concerning Cobalt	<i>Cobalt Development Institute</i> (http://www.thecdi.com/institute)	ProMine, Minerlas4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Cobalt in WEEE products	<i>In lithium batteries of laptops</i>	x		UNU, ECODOM	Mapping of CRM-related products	No IPR issues	D8.1
Mapping of technologies and EOL infrastructures for recycling of Cobalt				UNU, ECODOM	Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM	No IPR issues	D8.1
Financing of Cobalt recycling				UNU, ECODOM	Potential cost/benefit, financing of recycling if relevant	No IPR issues	D8.1
Mapping of concentrations and accessibility of Cobalt				UNU	Mapping of concentrations and accessibility	No IPR issues	D8.1
	<i>Grams of Co recovered from batteries after the hydrometallurgy treatment (lab scale)</i>		Amount of Co recoverable from Lithium batteries from laptops (information will be available in 2018)	Ecodom		No IPR issues	D8.1
Upgrade of regulations and standards	<i>CENELEC Standard on WEEE treatment Batteries Directive and WEEE Directive</i>		EN50625 series 2006/66/EC 2012/19/eu	UNU, ECODOM	Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling	No IPR issues	D8.2

2.2.2.6. COKING COAL

Critical Metal: Coking coal	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Coking coal (WP Leader: Fraunhofer)							
Current use of Coking coal in Europe	Steel production, other metallurgy & niche markets		Reports, articles ...	LGI			D2.1
Possible New Applications of Coking coal in Europe							D2.3
Future Coking coal demand - Industrial and consumer trends	Growth due to demand by Chinese & Indian steel markets		Reports, articles ...	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Coking coal global value chains	Extraction, processing, manufacturing, use...		Reports, articles ...	LGI			D2.1
WP3 - Mapping Coking coal supply for EU from primary and secondary sources (WP Leader: GTK)							
Coking coal primary resources in EU	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Coking coal secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...						D3.2
Challenges of Coking coal supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
NO DATA							
WP5 - Substitution (WP Leader: KTN)							
Coking coal substitutability per applications	Biomass as bio-kol or char coal in metallurgical coke. Use of Hyper coal (Japan) addition to Coking coal mix. Pre-processed biomass to enhance the use of biomass tin Coking coal mix-increase the replacement ratio		Reserach on-going	Swerea MEFOS			D5.1
Analysis of substitution trajectories and prerequisites							D5.2
Economic assessment of substitution trajectories							D5.3
Communication material (webinars,...) of Coking coal for stakeholders							D5.4
WP6 - Technology gaps/barriers and innovation pathways in Coking coal value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Coking coal value chain inhibiting their extraction from primary resources							D6.1
Technology gaps/Barriers in Coking coal value chain inhibiting their extraction from secondary resources							D6.2
Technology gaps/Barriers in Coking coal value chain hindering substitution solutions in industrial applications				Swerea MEFOS	Physical properties in biomass to be investigated for proper substitution in metallurgical cokemaking as crushing, grindability etc.		D6.3
Innovative pathways to supply the future EU Coking coal demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
NO DATA							
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

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2.2.2.7. CHROMIUM

Critical Metal: Chromium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Chromium (WP Leader: Fraunhofer)							
Current use of Chromium in Europe	Stainless steel, steel...		Reports, articles	LGI			D2.1
Possible New Applications of Chromium in Europe	Seawater desalinization, othopedic implants...		Reports, articles	LGI			D2.3
Future Chromium demand - Industrial and consumer trends	Strong growth in Asia driven by Chinese/Indian demand		Reports, articles	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Chromium global value chains	Extraction, processing, manufacturing, use...		Reports, articles	LGI			D2.1
WP3 - Mapping Chromium supply for EU from primary and secondary sources (WP Leader: GTK)							
Chromium primary resources in EU	Number of mines..location..annual production in EU..			GTK			D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Chromium secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21	Identification and quantification of Cr secondary resources	No IPR issues	D3.2
Challengues of Chromium supply in EU	Imports, exports, deficit, recycling, gaps..			GTK			D3.3
	Mines, annual production, exploration, processing, fefining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
Main proccesing technologies for Chromium primary sources	Smelting reduction of chromite ore in the SAF for ferrochrome production	Text book	Reports, articles	Swerea MEFOS	Identification of different production routines and considering the energy and raw materials efficiency.		D4.1
Main proccesing technologies for Chromium secondary sources	Carbothermic reduction in the arc furnace		Reports, articles	Swerea MEFOS	State-of-the-art technologies for processing Cr secondray resources		D4.2
Main processing technologies for Chromium recycling	Remelting stainless steel scrap in the EAF	Text book	Reports, articles	Swerea MEFOS	Identification of the processing routine(s) and their barries		D4.2
Estimated recovery rates of Chromium	15-20% Cr is lost from primary resources during the smelting reduction in the SAF for ferrochrome production		Reports, articles	Swerea MEFOS	Identification of Cr loss from different resources and recovery rates of chromium.		D4.2
Estimated costs for Chromium processing technologies	Cost for different production routines		Reports, articles	Swerea MEFOS	Cost estimation for Cr production from different production routines		D4.2
Environmental and circular economy aspects concerning Chromium processing technologies	Gaps that limit environmental performance of the processing chains		Reports, books, articles, theses	VTT		No IPR issues	D4.3
	Leaching of Cr from the Cr-containing steelmaking slag, dust, etc.; lost of Cr in the slag, dust, ect.		Reports, articles	Swerea MEFOS	Cr leaching from different wastes or by-products; state-of-the-art technologies to avoid Cr leaching; methods to recover Cr from wates/by-products.		D4.3
Main Chromium producers	Outukumpu		Reports, article, website info	Swerea MEFOS	list of main Cr producer and their production capacity		

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WP6 - Technology gaps/barriers and innovation pathways in Chromium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Chromium value chain inhibiting their extraction from primary resources	Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
	In comparison with the rest of the world, the EU capacity at each of the value chain stages is relatively low (e.g. ore is mined and processed in Finland to produce ferrochromium for the steel industry and chrome based chemicals are produced in the UK).	NA	Reports from MSP-REFRAM project deliverables	ICCRAM	Swot analysis, analysis of the economic relevance of industrial Cr value chain in the region of cyl, market analysis, índices sustentabilidad, distribución raw materials, reservas raw materials, aplicaciones industriales, importancia aplicaciones, herramientas conocimiento, compedia of publications, etc.	IPR Issues (specific internal registration number in ICCRAM)	D6.1
Technology gaps/Barriers in Chromium value chain inhibiting their extraction from secondary resources	Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	Lack of efficient beneficiation and hydrometallurgical techniques to recover Cr from secondary resources		Grant Agreement CHROMIC "Efficient mineral processing and hydrometallurgical recovery of by-product metals from low-grade metal containing secondary raw materials"	BRGM		Confidential	D6.2
	The EU has always been an importer of chromite ores and concentrates, due to a lack of internal supply and to demand from the steel industry.	NA	Reports from MSP-REFRAM project deliverables	ICCRAM		IPR Issues (specific internal registration number in ICCRAM)	D6.2
Technology gaps/Barriers in Chromium value chain hindering substitution solutions in industrial applications	Environmental and health concerns (carcinogenic potential) have been raised over some chromium compounds. For instance, hexavalent chromium is highly toxic to humans and thus its usage is regulated by the EC, leading to a decreasing use of chromium in some applications such as aeronautics, where exavalent chromium is used to protect aluminium parts from orrosion. Additionally, inorganic chromium compounds used for pigments or in leather tanning are being increasingly substituted by organic materials.	NA	Reports from MSP-REFRAM project deliverables	ICCRAM		IPR Issues (specific internal registration number in ICCRAM)	D6.3
Innovative pathways to supply the future EU Chromium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
NO DATA							
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730227

2.2.2.8. DYSPROSIUM

C+A1:H16ritical Metal: Dysprosium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Dysprosium (WP Leader: Fraunhofer)							
Current use of Dysprosium in Europe	Total current European use (grouped as part of Heavy Rare Earths), by application.		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
	Permanent magnet	Structured data from BRGM		CEA			D2.1
Possible New Applications of Dysprosium in Europe		Structured data from BRGM		CEA			D2.3
Future Dysprosium demand - Industrial and consumer trends		Model results: Tonnages per end-use, global		Fraunhofer ISI	Update scenarios	No IPR issues	D2.3
		Structured data from BRGM		CEA			
Dysprosium global value chains		Structured data from RARE		CEA			D2.1
WP3 - Mapping Dysprosium supply for EU from primary and secondary sources (WP Leader: GTK)							
Dysprosium primary resources in EU	Global distribution of rare earth deposits		Chapter in Critical Metals Handbook (Figure 13.4)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Number of mines..location..annual production in EU..	Mineral deposit database of GTK, FODD database covering Finland, Sweden and Norway	GTK Report Archive	GTK	Update on REE deposits in the Fennoscandia area (GTK) and EU (all WP partners)	Copyright GTK (Finland), SGU (Sweden), NGU (Norway)	D3.1
	Global distribution of rare earth deposit; names and descriptions of major deposits		Mineral Profile: Rare Earth Elements	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Dysprosium secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of dysprosium secondary resources	No IPR issues	D3.2
Challengues of Dysprosium supply in EU	Mines, annual production, exploration, processing, fefining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3

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WP4 - Production (WP Leader: VTT)							
Main processing technologies for Dysprosium primary sources	<i>Xenotime ore processing</i>		Technical books, reports and articles	MEFOS , IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but large passages	D4.1
Main processing technologies for Dysprosium secondary sources	<i>Recovery of REE from spent Ni-MH batteries</i>		Reports, REE4EU project reports (ongoing)	IDENER	Review of SoA main processing technologies for Dy extraction from secondary sources	No IPR issues	D4.2
			Patent	CEA	Recovery of Dy from permanent magnet powder	Patent	D4.2
Main processing technologies for Dysprosium recycling	<i>Processing of end of use magnets</i>		Ongoing research	Swerea MEFOS			D4.2
			Reports, publications	Chalmers			
Estimated recovery rates of Dysprosium	<i>Recycling of EOL NdFeB magnets</i>		Ongoing research	TU Delft	Detailed quantification of recovery rate of Dy in the magnets	No IPR issues	D4.2
Estimated costs for Dysprosium processing technologies							D4.2
Environmental and circular economy aspects concerning Dysprosium processing technologies			Reports, publications	Chalmers			D4.3
Main Dysprosium producers							D4.1
WP5 - Substitution (WP Leader: KTN)							
Dysprosium substitutability per applications			Reports and results from previous projects	Fraunhofer ISI	No new information	No IPR issues	D5.1
	<i>Reduction of Dy</i>	ERECON	Patents	CEA			
Analysis of substitution trajectories and prerequisites		ERECON		CEA			D5.2
Economic assessment of substitution trajectories		ERECON		CEA			D5.3
Communication material (webinars,...) of Dysprosium for stakeholders		ERECON		CEA			D5.4

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WP6 - Technology gaps/barriers and innovation pathways in Dysprosium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Dysprosium value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21, Chalmers	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Dysprosium value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21, Chalmers	Identification of technological gaps on secondary resources	No IPR issues	D6.2
Technology gaps/Barriers in Dysprosium value chain hindering substitution solutions in industrial applications	<i>Lack of efficient substitution for Dy for high temperature applications of the magnets</i>		Reports, articles	TU Delft	Further identification of technological gaps/Barriers in Dysprosium value chain hindering substitution solutions in industrial applications.	No IPR issues	D6.3
Innovative pathways to supply the future EU Dysprosium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Dysprosium	<i>EU Critical Raw Materials list</i>	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Dysprosium							D7.1 D7.2 D7.3
Policy recommendations for EU concerning Dysprosium		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Dysprosium in WEEE products		x		UNU	Mapping of CRM-related products		D8.1
	<i>Identification of Dy in electronic components, stocks, production in EU, worldwide</i>		Report from Eco-systemes	BRGM			D8.1
Mapping of technologies and EOL infrastructures for recycling of Dysprosium				UNU	Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM		D8.1
	<i>Recovery of Dy from permanent magnet in WEEE</i>		Report from Extrade Project	BRGM			D8.1
Financing of Dysprosium recycling				UNU	Potential cost/benefit, financing of recycling if relevant		D8.1
Mapping of concentrations and accessibility of Dysprosium				UNU	Mapping of concentrations and accessibility		D8.1
Upgrade of regulations and standards				UNU	Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

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2.2.2.9. ERBIUM

Critical Metal: Erbium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Erbium (WP Leader: Fraunhofer)							
Current use of Erbium in Europe	Total current European use (grouped as part of Heavy Rare Earths), by application.		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
Possible New Applications of Erbium in Europe							D2.3
Future Erbium demand - Industrial and consumer trends							D2.2
Erbium global value chains							D2.1
WP3 - Mapping Erbium supply for EU from primary and secondary sources (WP Leader: GTK)							
Erbium primary resources in EU	Global distribution of rare earth deposits		Chapter in Critical Metals Handbook (Figure 13.4)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Global distribution of rare earth deposit; names and descriptions of major deposits		Mineral Profile: Rare Earth Elements	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	Number of mines..location..annual production in EU..	Mineral deposit database of GTK, FODD database covering Finland, Sweden and Norway	GTK Report Archive	GTK	Update on REE deposits in the Fennoscandia area (GTK) and EU (all WP partners)	Copyright GTK (Finland), SGU (Sweden), NGU (Norway)	D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Erbium secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	SGU	Identification and quantification of REEs secondary resources		D3.2
Challenges of Erbium supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
Main processing technologies for Erbium primary sources	Ion adsorption clays processing		Technical books, reports and articles	MEFOS, IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission from publisher	D4.1
Main processing technologies for Erbium secondary sources			Reports, articles	Chalmers		No IPR issues	D4.2
Main processing technologies for Erbium recycling			Reports, articles	Chalmers		No IPR issues	D4.2
Estimated recovery rates of Erbium			Reports, articles	Chalmers		No IPR issues	D4.2
Estimated costs for Erbium processing technologies							D4.2
Environmental and circular economy aspects concerning Erbium processing technologies							D4.3
Main Erbium producers							D4.1

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WP5 - Substitution (WP Leader: KTN)							
NO DATA							
WP6 - Technology gaps/barriers and innovation pathways in Erbium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Erbium value chain inhibiting their extraction from primary resources			Reports, publications	Chalmers		No IPR issues	D6.1
Technology gaps/Barriers in Erbium value chain inhibiting their extraction from secondary resources			Reports, Publications	Chalmers		No IPR issues	D6.2
Technology gaps/Barriers in Erbium value chain hindering substitution solutions in industrial applications							
Innovative pathways to supply the future EU Erbium demand, unlocking the technology gaps/barriers							
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Erbium	EU Critical Raw Materials list	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Erbium			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Erbium		ProMine, Minerlas4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Erbium in WEEE products					Mapping of CRM-related products		D8.1
Mapping of technologies and EOL infrastructures for recycling of Erbium					Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM		D8.1
Financing of Erbium recycling					Potential cost/benefit, financing of recycling if relevant		D8.1
Mapping of concentrations and accessibility of Erbium					Mapping of concentrations and accessibility		D8.1
Upgrade of regulations and standards					Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

2.2.2.10. EUROPIUM

Critical Metal: Europium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
WP2 - Current and Future Use of Europium (WP Leader: Fraunhofer)							
Current use of Europium in Europe	Total current European Europium use (grouped as Light Rare Earths), by application.		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
		BRGM		CEA			D2.1
Possible New Applications of Europium in Europe		BRGM		CEA			D2.3
Future Europium demand - Industrial and consumer trends		BRGM		CEA			D2.2
Europium global value chains		RARE (association for rare earth)		CEA			D2.1
WP3 - Mapping Europium supply for EU from primary and secondary sources (WP Leader: GTK)							
Europium primary resources in EU	Global distribution of rare earth deposits		Chapter in Critical Metals Handbook (Figure 13.4)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Global distribution of rare earth deposit; names and descriptions of major deposits		Mineral Profile: Rare Earth Elements	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	Number of mines..location..annual production in EU..	Mineral deposit database of GTK, FODD database covering Finland, Sweden and Norway	GTK Report Archive	GTK	Update on REE deposits in the Fennoscandia area (GTK) and EU (all WP partners)	Copyright GTK (Finland), SGU (Sweden), NGU (Norway)	D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Europium secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of Europium secondary resources	No IPR issues	D3.2
Challenges of Europium supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
Main processing technologies for Europium primary sources	Bastnaesite and monazite ores processing		Technical books, reports and articles	MEFOS, IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission	D4.1
Main processing technologies for Europium secondary sources	Recovery and purification by hydrometallurgy (see WP8) * (possible input from participation in EGs, not direct contribution)		Reports, publications	ENEA, Chalmers	Report	No IPR issues	D4.2
Main processing technologies for Europium recycling	Recovery and purification by hydrometallurgy (see WP8) * (possible input from participation in EGs, not direct contribution)		Reports, publications	ENEA, Chalmers	Report	No IPR issues	D4.2
Estimated recovery rates of Europium							D4.2
Estimated costs for Europium processing technologies							D4.2
Environmental and circular economy aspects concerning Europium processing technologies							D4.3
Main Europium producers							D4.1

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WP5 - Substitution (WP Leader: KTN)							
Europium substitutability per applications		ERECON (2015)		CEA			D5.1
Analysis of substitution trajectories and prerequisites		ERECON (2015)		CEA			D5.2
Economic assessment of substitution trajectories		ERECON (2015)		CEA			D5.3
Communication material (webinars,...) of Europium for stakeholders		ERECON (2015)		CEA			D5.4
WP6 - Technology gaps/barriers and innovation pathways in Europium value chain (WP Leader: NTUA)							
Technology gaps/barriers in Europium value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/barriers in Europium value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	<i>Review on existing LCA studies on extraction from secondary resources</i>			ENEA			
Technology gaps/barriers in Europium value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Europium demand, unlocking the technology gaps/barriers			Report, articles	Chalmers	Report		D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Europium	<i>EU Critical Raw Materials list</i>	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1, D7.2, D7.3
Policy gaps in EU related to Europium			National databases				D7.1, D7.2, D7.3
Policy recommendations for EU concerning Europium		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Europium in WEEE products	<i>Dopant in some converters of white LEDs</i>	x		UNU, Fraunhofer IZM	Mapping of CRM-related products	Public	D8.1
	<i>Recovery of REEE from WEEE</i>		Reports	BRGM			D8.1
Mapping of technologies and EOL infrastructures for recycling of Europium	<i>No recycling, technology possibly available</i>			Fraunhofer IZM	Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM		D8.1
	<i>Recovery of REEE from fluorescent powders</i>		Report	BRGM			D8.1
	<i>Hydrometallurgy for recovery/purification of Eu from exhausted fluorescent lamps</i>			ENEA			
Financing of Europium recycling	<i>No financing</i>				Potential cost/benefit, financing of recycling if relevant		D8.1
Mapping of concentrations and accessibility of Europium	<i>Very low concentrations in LED converters (accessible after manual dismantling, process for removal of converters available)</i>			Fraunhofer IZM	Mapping of concentrations and accessibility	Public	D8.1
Upgrade of regulations and standards					Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

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2.2.2.11. FLUORSPAR

Critical Metal: Fluorspar	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Fluorspar (WP Leader: Fraunhofer)							
Current use of Fluorspar in Europe	Hydrofluoric acid, steel, aluminium...		Mineral Profile: Fluorspar	BGS		Information is quotable for free, but large passages will need permission from BGS	D2.1
			Reports, articles...	LGI			D2.1
Possible New Applications of Fluorspar in Europe							D2.3
Future Fluorspar demand - Industrial and consumer trends	Moderate growth driven by fluorochemicals and AI		Reports, articles...	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Fluorspar global value chains	Extraction, processing, manufacturing, use...		Reports, articles...	LGI			D2.1
WP3 - Mapping Fluorspar supply for EU from primary and secondary sources (WP Leader: GTK)							
Fluorspar primary resources in EU	Names and descriptions of major deposits		Mineral Profile: Fluorspar	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Fluorspar secondary resources in EU			Articles, reports, thesis	SGU	Identification and quantification of F secondary resources		D3.2
Challenges of Fluorspar supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
NO DATA							
WP5 - Substitution (WP Leader: KTN)							
Fluorspar substitutability per applications	Distribution of end uses and corresponding substitutability assessments		Reports from CRM Innonet and updates	FhG	CRM Profile Reports	Information freely available	D5.1
Analysis of substitution trajectories and prerequisites	Options for substitution		Reports and articles	CEA	Substitution strategy guide	Information freely available	D5.2
Economic assessment of substitution trajectories	Relevance of substitution for the European economy		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
Communication material (webinars,...) of Fluorspar for stakeholders	Material to raise awareness of opportunities for substitution		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4
WP6 - Technology gaps/barriers and innovation pathways in Fluorspar value chain (WP Leader: NTUA)							
NO DATA							
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Fluorspar	EU Critical Raw Materials list	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Fluorspar			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Fluorspar		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

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2.2.2.12. GADOLINIUM

Critical Metal: Gadolinium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Gadolinium (WP Leader: Fraunhofer)							
Current use of Gadolinium in Europe	Total current European use (grouped as part of Heavy Rare Earths), by application.		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
	Additive for permanent magnet and alloys	BRGM		CEA			D2.1
Possible New Applications of Gadolinium in Europe		BRGM		CEA			D2.3
Future Gadolinium demand - Industrial and consumer trends		BRGM		CEA			D2.2
Gadolinium global value chains		RARE (association for rare earth)		CEA			D2.1
WP3 - Mapping Gadolinium supply for EU from primary and secondary sources (WP Leader: GTK)							
Gadolinium primary resources in EU	Global distribution of rare earth deposits		Chapter in Critical Metals Handbook (Figure 13.4)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Number of mines..location..annual production in EU..	Mineral deposit database of GTK, FODD database covering Finland, Sweden and Norway	GTK Report Archive	GTK	Update on REE deposits in the Fennoscandia area (GTK) and EU (all WP partners)	Copyright GTK (Finland), SGU (Sweden), NGU (Norway)	D3.1
	Global distribution of rare earth deposit; names and descriptions of major deposits		Mineral Profile: Rare Earth Elements	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	Annual production by country; refinery production	Database		BGR	EU deposits	The database is confidential	D3.1
Gadolinium secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of gadolinium secondary resources	No IPR issues	D3.2
Challengues of Gadolinium supply in EU	Mines, annual production, exploration, processing, fefining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3

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WP4 - Production (WP Leader: VTT)							
Main processing technologies for Gadolinium primary sources	<i>Bastnaesite and monazite ores processing</i>		Technical books, reports and articles	MEFOS, IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission from	D4.1
Main processing technologies for Gadolinium secondary sources	<i>Recovery and purification by hydrometallurgy (possible input from participation in EGs, not direct contribution)</i>		Reports, articles	ENEA, Chalmers		No IPR issues	D4.2
Main processing technologies for Gadolinium recycling	<i>Recovery and purification by hydrometallurgy (possible input from participation in EGs, not direct contribution)</i>		Reports, articles	ENEA		No IPR issues	D4.2
Estimated recovery rates of Gadolinium							D4.2
Estimated costs for Gadolinium processing technologies							D4.2
Environmental and circular economy aspects concerning Gadolinium processing technologies							D4.3
Main Gadolinium producers							D4.1
WP5 - Substitution (WP Leader: KTN)							
Gadolinium substitutability per applications		ERECON (2015)		CEA			D5.1
Analysis of substitution trajectories and prerequisites		ERECON (2015)		CEA			D5.2
Economic assessment of substitution trajectories		ERECON (2015)		CEA			D5.3
Communication material (webinars,...) of Gadolinium for stakeholders		ERECON (2015)		CEA			D5.4

WP6 - Technology gaps/barriers and innovation pathways in Gadolinium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Gadolinium value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Chalmers, Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Gadolinium value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Chalmers, Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	<i>Review on existing LCA studies on extraction from secondary resources</i>			ENEA			
Technology gaps/Barriers in Gadolinium value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Gadolinium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Gadolinium	<i>EU Critical Raw Materials list</i>	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Gadolinium			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Gadolinium		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Gadolinium in WEEE products	<i>In some converters of white LED</i>				Mapping of CRM-related products		D8.1
Mapping of technologies and EOL infrastructures for recycling of Gadolinium	<i>No recycling, technology possibly available</i>				Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM		D8.1
Financing of Gadolinium recycling	<i>No financing</i>				Potential cost/benefit, financing of recycling if relevant		D8.1
Mapping of concentrations and accessibility of Gadolinium	<i>Very low concentration, converters accessible, but no detailed knowledge available</i>			UNU	Mapping of concentrations and accessibility		D8.1
Upgrade of regulations and standards					Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

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2.2.2.13. GALLIUM

Critical Metal: Gallium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Gallium (WP Leader: Fraunhofer)							
Current use of Gallium in Europe	Integrated circuits, LED, alloys, batteries, magnets, PV...		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but reproduction of significant passages of text will need permission from publisher	D2.1
			Reports, articles	LGI			D2.1
	Total current European use, by application.		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
	PV (CIGS), power electronic, additive in alloys	BRGM		CEA	Update		D2.1
Possible New Applications of Gallium in Europe	LED for general lighting...		Reports, articles	LGI			D2.3
		BRGM		CEA	Update		D2.3
Future Gallium demand - Industrial and consumer trends	Strong growth driven by LED and PV		Reports, articles	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
		BRGM		CEA	Update		D2.2
Future demand - Quantitative scenarios	Estimates of Gallium tonnage required in 2035 for certain applications, global			FhG ISI	No new information	No IPR issues	D2.3
Gallium global value chains	Extraction, processing, manufacturing, use...		Reports, articles	LGI			D2.1
		BRGM		CEA	Update		D2.1
WP3 - Mapping Gallium supply for EU from primary and secondary sources (WP Leader: GTK)							
Gallium primary resources in EU	Sources of gallium		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but reproduction of significant passages of text will need permission from publisher	D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Gallium secondary resources in EU	Production of 2 nd resources containing metal..mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of gallium secondary resources	No IPR issues	D3.2
Challengues of Gallium supply in EU	Mines, annual production, exploration, processing, fefining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
Main procressing technologies for Gallium primary sources	State of the art processing techniques in mines		Reports, books, articles, theses	VTT		No IPR issues	D4.1
Main processing technologies for Gallium secondary sources	State of the art processing techniques with tailings		Reports, books, articles, theses	VTT		No IPR issues	D4.2
Main processing technologies for Gallium recycling	State of the art processing techniques with industrial waste		Reports, books, articles, theses	VTT		No IPR issues	D4.2
Estimated recovery rates of Gallium	Recovery rate from EoL		Reports, books, articles, theses, statistics	VTT		No IPR issues	D4.2
Estimated costs for Gallium processing technologies	Cost for recovery from EoL vs. from primary resources		Reports, books, articles, theses	VTT		No IPR issues	D4.2
Environmental and circular economy aspects concerning Gallium processing technologies							
Main Gallium producers	Producer companies and their location, annual production		Statistics, reports	VTT		No IPR issues	D4.1

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WP5 - Substitution (WP Leader: KTN)							
Gallium substitutability per applications	Distribution of end uses and corresponding substitutability assessments		Reports and results from previous projects	FhG ISI	CRM Profile Reports	Information freely available	D5.1
		BRGM		CEA	Update		
Analysis of substitution trajectories and prerequisites	Options for substitution	BRGM	Reports and articles	CEA	Substitution strategy guide	Information freely available	D5.2
Economic assessment of substitution trajectories	Relevance of substitution for the European economy		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
		BRGM		CEA	Update	Information freely available	D5.3
Communication material (webinars,...) of Gallium for stakeholders	Material to raise awareness of opportunities for substitution		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4
		BRGM		CEA	Update		
WP6 - Technology gaps/barriers and innovation pathways in Gallium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Gallium value chain inhibiting their extraction from primary resources	Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Gallium value chain inhibiting their extraction from secondary resources	Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
Technology gaps/Barriers in Gallium value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Gallium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Gallium	EU Critical Raw Materials list	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Gallium			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Gallium		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Gallium in WEEE products	In chips of LEDs	x		UNU, Fraunhofer	Mapping of CRM-related products	Public	D8.1
	In electronic compounds		Literature Survey	BRGM			D8.1
Mapping of technologies and EOL infrastructures for recycling of Gallium	Recovery of Ga from WEEE		Literature Survey	BRGM			D8.1
	Technologies probably available		x		Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM		D8.1
Financing of Gallium recycling	No financing		x		Potential cost/benefit, financing of recycling if relevant		D8.1
Mapping of concentrations and accessibility of Gallium	Very low concentration	x		UNU, Fraunhofer IZM	Mapping of concentrations and accessibility	Public	D8.1
Upgrade of regulations and standards					Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

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2.2.2.14. GERMANIUM

Critical Metal: Germanium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Germanium (WP Leader: Fraunhofer)							
Current use of Germanium in Europe	<i>Fibre optics, catalysts (polymers), infrared optics, electric equipment...</i>		Reports, articles	LGI		No IPR issues	D2.1
	<i>Total current European use, by application.</i>		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
Possible New Applications of Germanium in Europe			Reports, articles	LGI		No IPR issues	D2.3
Future Germanium demand - Industrial and consumer trends	<i>Steady growth driven by infrared ans fibre optics</i>		Reports, articles	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Future demand - Quantitative scenarios		Estimates of Germanium tonnage required in 2035 for certain applications, global		Fraunhofer ISI	No new information	No IPR issues	D2.3
Germanium global value chains	<i>Extraction, processing, manufacturing, use...</i>		Reports, articles	LGI		No IPR issues	D2.1
WP3 - Mapping Germanium supply for EU from primary and secondary sources (WP Leader: GTK)							
Germanium primary resources in EU	<i>Annual production by country; refinery production</i>	Database		BGR	EU Deposits	The database is confidential	D3.1
Germanium secondary resources in EU	<i>Production of 2^o resources containing metal...mapping of resources...</i>		Reports, articles	Amphos21, SGU	Identification and quantification of gallium secondary resources	No IPR issues	D3.2
Challengues of Germanium supply in EU	<i>Mines, annual production, exploration, processing, refining</i>		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
Main proccesing technologies for Germanium primary sources							D4.1
Main proccesing technologies for Germanium secondary sources	<i>Recovery of Germanium from fly ash</i>		Master Thesis, Reports, Articles	IDENER	A document containing SoA of technology for Ge extraction from secondary sources	No IPR issues	D4.2
	<i>Recovery of Germanium from by-products of Zn/Pb industry</i>		Report	IMN	Recovery of Germanium from by-products of Zn/Pb industry	No IPR issues	D4.2
Main processing technologies for Germanium recycling							D4.2
Estimated recovery rates of Germanium							D4.2
Estimated costs for Germanium processing technologies							D4.2
Environmental and circular economy aspects concerning Germanium processing technologies	<i>Loss of Germanium in value chains</i>		Reports, articles	IDENER	A document containing information about circular economy and environmental aspects of Germanium processing technologies	No IPR issues	D4.3
Main Germanium producers							D4.1

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WP5 - Substitution (WP Leader: KTN)							
Germanium substitutability per application	AsGa, Sb2O3 (Catalyst PET)		Reports, articles, theses	IMN	Report containing Ge substitutability per applications	Information freely available	D5.1
			Reports and results from previous projects	Fraunhofer ISI	CRM Profile Reports	Information freely available	D5.1
Analysis of substitution trajectories and prerequisites	Options for substitution		Reports and articles	CEA	Substitution strategy guide	Information freely available	D5.2
			Reports, articles, theses	IMN	Analysis of substitution trajectories and prerequisites	Information freely available	D5.2
Economic assessment of substitution trajectories	Relevance of substitution for the European economy		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
Communication material (webinars,...) of Germanium for stakeholders	Material to raise awareness of opportunities for substitution		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4
WP6 - Technology gaps/barriers and innovation pathways in Germanium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Germanium value chain inhibiting their extraction from primary resources	Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Germanium value chain inhibiting their extraction from secondary resources	Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
Technology gaps/Barriers in Germanium value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Germanium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Germanium	EU Critical Raw Materials list	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Germanium			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Germanium		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Germanium in WEEE products	Used in some chips		Reports, articles	UNU, IMN	Mapping of CRM-related products	No IPR issues	D8.1
Mapping of technologies and EOL infrastructures for recycling of Germanium				UNU	Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM		D8.1
Financing of Germanium recycling				UNU	Potential cost/benefit, financing of recycling if relevant		D8.1
Mapping of concentrations and accessibility of Germanium				UNU	Mapping of concentrations and accessibility		D8.1
Upgrade of regulations and standards				UNU	Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

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2.2.2.15. INDIUM

Critical Metal: Indium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Indium (WP Leader: Fraunhofer)							
Current use of Indium in Europe	Flat panel displays, solders, PV, LED...		Reports, articles	LGI			D2.1
	Total current European use, by application.		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	
	TCO	Lack of data		CEA			
Possible New Applications of Indium in Europe			Reports, articles	LGI			D2.3
		Lack of data		CEA			
Future Indium demand - Industrial and consumer trends	Strong growth for LED and PV		Reports, articles	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
		Lack of data		CEA			
Future demand - Quantitative scenarios		Estimates of indium tonnage required in 2035 for certain applications, global		Fraunhofer ISI	No new information	No IPR issues	D2.3
Indium global value chains	Extraction, processing, manufacturing, use...		Reports, articles	LGI			D2.1
		Lack of data		CEA			
WP3 - Mapping Indium supply for EU from primary and secondary sources (WP Leader: GTK)							
Indium primary resources in EU	annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Indium secondary resources in EU	Production of 2 nd resources containing metal...mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of indium secondary resources	No IPR issues	D3.2
Challenges of Indium supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader:VTT)							
Main processing technologies for Indium primary sources							D4.1
Main processing technologies for Indium secondary sources	Recovery and purification by hydrometallurgy (see WP8) * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
Main processing technologies for Indium recycling	Recovery and purification by hydrometallurgy (see WP8) * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
	Extraction of In from EoL PV panels		Ongoing project	CEA			D4.2
Estimated recovery rates of Indium							D4.2
Estimated costs for Indium processing technologies							D4.2
Environmental and circular economy aspects concerning Indium processing technologies	Indium as the by-product of main non-ferrous metals. Circularity of In is crucial for sustainable In supply.			TU Delft	Identification of Environmental and circular economy aspects concerning Indium processing technologies	No IPR issues	D4.3
Main Indium producers							D4.1

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WP5 - Substitution (WP Leader: KTN)							
Indium substitutability per applications	Distribution of end uses and corresponding substitutability assessments		Reports and results from previous projects	Fraunhofer ISI	CRM Profile Reports	Information freely available	D5.1
	PEDOT:PSS and other conductive polymers, metal grids, metal nanowires, metal nano-meshes, carbon nanotubes, graphene, other metal oxides for displays, PV and OLEDs		Reports, articles	ENEA (project coordinator of a KIC EIT Raw Materials Network of Infrastructure with CSIC, Grenoble INP, PoliMI, TU Darmstadt, UniMI-Bicocca, Univ. Lorraine, CNRS, CNR, FBK).			
	metallic nanowires random network for TCO		Patents, Ph.D. thesis, articles	CEA			
Analysis of substitution trajectories and prerequisites	Options for substitution		Reports and articles	CEA	Substitution strategy guide		D5.2
	Prerequisites - improvement of conductivity vs. transparency of new materials; - stability of materials vs. time, vs. environment, vs. electrical stress, vs. temperature, vs. light exposition, etc.		Reports, articles	ENEA			
Economic assessment of substitution trajectories	Relevance of substitution for the European economy		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	D5.3	
	Analyses evaluate a market of 400+ million US\$ for ITO substitution in 2027 (source IDTechEx)		Market analyses	ENEA			
Communication material (webinars,...) of Indium for stakeholders	Material to raise awareness of opportunities for substitution		Case studies, webinars	KTN	Delivery of case studies and webinars	D5.4	
			Reports, articles, market analyses	ENEA			
WP6 - Technology gaps/barriers and innovation pathways in Indium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Indium value chain inhibiting their extraction from primary resources	Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Indium value chain inhibiting their extraction from secondary resources	Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	Review on existing LCA studies on extraction from secondary resources			ENEA			D6.2
Technology gaps/Barriers in Indium value chain hindering substitution solutions in industrial applications	ITO still outperforms all its proposed substitutes, but increasing request of plastic/flexible substrates/applications will need more new transparent conductive films		Reports, articles	ENEA			D6.3
Innovative pathways to supply the future EU Indium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Indium	EU Critical Raw Materials list	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2
Policy gaps in EU related to Indium			National databases				D7.1 D7.2
Policy recommendations for EU concerning Indium		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Indium in WEEE products	In LED-chips, flat panel displays (FPDs), solar power modules	x	Reports, articles	UNU, Fraunhofer IZM, IMN	Mapping of CRM-related products	Public	D8.1
Mapping of technologies and EOL infrastructures for recycling of Indium	Available		x	Fraunhofer IZM	Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM	Public	D8.1
	Hydrometallurgy for recovery/purification of In from LCD screen			ENEA			D8.1
Financing of Indium recycling	None, concentration too low		Reports, articles	UNU	Potential cost/benefit, financing of recycling if relevant	Public	D8.1
Mapping of concentrations and accessibility of Indium	Very low concentrations in LEDs and FPDs			UNU, Fraunhofer IZM	Mapping of concentrations and accessibility	Public	D8.1
Upgrade of regulations and standards					Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

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2.2.2.16. IRIIDIUM

Critical Metal: Iridium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Iridium (WP Leader: Fraunhofer)							
Current use of Iridium in Europe	Uses of platinum group metals		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but large passages will need permission from publisher	D2.1
			Mineral Profile: Platinum Group Metals	BGS		Information is quotable for free, but large passages will need permission from BGS	D2.1
Possible New Applications of Iridium in Europe							D2.3
Future Iridium demand - Industrial and consumer trends							D2.2
Iridium global value chains							D2.1
WP3 - Mapping Iridium supply for EU from primary and secondary sources (WP Leader: GTK)							
Iridium primary resources in EU	Distribution of the main PGM mining districts, mines and deposits		Chapter in Critical Metals Handbook (Figure 12.1)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Names and descriptions of main PGM deposits		Mineral Profile: Platinum Group Metals	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
Iridium secondary resources in EU							D3.2
Challengues of Iridium supply in EU							D3.3
WP4 - Production (WP Leader: VTT)							
Main processing technologies for Iridium primary sources	Nickel and copper ores processing		Technical books, reports and articles	MEFOS , IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission from publisher	D4.1
Main processing technologies for Iridium secondary sources							D4.2
Main processing technologies for Iridium recycling	Some knowledge development about PGM recovery from different waste streams: auto catalysts, electronic waste (WEEE) and tailings and slags from nickel and copper smelters			TECNALIA			D4.2
Estimated recovery rates of Iridium							D4.2
Estimated costs for Iridium processing technologies							D4.2
Environmental and circular economy aspects concerning Iridium processing technologies							D4.3
Main Iridium producers							D4.1
WP5 - Substitution (WP Leader: KTN)							
Iridium substitutability per applications	Distribution of end uses and corresponding substitutability assessments		Reports from CRM Innonet and updates	FhG	CRM Profile Reports	Information freely available	D5.1
Analysis of substitution trajectories and prerequisites	Options for substitution		Reports and articles	CEA	Substitution strategy guide	Information freely available	D5.2
Economic assessment of substitution trajectories	Relevance of substitution for the European economy		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
Communication material (webinars,...) of Iridium for stakeholders	Material to raise awareness of opportunities for substitution		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4
WP6 - Technology gaps/barriers and innovation pathways in Iridium value chain (WP Leader: NTUA)							
NO DATA							
WP7 - Policy Issues (WP Leader: MINPOL)							
NO DATA							
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

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2.2.2.17. LANTHANUM

Critical Metal: Lanthanum	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Lanthanum (WP Leader: Fraunhofer)							
Current use of Lanthanum in Europe	Fluid catalytic cracking, NiMH batteries, metallurgy...		Reports, articles,... from European Commission	LGI			D2.1
	Total current European use (grouped as part of Light Rare Earths), by application.			CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
	Catalyst, battery, additive in alloy	BRGM		CEA			
Possible New Applications of Lanthanum in Europe	Electroceraic	BRGM		CEA			D2.3
Future Lanthanum demand - Industrial and consumer trends	Steady growth driven by FCC and batteries		Reports, articles,... from European Commission	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
		BRGM		CEA			
Lanthanum global value chains	Extraction, processing, manufacturing, use...		Reports, articles,... from European Commission	LGI			D2.1
		RARE		CEA			
WP3 - Mapping Lanthanum supply for EU from primary and secondary sources (WP Leader: GTK)							
Lanthanum primary resources in EU	Global distribution of rare earth deposits		Chapter in Critical Metals Handbook (Figure 13.4)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Number of mines..location..annual production in EU..	Mineral deposit database of GTK, FODD database covering Finland, Sweden and Norway	GTK Report Archive	GTK	Update on REE deposits in the Fennoscandia area (GTK) and EU (all WP partners)	copyright GTK (Finland), SGU (Sweden), NGU (Norway)	D31
	Global distribution of rare earth deposit; names and descriptions of major deposits		Mineral Profile: Rare Earth Elements	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Lanthanum secondary resources in EU	Production of 2º resources containing metal..mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of lanthanum secondary resources	No IPR issues	D3.2
Challengues of Lanthanum supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3

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WP4 - Production (WP Leader: VTT)							
Main processing technologies for Lanthanum primary sources	<i>Bastnaesite and monazite ores processing</i>		Technical books, reports and articles	MEFOS , IMN, Chalmers,	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the	D4.1
Main processing technologies for Lanthanum secondary sources	<i>Recovery and purification by hydrometallurgy (possible input from participation in EGs, not direct contribution)</i>		Technical books, reports and articles	ENEA, Chalmers		No IPR issues	D4.2
	<i>Recovery of REE from spent Ni-MH batteries</i>		Reports, REE4EU project reports (ongoing)	IDENER	Review of SoA main processing technologies for Dy extraction from secondary		D4.2
Main processing technologies for Lanthanum recycling	<i>Recovery and purification by hydrometallurgy (possible input from participation in EGs, not direct contribution)</i>		Technical books, reports and articles	ENEA, Chalmers		No IPR issues	D4.2
	<i>Extraction of La from spent Ni-MH batteries</i>		Reports, REE4EU project reports (ongoing)	IDENER	Review of SoA main processing technologies for Dy extraction from secondary sources	No IPR issues	D4.2
			Patent, ongoing project	CEA			D4.2
Estimated recovery rates of Lanthanum							D4.2
Estimated costs for Lanthanum processing technologies							D4.2
Environmental and circular economy aspects concerning Lanthanum processing technologies	<i>Uses of rare earth elements</i>		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but large passages will need permission from publisher	D4.3
			Mineral Profile: Rare Earth Elements	BGS		Information is quotable for free, but large passages will need permission from BGS	D4.3
Main Lanthanum producers							D4.1
WP5 - Substitution (WP Leader: KTN)							
Lanthanum substitutability per applications		ERECON (2015)		CEA			D5.1
Analysis of substitution trajectories and prerequisites		ERECON (2015)		CEA			D5.2
Economic assessment of substitution trajectories		ERECON (2015)		CEA			D5.3
Communication material (webinars,...) of Lanthanum for stakeholders		ERECON (2015)		CEA			D5.4

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WP6 - Technology gaps/barriers and innovation pathways in Lanthanum value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Lanthanum value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21, Chalmers	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Lanthanum value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21, Chalmers	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	<i>Review on existing LCA studies on extraction from secondary resources</i>			ENEA			D6.2
Technology gaps/Barriers in Lanthanum value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Lanthanum demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Lanthanum	<i>EU Critical Raw Materials list</i>		CRM Factsheets	SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Lanthanum		National databases					D7.1 D7.2 D7.3
Policy recommendations for EU concerning Lanthanum	<i>Cobalt Development Institute (http://www.thecdi.com/institute)</i>	ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

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2.2.2.18. MAGNESITE

Critical Metal: Magnesite	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 -							
Current use of Magnesite in Europe	<i>Refractory goods, environmental (animal feed, fertilizers)...</i>		Reports, articles...	LGI			D2.1
	<i>Total current European use, by application.</i>		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
Possible New Applications of Magnesite in Europe							D2.3
Future Magnesite demand - Industrial and consumer trends	<i>Moderate growth</i>		Reports, articles...	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Magnesite global value chains	<i>Extraction, processing, manufacturing, use...</i>		Reports, articles...	LGI			D2.1
WP3 - Mapping Magnesite supply for EU from primary and secondary sources (WP Leader: GTK)							
NO DATA							
WP4 - Production (WP Leader: VTT)							
NO DATA							
WP5 - Substitution (WP Leader: KTN)							
NO DATA							
WP6 - Technology gaps/barriers and innovation pathways in Magnesites value chain (WP Leader: NTUA)							
NO DATA							
WP7 - Policy Issues (WP Leader: MINPOL)							
NO DATA							
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

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2.2.2.19. MAGNESIUM

Critical Metal: Magnesium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Magnesium (WP Leader: Fraunhofer)							
Current use of Magnesium in Europe	Al-based alloys (packaging, transport, construction), Mg die-casting, steel desulphurization		Reports, articles, etc. From European Commission	LGI		No IPR issues	D2.1
	Total current European use, by application.			CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
Possible New Applications of Magnesium in Europe							D2.3
Future Magnesium demand - Industrial and consumer trends	Strong growth for Al alloys and Mg die-casting		Reports, articles, etc. From European Commission	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Magnesium global value chains	Extraction, processing, manufacturing, use...		Reports, articles, etc. From European Commission	LGI			D2.1
WP3 - Mapping Magnesium supply for EU from primary and secondary sources (WP Leader: GTK)							
Magnesium primary resources in EU							D3.1
Magnesium secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21	Identification and quantification of magnesium secondary resources	No IPR issues	D3.2
Challenges of Magnesium supply in EU							D3.3
WP4 - Production (WP Leader: VTT)							
Main processing technologies for Magnesium primary sources	State of the art processing techniques in mines		Reports, books, articles, theses	MEFOS		No IPR issues	D4.1
Main processing technologies for Magnesium secondary sources	State of the art processing techniques with tailings		Reports, books, articles, theses	MEFOS		No IPR issues	D4.2
Main processing technologies for Magnesium recycling	State of the art processing techniques with industrial waste		Reports, books, articles, theses	MEFOS		No IPR issues	D4.2
Estimated recovery rates of Magnesium	Recovery rate from EoL		Reports, books, articles, theses, statistics	MEFOS		No IPR issues	D4.2
Estimated costs for Magnesium processing technologies	Cost for recovery from EoL vs. from primary resources		Reports, books, articles, theses	MEFOS		No IPR issues	D4.2
Environmental and circular economy aspects concerning Magnesium processing technologies	Gaps that limit environmental performance of the processing chains		Reports, books, articles, theses	VTT		No IPR issues	D4.3
Main Magnesium producers	Producer companies and their location, annual production		Statistics, reports	MEFOS		No IPR issues	D4.1

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WP5 - Substitution (WP Leader: KTN)							
Magnesium substitutability per applications	<i>Distribution of end uses and corresponding substitutability assessments</i>		Reports from CRM Innonet and updates	FhG	CRM Profile Reports	Information freely available	D5.1
Analysis of substitution trajectories and prerequisites	<i>Options for substitution</i>		Reports and articles	CEA	Substitution strategy guide	Information freely available	D5.2
Economic assessment of substitution trajectories	<i>Relevance of substitution for the European economy</i>		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
Communication material (webinars,...) of Magnesium for stakeholders	<i>Material to raise awareness of opportunities for substitution</i>		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4
WP6 - Technology gaps/barriers and innovation pathways in Magnesium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Magnesium value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Magnesium value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
Technology gaps/Barriers in Magnesium value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Magnesium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
NO DATA							
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

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2.2.2.20. NATURAL GRAPHITE

Critical Metal: Natural Graphite	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Natural Graphite (WP Leader: Fraunhofer)							
Current use of Natural Graphite in Europe	Electrodes, refractories, lubricants, batteries...		Report, articles, etc. from European Comission	LGI		No IPR issues	D2.1
	Total current European use, by application.			CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	
	Refractory materials (steel & cast iron), batteries	BRGM, ECGA (European Carbon and Graphite Association)		CEA			
Possible New Applications of Natural Graphite in Europe		BRGM, ECGA		CEA			D2.3
	Graphene (better heat and electricity conductor than Cu)		Report, articles, etc. from European Comission	LGI			
Future Natural Graphite demand - Industrial and consumer trends		BRGM, ECGA		CEA			D2.2
	Growth driven by Li-Ion batteries (EV, phones, tab...)		Report, articles, etc. from European Comission	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	
Natural Graphite global value chains		BRGM, ECGA		CEA			D2.1
	Extraction, processing, manufacturing, use...		Report, articles, etc. from European Comission	LGI			
WP3 - Mapping Natural Graphite supply for EU from primary and secondary sources (WP Leader: GTK)							
Natural Graphite primary resources in EU							D3.1
Natural Graphite secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		No info	SGU			D3.2
Challengues of Natural Graphite supply in EU							D3.3
WP4 - Production (WP Leader: VTT)							
Main proccesing technologies for Natural Graphite primary sources							D4.1
Main proccesing technologies for Natural Graphite secondary sources							D4.2
Main processing technologies for Natural Graphite recycling							D4.2
Estimated recovery rates of Natural Graphite							D4.2
Estimated costs for Natural Graphite processing technologies							D4.2
Environmental and circular economy aspects concerning Natural Graphite processing technologies	Not known			TU Delft	Identification of environmental and circular economy aspects concerning Natural Graphite processing technologies	No IPR issues	D4.3
Main Natural Graphite producers							D4.1

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WP5 - Substitution (WP Leader: KTN)							
Natural Graphite substitutability per applications	Distribution of end uses and corresponding substitutability assessments	BRGM, ECGA		CEA		Information freely available	D5.1
			Reports from CRM Innonet and updates	FhG	CRM Profile Reports		
Analysis of substitution trajectories and prerequisites	Options for substitution	BRGM, ECGA	Reports and articles	CEA	Substitution strategy guide		D5.2
Economic assessment of substitution trajectories	Relevance of substitution for the European economy		Reports and articles	VTT	Report on the economic assessment of substitution trajectories		D5.3
		BRGM, ECGA		CEA			
Communication material (webinars,...) of Natural Graphite for stakeholders	Material to raise awareness of opportunities for substitution		Case studies, webinars	KTN	Delivery of case studies and webinars	D5.4	
		BRGM, ECGA		CEA			
WP6 - Technology gaps/barriers and innovation pathways in natural graphite value chain (WP Leader:NTUA)							
NO DATA							
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to natural graphite	EU Critical Raw Materials list	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1
							D7.2
Policy gaps in EU related to Natural Graphite							D7.3
							D7.1
							D7.2
Policy recommendations for EU concerning Natural Graphite	Cobalt Development Institute (http://www.thecdi.com/institute)	ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Natural Graphite in WEEE products	Graphite is present in Lithium Batteries of Laptops, mobile phones, tablets						D8.1
Mapping of technologies and EOL infrastructures for recycling of Natural Graphite			No recycling of Graphite is performed today	Ecodom			D8.1
Financing of Natural Graphite recycling				Ecodom	To be investigated		D8.1
Mapping of concentrations and accessibility of Natural Graphite	Grams of Graphite recovered from batteries after the hydrometallurgy treatment (lab scale)		Amount of Graphite recoverable from Lithium batteries from laptops (information will be available in 2018)	Ecodom			D8.1
Upgrade of regulations and standards	CENELEC Standard on WEEE treatment Batteries Directive and WEEE Directive	EN50625 series 2006/66/EC 2012/19/eu		Ecodom			D8.2

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2.2.2.21. NEODYMIUM

Critical Metal: Neodymium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV
		Structured data	Unstructured data				
WP2 - Current and Future Use of Neodymium (WP Leader: Fraunhofer)							
Current use of Neodymium in Europe	Total current European use (grouped as part of Light Rare Earths), by application.		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
	Permanent magnet, additives in alloys	BRGM		CEA			
Possible New Applications of Neodymium in Europe		BRGM		CEA			D2.3
Future Neodymium demand - Industrial and consumer trends		BRGM		CEA			
Future demand - Quantitative scenarios		Model results: Tonnages per end-use, global		Fraunhofer ISI	Update scenarios	No IPR issues	D2.3
Neodymium global value chains		RARE (association for rare earth)		CEA			
WP3 - Mapping Neodymium supply for EU from primary and secondary sources (WP Leader: GTK)							
Neodymium primary resources in EU	Global distribution of rare earth deposits		Chapter in Critical Metals Handbook (Figure 13.4)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Number of mines..location..annual production in EU..	Mineral deposit database of GTK, FODD database covering Finland, Sweden and Norway	GTK Report Archive	GTK	Update on REE deposits in the Fennoscandia area (GTK) and EU (all WP partners)	Copyright GTK (Finland), SGU (Sweden), NGU (Norway)	
	Global distribution of rare earth deposit; names and descriptions of major deposits		Mineral Profile: Rare Earth Elements	BGS		Information is quotable for free, but large passages will need permission from BGS	
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	
Neodymium secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of Nd secondary resources	No IPR issues	D3.2
Challengues of Neodymium supply in EU	Mines, annual production, exploration, processing, fefining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3

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WP4 - Production (WP Leader: VTT)							
Main processing technologies for Neodymium primary sources	<i>Bastnaesite and monazite ores processing</i>		Technical books, reports and articles	MEFOS, IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission	D4.1
Main processing technologies for Neodymium secondary sources	<i>Recovery of REE from spent Ni-MH batteries</i>		Reports, REE4EU project reports (ongoing)	IDENER	Review of SoA main processing technologies for Dy extraction from secondary sources	No IPR issues	D4.2
	<i>Recovery and purification by hydrometallurgy (possible input from participation in EGs, not direct contribution)</i>		Technical books, reports and articles	ENEA, Chalmers		No IPR issues	D4.2
Main processing technologies for Neodymium recycling	<i>Recovery and purification by hydrometallurgy (possible input from participation in EGs, not direct contribution)</i>			ENEA			D4.2
	<i>Recovery of REE from spent Ni-MH batteries</i>		Reports, REE4EU project reports (ongoing)	IDENER	Review of SoA main processing technologies for Dy extraction from secondary sources	No IPR issues	D4.2
	<i>Efficient and economically viable technologies for recycling EOL diluted magnet scrap and waste</i>		Thesis, reports, articles	TU Delft	Further identification of main processing technologies and innovations for Neodymium recycling from EOL permanent magnets	Copyright TU Delft (thesis, report), publisher (articles)	D4.2
			Patent	CEA	Recovery of Nd from permanent magnet powder	Patent	D4.2
	<i>Processing of end of use magnets</i>		Ongoing research	Swerea MEFOS			
Estimated recovery rates of Neodymium	<i>Low recovery rate from dilute waste streams (WEEE)</i>		Thesis, reports, articles	TU Delft	Further identification of EOL recovery rate of Nd from EOL product and e-waste	Copyright TU Delft (thesis, report), publisher (articles)	D4.2
Estimated costs for Neodymium processing technologies							D4.2
Environmental and circular economy aspects concerning Neodymium processing technologies	<i>Little information is publicly available</i>		Thesis, report, articles	TU Delft	Further identification of environmental and circular economy aspects concerning Neodymium processing technologies	No IPR issues	D4.3
Main Neodymium producers							D4.1

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WP5 - Substitution (WP Leader: KTN)							
Neodymium substitutability per applications		ERECON (2015)		CEA			D5.1
Analysis of substitution trajectories and prerequisites		ERECON (2015)		CEA			D5.2
Economic assessment of substitution trajectories		ERECON (2015)		CEA			D5.3
Communication material (webinars,...) of Neodymium for stakeholders		ERECON (2015)		CEA			D5.4
WP6 - Technology gaps/barriers and innovation pathways in Neodymium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Neodymium value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21, Chalmers	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Neodymium value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21, Chalmers	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	<i>Review on existing LCA studies on extraction from secondary resources</i>			ENEA			
Technology gaps/Barriers in Neodymium value chain hindering substitution solutions in industrial applications	<i>Lack of efficient/effective/cheaper substitution for Nd as permanent magnets</i>			TU Delft	Identification of technology gaps/Barriers in Neodymium value chain hindering substitution solutions in industrial applications	No IPR issues	D6.3
Innovative pathways to supply the future EU Neodymium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Neodymium	EU Critical Raw Materials list	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Neodymium			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Neodymium		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D+A30:H4 47.4

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WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Neodymium in WEEE products	<i>In magnets</i>	x		UNU (ProSUM consortium)	Mapping of CRM-related products	Public	D8.1
	<i>Nd-Fe-B type permanent magnets in WEEE</i>		Report, published papers	BRGM			D8.1
Mapping of technologies and EOL infrastructures for recycling of Neodymium					Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM		D8.1
	<i>Recovery of strategic metals from WEEE</i>		Report, published papers	BRGM			D8.1
Financing of Neodymium recycling					Potential cost/benefit, financing of recycling if relevant		D8.1
Mapping of concentrations and accessibility of Neodymium					Mapping of concentrations and accessibility		D8.1
Upgrade of regulations and standards					Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

2.2.2.22. NIOBIUM

Critical Metal: Niobium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Niobium (WP Leader: Fraunhofer)							
Current use of Niobium in Europe	High-strength low-alloy steel (structural, automotive, pipeline), superalloys...		Mineral Profile: Niobium	BGS		Information is quotable for free, but large passages will need permission from BGS	D2.1
	Total current European use, by application.		Reports, articles...from European Commission	LGI			
	Total current European use, by application.		Reports, articles...from European Commission	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	
	Superalloys	BRGM		CEA			
Possible New Applications of Niobium in Europe		BRGM		CEA			D2.3
Future Niobium demand - Industrial and consumer trends	Strong growth of steel demand, intensification of HSLA steel use		Reports, articles...from European Commission	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
		BRGM		CEA			D2.2
Niobium global value chains	Extraction, processing, manufacturing, use...		Reports, articles...from European Commission	LGI			D2.1
		BRGM		CEA			D2.1

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WP3 - Mapping Niobium supply for EU from primary and secondary sources (WP Leader: GTK)							
Niobium primary resources in EU	Global distribution of niobium and tantalum mines; names and descriptions of major deposits		Mineral Profile: Niobium	BGS		Information is quotable for free, but large passages or reproduction of the figure will need permission from BGS	D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Niobium secondary resources in EU	Production of 2 nd resources containing metal..mapping of resources...		Reports of MSP REFRAM project	Amphos21, SGU	Identification and quantification of Nb secondary resources	No IPR issues	D3.2
Challenges of Niobium supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
Main processing technologies for Niobium primary sources	State of the art processing techniques in mines		Reports, books, articles, theses	MEFOS		No IPR issues	D4.1
Main processing technologies for Niobium secondary sources	State of the art processing techniques with tailings		Reports, books, articles, theses	TU Delft, Chalmers		No IPR issues	D4.2
	Hydrometallurgical and pyrometallurgical methods for Nb recovery from tailings		Reports from MSP REFRAM project	IDENER, Chalmers		No IPR issues	D4.2
Main processing technologies for Niobium recycling	State of the art processing techniques with industrial waste		Reports, books, articles, theses	TU Delft		No IPR issues	D4.2
Estimated recovery rates of Niobium	Recovery rate from EoL		Reports, books, articles, theses, statistics	TU Delft		No IPR issues	D4.2
Estimated costs for Niobium processing technologies	Cost for recovery from EoL vs. from primary resources		Reports, books, articles, theses	TU Delft		No IPR issues	D4.2
Environmental and circular economy aspects concerning Niobium processing technologies	Environmental aspects: presence of radioactive elements		Reports from MSP_REFRAM project	IDENER	Circular economy aspects of Niobium	No IPR issues	D4.3
	Gaps that limit environmental performance of the processing chains		Reports, books, articles, theses	Idener		No IPR issues	D4.3
Main Niobium producers	Brazil, Canada		Reports from MSP REFRAM project	IDENER		No IPR issues	D4.3
	Producer companies and their location, annual production		Statistics, reports	MEFOS		No IPR issues	D4.1

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WP5 - Substitution (WP Leader: KTN)							
Niobium substitutability per applications	Ferro-niobium by ferro-vanadium	BRGM	Reports from MSP-REFRAM project	CEA			D5.1
	<i>A superconductor that can be put to practical use needs to possess superior high-critical-magnetic-field and high-critical-supercurrent-density properties coupled in addition to high critical temperature with affordability and good workability.</i>	NA	Reports from MSP-REFRAM project deliverables and other conclusions made by the Experts Group in the Workshops of the FP7 Project CRM_InnoNet (Critical Raw Materials Innovation Network)	ICCRAM	Assessment study of the substitutability rate of niobium products in industrial applications	Consortium IPR issues	D5.1
Analysis of substitution trajectories and prerequisites		BRGM		CEA			D5.2
	<i>Innovation potential for Ta and Nb valorization</i>	NA	Reports from MSP-REFRAM project deliverables and other conclusions made by the Experts Group in the Workshops of the FP7 Project CRM_InnoNet (Critical Raw Materials Innovation Network)	ICCRAM	Brief report on substitution trajectories and prerequisites	IPR Issues (specific internal registration number in ICCRAM)	D5.2
Economic assessment of substitution trajectories		BRGM		CEA			D5.3
	<i>Substitution of niobium is possible, but it may involve higher costs and/or a loss in performance.</i>	NA	Reports from MSP-REFRAM project deliverables and other conclusions made by the Experts Group in the Workshops of the FP7 Project CRM_InnoNet (Critical Raw Materials Innovation Network)	ICCRAM	Economic assessment study of potential tungsten substitutes	Consortium IPR issues	D5.3
Communication material (webinars,...) of Niobium for stakeholders	<i>1st, 2nd and 3rd workshops of MSP-REFRAM project (i.e. state of the art, preparing the future & matching policy, society technology and market).</i>	NA	Reports from MSP-REFRAM project deliverables	ICCRAM	NA	Consortium IPR issues	D5.4
	<i>Final Conference</i>	NA	Reports from MSP-REFRAM project deliverables	ICCRAM	NA	Consortium IPR issues	D5.4
WP6 - Technology gaps/barriers and innovation pathways in Niobium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Niobium value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports of MSP REFRAM project	Amphos 21, Chalmers		No IPR issues	D6.1
	<i>There is no primary production on Nb in Europe</i>	NA	Reports from MSP-REFRAM project deliverables and other conclusions made by the Experts Group in the Workshops of the FP7 Project CRM_InnoNet (Critical Raw Materials Innovation Network)	ICCRAM	Swot analysis, analysis of the economic relevance of industrial Nb value chain in the region of Castilla y León region, market analysis, substitutability index, raw materials distribution, raw material resources, industrial applications, publications	IPR Issues (specific internal registration number in ICCRAM)	D6.1
Technology gaps/Barriers in Niobium value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports from MSP-REFRAM project	IDENER, AMPHOS 21, CEA		No IPR issues	D6.2
	<i>Important secondary resources such as copper smelting slags are not fully recovered./ Sites with Secondary resources of Nb are not fully available.</i>	NA	Reports from MSP-REFRAM project deliverables and other conclusions made by the Experts Group in the Workshops of the FP7 Project CRM_InnoNet (Critical Raw Materials Innovation Network)	ICCRAM	Swot analysis, analysis of the economic relevance of industrial Nb value chain in the region of Castilla y León region, market analysis, substitutability index, raw materials distribution, raw material resources, industrial applications, publications	IPR Issues (specific internal registration number in ICCRAM)	D6.2

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Technology gaps/Barriers in Niobium value chain hindering substitution solutions in industrial applications	<i>Technology gaps/Barriers exist</i>		Reports from MSP-REFRAM project	TU Delft		No IPR issues	
	<i>Two possible substitutes: Vanadium(V) and Titanium(Ti). Little literature available.</i>	NA	Reports from MSP-REFRAM project deliverables and other conclusions made by the Experts Group in the Workshops of the FP7 Project CRM_InnoNet (Critical Raw Materials Innovation Network)	ICCRAM	Swot analysis, analysis of the economic relevance of industrial Nb value chain in the region of Castilla y León region, market analysis, substitutability index, raw materials distribution, raw material resources, industrial applications, publications	Consortium IPR issues	D6.3
Innovative pathways to supply the future EU Niobium demand, unlocking the technology gaps/barriers	<i>Recovery of Nb as a by-product, innovative Pyrometallurgical Processes of Ta and Nb, recovery from slags and innovative solvent extraction processes.</i>	NA	Reports from MSP-REFRAM project deliverables and other conclusions made by the Experts Group in the Workshops of the FP7 Project CRM_InnoNet (Critical Raw Materials Innovation Network)	ICCRAM	SWOT analysis for the transition pathways.	IPR Issues (specific internal registration number in ICCRAM)	D6.4
			Reports from MSP_REFRAM project	CEA			D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Niobium	<i>EU Critical Raw Materials list</i>	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Niobium			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Niobium		ProMine, Minerlas4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

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2.2.2.23. OSMIUM

Critical Metal: Osmium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Osmium (WP Leader: Fraunhofer)							
Current use of Osmium in Europe	Uses of platinum group metals		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but large passages will need permission from publisher	D2.1
			Mineral Profile: Platinum Group Metals	BGS		Information is quotable for free, but large passages will need permission from BGS	D2.1
Possible New Applications of Osmium in Europe							D2.3
Future Osmium demand - Industrial and consumer trends							D2.2
Osmium global value chains							D2.1
WP3 - Mapping Osmium supply for EU from primary and secondary sources (WP Leader: GTK)							
Osmium primary resources in EU	Distribution of the main PGM mining districts, mines and deposits		Chapter in Critical Metals Handbook (Figure 12.1)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Names and descriptions of main PGM deposits		Mineral Profile: Platinum Group Metals	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
Osmium secondary resources in EU							D3.2
Challengues of Osmium supply in EU							D3.3
WP4 - Production (WP Leader: VTT)							
Main proccessing technologies for Osmium primary sources	Nickel and copper ores processing		Technical books, reports and articles	MEFOS , IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission from publisher	D4.1
Main proccessing technologies for Osmium secondary sources							D4.2
Main processing technologies for Osmium recycling				TECNALIA	Some knowledge development about PGM recovery from different waste streams: auto catalysts, electronic waste (WEEE) and tailings and slags from nickel and copper smelters		D4.2
Estimated recovery rates of Osmium							D4.2
Estimated costs for Osmium processing technologies							D4.2
Environmental and circular economy aspects concerning Osmium processing technologies							D4.3
Main Osmium producers							D4.1
WP5 - Substitution (WP Leader: KTN)							
Osmium substitutability per applications	Distribution of end uses and corresponding substitutability assessments		Reports from CRM Innonet and updates	FhG	CRM Profile Reports	Information freely available	D5.1
Analysis of substitution trajectories and prerequisites	Options for substitution		Reports and articles	CEA	Substitution strategy guide	Information freely available	D5.2
Economic assessment of substitution trajectories	Relevance of substitution for the European economy		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
Communication material (webinars,..) of Osmium for stakeholders	Material to raise awareness of opportunities for substitution		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4
WP6 - Technology gaps/barriers and innovation pathways in Osmium value chain (WP Leader: NTUA)							
NO DATA							
WP7 - Policy Issues (WP Leader: MINPOL)							
NO DATA							
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

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2.2.2.24. PALLADIUM

Critical Metal: Palladium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Palladium (WP Leader: Fraunhofer)							
Current use of Palladium in Europe	Autocatalysts, electronics, investment, chemical catalysts...		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but large passages will need permission from publisher	D2.1
			Mineral Profile: Platinum Group Metals	BGS		Information is quotable for free, but large passages will need permission from BGS	
			Reports, articles... from European Commission	LGI		No IPR issues	
	Total current European use, by application.		Reports, articles... from European Commission	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	
	Catalyst, condensator, jewellery industry	BRGM		CEA	Update		
Possible New Applications of Palladium in Europe		IPA		CEA	Update		D2.3
Future Palladium demand - Industrial and consumer trends	Steady growth driven by autocatalysts		Reports, articles... from European Commission	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
		IPA, JM, Heraeus		CEA	Update		D2.2
Future demand - Quantitative scenarios		stimates of Palladium tonnage required in 2035 for certain applications, global		Fraunhofer ISI	No new information	No IPR issues	D2.3
Palladium global value chains	Extraction, processing, manufacturing, use...		Reports, articles... from European Commission	LGI			D2.1
		IPA		CEA	Update		D2.1
WP3 - Mapping Palladium supply for EU from primary and secondary sources (WP Leader: GTK)							
Palladium primary resources in EU	Distribution of the main PGM mining districts, mines and deposits		Chapter in Critical Metals Handbook (Figure 12.1)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Names and descriptions of main PGM deposits		Mineral Profile: Platinum Group Metals, BGS	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Palladium secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21	Identification and quantification of Pd secondary resources	No IPR issues	D3.2
Challengues of Palladium supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3

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WP4 - Production (WP Leader: VTT)							
Main processing technologies for Palladium primary sources	Nickel and copper ores processing		Technical books, reports and articles	MEFOS, IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission from publisher	D4.1
Main processing technologies for Palladium secondary sources			Technical books, reports and articles	IMN	Published books, articles and industrial operational reports		D4.2
				TECNALIA	Some knowledge development about PGM recovery from different waste streams: auto catalysts, electronic waste (WEEE) and tailings and slags from nickel and copper smelters		
	Recovery and purification by hydrometallurgy (see WP8) * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
Main processing technologies for Palladium recycling			Technical books, reports and articles	IMN	Published books, articles and industrial operational reports		D4.2
	Recovery and purification by hydrometallurgy (see WP8) * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
Estimated recovery rates of Palladium							D4.2
Estimated costs for Palladium processing technologies							D4.2
Environmental and circular economy aspects concerning Palladium processing technologies							D4.3
Main Palladium producers							D4.1
WP5 - Substitution (WP Leader: KTN)							
Palladium substitutability per applications	Aggregated to PGM		Reports, results from CRM_InnoNet	Fraunhofer ISI	Possibly update	Information freely available	D5.1
	Possible substitution between elements of the PGM group		JM, Heraeus, IPA (International Platinum group metal Association), BRGM	CEA		Information freely available	D5.1
Analysis of substitution trajectories and prerequisites	Options for substitution		BRGM	CEA	Substitution strategy guide	Information freely available	D5.2
Economic assessment of substitution trajectories	Relevance of substitution for the European economy		BRGM	CEA		Information freely available	D5.3
			Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
Communication material (webinars,...) of Palladium for stakeholders	Material to raise awareness of opportunities for substitution		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4

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WP6 - Technology gaps/barriers and innovation pathways in Palladium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Palladium value chain inhibiting their extraction from primary resources	Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications		Reports, articles	Amphos21		No IPR issues	D6.1
Technology gaps/Barriers in Palladium value chain inhibiting their extraction from secondary resources	Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications		Reports, articles	Amphos21		No IPR issues	D6.2
	Barriers: difficulties in identifying components containing Pd (WEEE). Review on existing LCA studies on extraction from secondary resources			ENEA			
Technology gaps/Barriers in Palladium value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Palladium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
NO DATA							
WP8 - WEEE Issues							
Mapping the Palladium in WEEE products	In electrical and electronic components (integrated chips, in some passive devices like resistors, capacitors, ...)		Reports, articles	UNU	Mapping of CRM-related products	No IPR issues	D8.1
Mapping of technologies and EOL infrastructures for recycling of Palladium	Available		Reports, articles	UNU	Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM	No IPR issues	D8.1
	Hydrometallurgy for recovery/purification of Pd from ceramic capacitors			ENEA			D8.1
Financing of Palladium recycling	Not required for recycling, in most cases required for pre-treatment			UNU	Potential cost/benefit, financing of recycling if relevant		D8.1
Mapping of concentrations and accessibility of Palladium		x		UNU	Mapping of concentrations and accessibility		D8.1
Upgrade of regulations and standards				UNU	Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

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2.2.2.25. PHOSPHATE ROCK

Critical Metal: Phosphate Rock	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Phosphate rock (WP Leader: Fraunhofer)							
Current use of Phosphate rock in Europe	Mineral fertilizers, feed and food additives, detergents...		Reports, articles... from European Commission	LGI			D2.1
Possible New Applications of Phosphate rock in Europe							D2.3
Future Phosphate rock demand - Industrial and consumer trends	Moderate growth due to increased use of fertilizers		Reports, articles... from European Commission	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Phosphate rock global value chains	Extraction, processing, manufacturing, use...		Reports, articles... from European Commission	LGI			D2.1
WP3 - Mapping Phosphate rock supply for EU from primary and secondary sources (WP Leader: GTK)							
Phosphate rock primary resources in EU	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Phosphate rock secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of phosphate secondary resources	No IPR issues	D3.2
Challengues of Phosphate rock supply in EU	Mines, annual production, exploration, processing, fefining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
Main proccesing technologies for Phosphate rock primary sources	State of the art processing techniques in mines		Reports, books, articles, theses	VTT		No IPR issues	D4.1
Main proccesing technologies for Phosphate rock secondary sources	State of the art processing techniques with tailings		Reports, books, articles, theses	VTT		No IPR issues	D4.2
Main processing technologies for Phosphate rock recycling	State of the art processing techniques with industrial waste		Reports, books, articles, theses	VTT		No IPR issues	D4.2
Estimated recovery rates of Phosphate rock	Recovery rate from manufacturing residue		Reports, books, articles, theses, statistics	VTT		No IPR issues	D4.2
Estimated costs for Phosphate Rock processing technologies	Cost for recovery from manufacturing residue vs. from primary resources		Reports, books, articles, theses	VTT		No IPR issues	D4.2
Environmental and circular economy aspects concerning Phosphate rock processing technologies	Gaps that limit environmental performance of the processing chains		Reports, books, articles, theses	VTT		No IPR issues	D4.3
Main Phosphate rock producers	Producer companies and their location, annual production		Statistics, reports	VTT		No IPR issues	D4.1
WP5 - Substitution (WP Leader: KTN)							
NO DATA							

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WP6 - Technology gaps/barriers and innovation pathways in Phosphate Rock value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Phosphate Rock value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Phosphate Rock value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
Technology gaps/Barriers in Phosphate Rock value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Phosphate rock demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Phosphate Rock	<i>EU Critical Raw Materials list</i>	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Phosphate rock			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Phosphate rock		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

2.2.2.26. PLATINUM

Critical Metal: Platinum	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Platinum (WP Leader: Fraunhofer)							
Current use of Platinum in Europe	Autocatalysts, chemical catalysts, electronics, jewellery, investment...		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but large passages will need permission from publisher	D2.1
			Mineral Profile: Platinum Group Metals	BGS		Information is quotable for free, but large passages will need permission from BGS	D2.1
			Reports, articles from European Commission	LGI			D2.1
	Total current European use (grouped as part of Platinum Group Metals), by application.	Reports, articles from European Commission	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1	
Possible New Applications of Platinum in Europe							D2.3
Future Platinum demand - Industrial and consumer trends	Strong growth: fuel cell catalysts		Reports, articles from European Commission	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Future demand - Quantitative scenarios		Estimates of Platinum tonnage required in 2035 for certain applications, global		Fraunhofer ISI	No new information	No IPR issues	D2.3
Platinum global value chains	Extraction, processing, manufacturing, use...		Reports, articles from European Commission	LGI			D2.1
WP3 - Mapping Platinum supply for EU from primary and secondary sources (WP Leader: GTK)							
Platinum primary resources in EU	Distribution of the main PGM mining districts, mines and deposits		Chapter in Critical Metals Handbook (Figure 12.1)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Names and descriptions of main PGM deposits		Mineral Profile: Platinum Group Metals	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Platinum secondary resources in EU	Production of 2 nd resources containing metal..mapping of resources...		Reports, articles	Amphos21	Identification and quantification of Pt secondary resources	No IPR issues	D3.2
Challengues of Platinum supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3

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WP4 - Production (WP Leader: VTT)							
Main processing technologies for Platinum primary sources	Nickel and copper ores processing		Technical books, reports and articles	MEFOS , IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission	D4.1
Main processing technologies for Platinum secondary sources	State of the art processing techniques with tailings		Reports, books, articles, theses	VTT		No IPR issues	D4.2
Main processing technologies for Platinum recycling	State of the art processing techniques with industrial waste		Reports, books, articles, theses	VTT		No IPR issues	D4.2
				TECNALIA	Some knowledge development about PGM recovery from different waste streams: auto catalysts, electronic waste (WEEE) and tailings and slags from nickel and copper smelters		D4.2
	Pt recovery from spent fuel cells		Patents, on going Ph.D. thesis	CEA			D4.2
Estimated recovery rates of Platinum	Recovery rate from EoL		Reports, books, articles, theses, statistics	VTT		No IPR issues	D4.2
Estimated costs for Platinum processing technologies	Cost for recovery from EoL vs. from primary resources		Reports, books, articles, theses	VTT		No IPR issues	D4.2
Environmental and circular economy aspects concerning Platinum processing technologies	Gaps that limit environmental performance of the processing chains		Reports, books, articles, theses	VTT		No IPR issues	D4.3
Main Platinum producers	Producer companies and their location, annual production		Statistics, reports	GTK		No IPR issues	D4.1
WP5 - Substitution (WP Leader: KTN)							
Platinum's substitutability per applications	Aggregated to PGM		Reports, results from CRM InnoNet	Fraunhofer ISI	possibly update	Information freely available	D5.1
	Reduction of Pt content by improved carbon supports for fuel cell application ; study on the reduction in the use of Pt through nanostructuration (nanoclusters) using PVD (e.g. sputtering); preliminary studies of feasibility for the reduction of use of Pt using ALD techniques, as catalyst for applications in gas sensors and fuel cells.	Published data on International peer reviewed Journals; experimental researches, R. Giorgi et al., J. Fuel Cell Sci. Tech. 8, 041004 (2011) M. Penza et al., Appl. Phys. Lett. 90, 173123 (2007)		ENEA		Information freely available	
	Fuel cells with lower Pt content		Patents, Ph.D. thesis	CEA		Information freely available	
Analysis of substitution trajectories and prerequisites	Options for substitution		Reports and articles	CEA	Substitution strategy guide	Information freely available	D5.2
	Study on trends on Pt substitution in particular for fuel cell applications	Analysis of literature data		ENEA		Information freely available	
Economic assessment of substitution trajectories	Relevance of substitution for the European economy		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
Communication material (webinars,...) of Platinum for stakeholders	Material to raise awareness of opportunities for substitution		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4

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WP6 - Technology gaps/barriers and innovation pathways in Platinums value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Platinums value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on prim	No IPR issues	D6.1
Technology gaps/Barriers in Platinums value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on sec	No IPR issues	D6.2
Technology gaps/Barriers in Platinums value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Platinum demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
NO DATA							
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Platinum in WEEE products	<i>Platinum is contained in printed circuit boards of IT and Small domestic appliances (Laptops, mobile phones,...)</i>						D8.1
Mapping of technologies and EOL infrastructures for recycling of Platinum	<i>Smelters (Umicore, Boliden, Aurubis)</i>						D8.1
Financing of Platinum recycling							D8.1
Mapping of concentrations and accessibility of Platinum	<i>Grams of Platinum recovered from printed circuit boards</i>						D8.1
Upgrade of regulations and standards	<i>CENELEC Standard on WEEE treatment Batteries Directive and WEEE Directive</i>	EN50625 series 2006/66/EC 2012/19/eu		Ecodom		No IPR issues	D8.2

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2.2.2.27. PRASEODYMIUM

Critical Metal: Praseodymium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Praseodymium (WP Leader: Fraunhofer)							
Current use of Praseodymium in Europe	Total current European use (grouped as part of Light Rare Earths), by application.		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
Possible New Applications of Praseodymium in Europe							D2.3
Future Praseodymium demand - Industrial and consumer trends							D2.2
Praseodymium global value chains							D2.1
WP3 - Mapping Praseodymium supply for EU from primary and secondary sources (WP Leader: GTK)							
Praseodymium primary resources in EU	Global distribution of rare earth deposits		Chapter in Critical Metals Handbook (Figure 13.4)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Number of mines..location..annual production in EU..	Mineral deposit database of GTK, FODD database covering Finland, Sweden and Norway	GTK Report Archive	GTK	Update on REE deposits in the Fennoscandia area (GTK) and EU (all WP partners)	Copyright GTK (Finland), SGU (Sweden), NGU (Norway)	D3.1
	Global distribution of rare earth deposit; names and descriptions of major deposits		Mineral Profile: Rare Earth Elements, BGS	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Praseodymium secondary resources in EU	Production of 2 nd resources containing metal..mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of praseodymium secondary resources	No IPR issues	D3.2
Challenges of Praseodymium supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
Main processing technologies for Praseodymium primary sources	Bastnaesite and monazite ores processing		Technical books, reports and articles	MEFOS , IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission	D4.1
Main processing technologies for Praseodymium secondary sources	Recovery and purification by hydrometallurgy * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
Main processing technologies for Praseodymium recycling	Recovery and purification by hydrometallurgy * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
	Recycling of Pr from EOL magnet scrap and waste		Thesis, report, articles	TU Delft	Further identification of main processing technologies for Praseodymium recycling	Copyright TU Delft (thesis,report), publisher (articles)	D4.2
Estimated recovery rates of Praseodymium	Low recovery rate from dilute waste streams (WEEE)		Thesis, reports, articles	TU Delft	Further identification of EOL recovery rate of Pr from EOL product and e-waste	Copyright TU Delft (thesis,report), publisher (articles)	D4.2
Estimated costs for Praseodymiums processing technologies							D4.2
Environmental and circular economy aspects concerning Praseodymium processing technologies	Little information is publically available		Thesis, report, articles	TU Delft	Further identification of environmental and circular economy aspects concerning Neodymium processing technologies	No IPR issues	D4.3
Main Praseodymium producers							D4.1

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WP5 - Substitution (WP Leader: KTN)							
NO DATA							
WP6 - Technology gaps/barriers and innovation pathways in Praseodymiums value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Praseodymiums value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Praseodymiums value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	<i>Review on existing LCA studies on extraction from secondary resources</i>			ENEA			D6.2
Technology gaps/Barriers in Praseodymiums value chain hindering substitution solutions in industrial applications	<i>Lack of efficient/effective/cheaper substitution for Nd as permanent magnets</i>			TU Delft	Identificaiton of technology gaps/Barriers in Praseodymium's value chain hindering substitution solutions in industrial applications	No IPR issues	D6.3
Innovative pathways to supply the future EU Praseodymium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Praseodymiums	<i>EU Critical Raw Materials list</i>	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Praseodymium			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Praseodymium		ProMine, Minerlas4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Praseodymium in WEEE products	<i>Identification of Prin electronic components, stocks, production in EU, worldwide</i>		Report from Eco-Systemes	BRGM			D8.1
				UNU	Mapping of CRM-related products		D8.1
Mapping of technologies and EOL infrastructures for recycling of Praseodymium				UNU	Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM		D8.1
	<i>Recovery of Pr from permanent magnet in WEEE</i>		Report from Extrade Project	BRGM			D8.1
Financing of Praseodymium recycling				UNU	Potential cost/benefit, financing of recycling if relevant		D8.1
Mapping of concentrations and accessibility of Praseodymium				UNU	Mapping of concentrations and accessibility		D8.1
Upgrade of regulations and standards				UNU	Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

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2.2.2.28. RHODIUM

Critical Metal: Rhodium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Rhodium (WP Leader: Fraunhofer)							
Current use of Rhodium in Europe	Uses of platinum group metals		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but large passages will need permission from publisher	D2.1
			Mineral Profile: Platinum Group Metals	BGS		Information is quotable for free, but large passages will need permission from BGS	D2.1
Possible New Applications of Rhodium in Europe							D2.3
Future Rhodium demand - Industrial and consumer trends							D2.2
Rhodium global value chains							D2.1
WP3 - Mapping Rhodium supply for EU from primary and secondary sources (WP Leader: GTK)							
Rhodium primary resources in EU	<i>Number of mines..location..annual production in EU..</i>			GTK			D3.1
Rhodium secondary resources in EU	<i>Production of 2nd resources containing metal..mapping of resources...</i>		Reports, articles	Amphos21	Identification and quantification of Rhodium secondary resources	No IPR issues	D3.2
Challenges of Rhodium supply in	<i>Imports, exports, deficit, recycling, gaps..</i>			GTK			D3.3
WP4 - Production (WP Leader: VTT)							
Main processing technologies for Rhodium primary sources	<i>Nickel and copper ores processing</i>		Technical books, reports and articles	MEFOS , IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission from publisher	D4.1
Main processing technologies for Rhodium secondary sources	<i>State of the art processing techniques with tailings</i>		Reports, books, articles, theses	VTT		No IPR issues	D4.2
Main processing technologies for Rhodium recycling				TECNALIA	Some knowledge development about PGM recovery from different waste streams: auto catalysts, electronic waste (WEEE) and tailings and slags from nickel and copper smelters		D4.2
Estimated recovery rates of Rhodium	<i>Recovery rate from EoL</i>		Reports, books, articles, theses, statistics	VTT		No IPR issues	D4.2
Estimated costs for Rhodiums processing technologies	<i>Cost for recovery from EoL vs. from primary resources</i>		Reports, books, articles, theses	VTT		No IPR issues	D4.2
Environmental and circular economy aspects concerning Rhodium processing technologies	<i>Gaps that limit environmental performance of the processing chains</i>		Reports, books, articles, theses	VTT		No IPR issues	D4.3
Main Rhodium producers	<i>Producer companies and their location, annual production</i>		Statistics, reports	GTK		No IPR issues	D4.1

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WP5 - Substitution (WP Leader: KTN)							
Rhodiums substitutability per applications	<i>Distribution of end uses and corresponding substitutability assessments</i>		Reports from CRM Innonet and updates	FhG	CRM Profile Reports	Information freely available	D5.1
Analysis of substitution trajectories and prerequisites	<i>Options for substitution</i>		Reports and articles	CEA	Substitution strategy guide	Information freely available	D5.2
Economic assessment of substitution trajectories	<i>Relevance of substitution for the European economy</i>		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
Communication material (webinars,...) of Rhodiums for stakeholders	<i>Material to raise awareness of opportunities for substitution</i>		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4
WP6 - Technology gaps/barriers and innovation pathways in Rhodiums value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Rhodiums value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Rhodiums value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
Technology gaps/Barriers in Rhodiums value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Rhodium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
NO DATA							
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

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2.2.2.29. RUTHENIUM

Critical Metal: Ruthenium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Ruthenium (WP Leader: Fraunhofer)							
Current use of Ruthenium in Europe	Uses of platinum group metals		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but large passages will need permission from publisher	D2.1
			Mineral Profile: Platinum Group Metals, BGS	BGS		Information is quotable for free, but large passages will need permission from BGS	D2.1
Possible New Applications of Ruthenium in Europe							D2.3
Future Ruthenium demand - Industrial and consumer trends							D2.2
Ruthenium global value chains							D2.1
WP3 - Mapping Ruthenium supply for EU from primary and secondary sources (WP Leader: GTK)							
Ruthenium primary resources in EU	<i>Distribution of the main PGM mining districts, mines</i>		Chapter in Critical Metals Handbook (Figure 12.1)	BGS		Information is quotable for free, but reproduction of the figure will need	D3.1
	<i>Names and descriptions of main PGM deposits</i>		Mineral Profile: Platinum Group Metals, BGS	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
Ruthenium secondary resources in EU	<i>Production of 2nd resources containing metal..mapping of resources...</i>		Reports, articles	Amphos21	Identification and quantification of ruthenium secondary resources	No IPR issues	D3.2
Challenges of Ruthenium supply in EU							D3.3
WP4 - Production (WP Leader: VTT)							
Main processing technologies for Ruthenium primary sources	<i>Nickel ore processing</i>		Technical books, reports and articles	MEFOS , IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission from publisher	D4.1
Main processing technologies for Ruthenium secondary sources			Reports, publications and REFRAM deliverable	Chalmers	General information	VTT	D4.2
Main processing technologies for Ruthenium recycling			Reports, publications and REFRAM deliverable	Chalmers	General information	VTT	D4.2
				TECNALIA	Some knowledge development about PGM recovery from different waste streams: auto catalysts, electronic waste (WEEE) and tailings and slags from nickel and copper smelters		D4.2
Estimated recovery rates of Ruthenium							D4.2
Estimated costs for Ruthenium processing technologies							D4.2
Environmental and circular economy aspects concerning Ruthenium processing technologies							D4.3
Main Ruthenium producers							D4.1

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WP5 - Substitution (WP Leader: KTN)							
Ruthenium substitutability per applications	<i>Distribution of end uses and corresponding substitutability assessments</i>		Reports from CRM Innonet and updates	FhG	CRM Profile Reports	Information freely available	D5.1
Analysis of substitution trajectories and prerequisites	<i>Options for substitution</i>		Reports and articles	CEA	Substitution strategy guide	Information freely available	D5.2
Economic assessment of substitution trajectories	<i>Relevance of substitution for the European economy</i>		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
Communication material (webinars,...) of Ruthenium for stakeholders	<i>Material to raise awareness of opportunities for substitution</i>		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	D5.4
WP6 - Technology gaps/barriers and innovation pathways in Ruthenium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Ruthenium value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21, Chalmers	Identification of technological gaps on primary resources	No IPR issues	D5.1
Technology gaps/Barriers in Ruthenium value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21, Chalmers	Identification of technological gaps on secondary resources	No IPR issues	D5.2
Technology gaps/Barriers in Ruthenium value chain hindering substitution solutions in industrial applications							D5.3
Innovative pathways to supply the future EU Ruthenium demand, unlocking the technology gaps/barriers							D5.4
WP7 - Policy Issues (WP Leader: MINPOL)							
NO DATA							
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

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2.2.2.30. SAMARIUM

Critical Metal: Samarium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Samarium (WP Leader: Fraunhofer)							
Current use of Samarium in Europe	Total current European use (grouped as part of Light Rare Earths), by application.		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
Possible New Applications of Samarium in Europe							D2.3
Future Samarium demand - Industrial and consumer trends							D2.2
Samarium global value chains							D2.1
WP3 - Mapping Samarium supply for EU from primary and secondary sources (WP Leader: GTK)							
Samarium primary resources in EU	Global distribution of rare earth deposits		Chapter in Critical Metals Handbook (Figure 13.4)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	Number of mines..location..annual production in EU..	Mineral deposit database of GTK, FODD database covering Finland, Sweden and Norway	GTK Report Archive	GTK	Update on REE deposits in the Fennoscandia area (GTK) and EU (all WP partners)	Copyright GTK (Finland), SGU (Sweden), NGU (Norway)	D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
	Global distribution of rare earth deposit; names and descriptions of major deposits		Mineral Profile: Rare Earth Elements, BGS	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
Samarium secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of samarium secondary resources	No IPR issues	D3.2
Challengues of Samarium supply in EU	Mines, annual production, exploration, processing, fefining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
Main proccesing technologies for Samarium primary sources	Bastnaesite and monazite ores processing		Technical books, reports and articles	MEFOS , IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission from publisher	D4.1
Main proccesing technologies for Samarium secondary sources	Recovery and purification by hydrometallurgy * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
Main processing technologies for Samarium recycling	Recovery and purification by hydrometallurgy * (possible input from participation in EGs, not direct contribution)			ENEA			D4.2
Estimated recovery rates of Samarium							D4.2
Estimated costs for Samarium processing technologies							D4.2
Environmental and circular economy aspects concerning Samarium processing technologies							D4.3
Main Samarium producers							D4.1

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WP5 - Substitution (WP Leader: KTN)							
NO DATA							
WP6 - Technology gaps/barriers and innovation pathways in Samarium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Samarium value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Samarium value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	<i>Review on existing LCA studies on extraction from secondary resources</i>			ENEA			
Technology gaps/Barriers in Samarium value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Samarium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Samarium	EU Critical Raw Materials list	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Samarium			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Samarium	Cobalt Development Institute (http://www.thecdi.com/institute)	ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
NO DATA							

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2.2.2.31. SILICON METAL

Critical Metal: Silicon Metal	Example?	Existing info		Partner	Info to be produced	IPR status	DElIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Silicon Metal (WP Leader: Fraunhofer)							
Current use of Silicon Metal in Europe	Chemicals, Al alloys in automotive and construction, electronics/PV...		Reports, articles, from European Commission	LGI			D2.1
Possible New Applications of Silicon Metal in Europe							D2.3
Future Silicon Metal demand - Industrial and consumer trends	Moderate growth driven by semiconductors (incl PV cells)		Reports, articles, from European Commission	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Silicon Metal global value chains	Extraction, processing, manufacturing, use...		Reports, articles, from European Commission	LGI			D2.1
WP3 - Mapping Silicon Metal supply for EU from primary and secondary sources (WP Leader: GTK)							
Silicon Metal primary resources in EU							D3.1
Silicon Metal secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21	Identification and quantification of silicon metal secondary resources	No IPR issues	D3.2
Challengues of Silicon Metal supply in EU							D3.3
WP4 - Production (WP Leader: VTT)							
NO DATA							
WP5 - Substitution (WP Leader: KTN)							
NO DATA							
WP6 - Technology gaps/barriers and innovation pathways in Silicon metal value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Silicon metal value chain inhibiting their extraction from primary resources	Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications		Reports, articles	Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Silicon metal value chain inhibiting their extraction from secondary resources	Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications		Reports, articles	Amphos21	Identification of technological gaps on secondary resources	No IPR issues	D6.2
Technology gaps/Barriers in Silicon metal value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Silicon Metal demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
NO DATA							
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Silicon Metal in WEEE products	Silicon is contained in Solar Panels						D8.1
Mapping of technologies and EOL infrastrctures for recycling of Silicon Metal				ECODOM	To be investigated		D8.1
Financing of Silicon Metal recycling				ECODOM	To be investigated		D8.1
Mapping of concentrations and accessibility of Silicon Metal				ECODOM	To be investigated		D8.1
Upgrade of regulations and standards	CENELEC Standard on WEEE treatment Batteries Directive and WEEE Directive	EN50625 series 2006/66/EC 2012/19/eu		ECODOM			D8.2

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2.2.2.32. TERBIUM

Critical Metal: Terbium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Terbium (WP Leader: Fraunhofer)							
Current use of Terbium in Europe	Total current European use (grouped as part of Heavy Rare Earths), by application.		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
Possible New Applications of Terbium in Europe							D2.3
Future Terbium demand - Industrial and consumer trends							D2.2
Terbium global value chains							D2.1
WP3 - Mapping Terbium supply for EU from primary and secondary sources (WP Leader: GTK)							
Terbium primary resources in EU	Global distribution of rare earth deposits		Chapter in Critical Metals Handbook (Figure 13.4)	BGS		Information is quotable for free, but reproduction of the figure will need permission from publisher	D3.1
	number of mines..location..annual production in EU..	Mineral deposit database of GTK, FODD database covering Finland, Sweden and Norway	GTK Report Archive	GTK	Update on REE deposits in the Fennoscandia area (GTK) and EU (all WP partners)	copyright GTK (Finland), SGU (Sweden), NGU (Norway)	D3.1
	Global distribution of rare earth deposit; names and descriptions of major deposits		Mineral Profile: Rare Earth Elements, BGS	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Terbium secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of Terbium secondary resources	No IPR issues	D3.2
Challenges of Terbium supply in EU	Mines, annual production, exploration, processing, refining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
WP4 - Production (WP Leader: VTT)							
Main processing technologies for Terbium primary sources	Monazite and xenotime ores processing		Technical books, reports and articles	MEFOS , IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission	D4.1
Main processing technologies for Terbium secondary sources	Recovery and purification by hydrometallurgy * (possible input from participation in EGs, not direct contribution)		Reports, articles, REFRAM Reports	ENEA, Chalmers	General information	No IPR issues	D4.2
Main processing technologies for Terbium recycling	Recovery and purification by hydrometallurgy * (possible input from participation in EGs, not direct contribution)		Reports, articles, REFRAM Reports	ENEA, Chalmers	General information	No IPR issues	D4.2
Estimated recovery rates of Terbium							D4.2
Estimated costs for Terbium processing technologies							D4.2
Environmental and circular economy aspects concerning Terbium processing technologies							D4.3
Main Terbium producers							D4.1

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WP5 - Substitution (WP Leader: KTN)							
NO DATA							
WP6 - Technology gaps/barriers and innovation pathways in Terbium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Terbium value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Amphos21, Chalmers	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/Barriers in Terbium value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21, Chalmers	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	<i>Review on existing LCA studies on extraction from secondary resources</i>			ENEA			D6.2
Technology gaps/Barriers in Terbium value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Terbium demand, unlocking the technology gaps/barriers							D6.4
WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Terbium	<i>EU Critical Raw Materials list</i>	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Terbium			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Terbium		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Terbium in WEEE products	<i>Used in some converters of white LEDs until few years ago</i>			UNU (ProSUM consortium), Fraunhofer IZM	Mapping of CRM-related products		D8.1
Mapping of technologies and EOL infrastructures for recycling of Terbium	<i>No recycling, technology possibly available</i>				Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of CRM		D8.1
Financing of Terbium recycling	<i>None</i>				Potential cost/benefit, financing of recycling if relevant		D8.1
Mapping of concentrations and accessibility of Terbium	<i>Reasonable concentration in LED converters</i>				Mapping of concentrations and accessibility		D8.1
Upgrade of regulations and standards					Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

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2.2.2.33. TUNGSTEN

Critical Metal: Tungsten	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Tungsten (WP Leader: Fraunhofer)							
Current use of Tungsten in Europe	Cemented carbides, electricals, alloys...		Chapter in Critical Metals Handbook	BGS		Information is quotable for free, but large passages will need permission from publisher	D2.1
			Mineral Profile: Tungsten	BGS		Information is quotable for free, but large passages will need permission from BGS	D2.1
			Reports, articles...from European Commission	LGI			D2.1
	Total current European use, by application.		Reports, articles...from European Commission	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
Possible New Applications of Tungsten in Europe							D2.3
Future Tungsten demand - Industrial and consumer trends	Steady growth driven by chemical sector		Reports, articles...from European Commission	LGI	Report on major trends affecting future demand for critical raw material	No IPR issues	D2.2
Tungsten global value chains	Extraction, processing, manufacturing, use...		Reports, articles...from European Commission	LGI			D2.1
WP3 - Mapping Tungsten supply for EU from primary and secondary sources (WP Leader: GTK)							
Tungsten primary resources in EU	Selected major Tungsten mines and deposits		Chapter in Critical Metals Handbook (Figure 16.1)	BGS		Information is quotable for free, but reproduction of the figure will need permission	D3.1
	Location and type of major Tungsten deposits and districts; names and descriptions of example deposits		Mineral Profile: Tungsten, BGS	BGS		Information is quotable for free, but large passages will need permission from BGS	D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Tungsten secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports of MSP REFRAM project	Amphos21	Identification and quantification of W secondary resources	No IPR issues	D3.2
			Articles, reports, thesis (mainly unpublished)	SGU	Identification and quantification of W secondary resources		D3.2
Challengues of Tungsten supply in EU	Mines, annual production, exploration, processing, fefining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3
	Imports, exports, deficit, recycling, gaps..		Reports of MSP REFRAM project	CEA		No IPR issues	D3.3

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WP4 - Production (WP Leader: VTT)							
Main processing technologies for Tungsten primary sources	<i>Pressure digestion in the autoclave</i>		Text book, articles, reports from MSP-REFRAM project	SWEREA MEFOS	Summary of the main processing technologies for different types of W primary sources		D4.1
	<i>Scheelite and wolframite ores processing</i>		Technical books, reports and articles, MSP-REFRAM reports	IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of the figure will need permission	D4.1
Main processing technologies for Tungsten secondary sources	<i>Hydrometallurgical and pyrometallurgical methods for W recovery from W-Carbides</i>		Reports from MSP-REFRAM project deliverables	IDENER, TUDelft		No IPR issues	D4.2
	<i>State of the art processing techniques with tailings</i>		Reports, books, articles, theses	IMN	Main processing technologies for Tungsten secondary sources	No IPR issues	D4.2
Main processing technologies for Tungsten recycling	<i>Oxidation-wet chemical treatment process</i>		Articles, reports from MSP-REFRAM project deliverables	Swerea MEFOS	Description of the oxidation-wet chemical treatment process		D4.2
	<i>State of the art processing techniques with industrial waste</i>		Reports, books, articles, theses	IMN, TUDelft, Chalmers	Main processing technologies for Tungsten recycling	No IPR issues	D4.2
Estimated recovery rates of Tungsten	<i>Recovery rate from EoL</i>		Reports, books, articles, theses, statistics	IMN	Estimated recovery rates of Tungsten	No IPR issues	D4.2
	<i>Around 50% in Europe</i>		Articles, reports from MSP-REFRAM project deliverables	Swerea MEFOS	Identification of W loss in different production steps		D4.2
Estimated costs for Tungsten processing technologies	<i>Cost for recovery from EoL vs. from primary resources</i>		Reports, books, articles, theses	IMN	Estimated costs for Tungsten processing technologies	No IPR issues	D4.2
Environmental and circular economy aspects concerning Tungsten processing technologies	<i>Gaps that limit environmental performance of the processing chains</i>		Reports, books, articles, theses	VTT		No IPR issues	D4.3
Main Tungsten producers	<i>Producer companies and their location, annual production</i>		Statistics, reports	GTK		No IPR issues	D4.1

WP5 - Substitution (WP Leader: KTN)							
Tungsten substitutability per applications	<i>Distribution of end uses and corresponding substitutability assessments</i>		Reports, books, articles, theses	IMN, FhG	Tungsten substitutability per applications	Information freely available	D5.1
	<i>Potential substitutes for cemented Tungsten carbides or hard metals include cemented carbides based on molybdenum carbide and titanium carbide, ceramics, ceramic-metallic composites (cermets), diamond tools, and tool steels. Other potential substitutes for other applications are listed</i>	NA	Reports from MSP-REFRAM project deliverables and other conclusions made by the Experts Group in the Workshops of the FP7 Project CRM_InnoNet (Critical Raw Materials Innovation Network)	ICCRAM	Assessment study of the substitutability rate of Tungsten products in industrial applications	IPR Issues (specific internal registration number in ICCRAM)	
Analysis of substitution trajectories and prerequisites	<i>Options for substitution</i>		Reports, books, articles, theses	IMN, CEA	Analysis of substitution trajectories and prerequisites	Information freely available	D5.2
	<i>W Multilevel Perspective</i>	NA	Reports from MSP-REFRAM project deliverables	ICCRAM	NA	IPR Issues (specific internal registration number in ICCRAM)	
	<i>Information about the potential substitutes for Tungsten, their advantages and drawbacks for each application (Table 2)</i>	NA	Reports from MSP-REFRAM project deliverables	ICCRAM	Brief report on substitution trajectories and prerequisites	Consortium IPR issues	
Economic assessment of substitution trajectories	<i>Relevance of substitution for the European economy</i>		Reports and articles	VTT	Report on the economic assessment of substitution trajectories	Information freely available	D5.3
	<i>Tungsten substitutes for most application results in a loss of performance or in an increase of cost</i>	NA	Reports from MSP-REFRAM project deliverables and other conclusions made by the Experts Group in the Workshops of the FP7 Project CRM_InnoNet (Critical Raw Materials Innovation Network)	ICCRAM	Economic assessment study of potential Tungsten substitutes	Consortium IPR issues and IPR Issues (specific internal registration number in ICCRAM)	
Communication material (webinars,..) of Tungsten for stakeholders	<i>1st, 2nd and 3rd workshops of MSP-REFRAM project (i.e. state of the art, preparing the future & matching policy, society technology and market).</i>	NA	Reports from MSP-REFRAM project deliverables	ICCRAM	NA	MSP-REFRAM Consortium IPR issues	D5.4
	<i>Material to raise awareness of opportunities for substitution</i>		Case studies, webinars	KTN	Delivery of case studies and webinars	Information freely available	
	<i>MSP-REFRAM Final Conference</i>	NA	Reports from MSP-REFRAM project deliverables	ICCRAM	NA	MSP-REFRAM Consortium IPR issues	

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WP6- Technology gaps/barriers and innovation pathways in Tungsten value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Tungsten value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports of MSP REFRAM project	Amphos 21, Chalmers		No IPR issues	D6.1
	<i>Raw material procurement becomes more difficult, due to lack of investments in new mines and reduced secondary raw material availability. The majority of Tungsten primary raw material reserves are located in China or politically instable regions.</i>	NA	Reports from MSP-REFRAM project deliverables and other conclusions made by the Experts Group in the Workshops of the FP7 Project CRM_InnoNet (Critical Raw Materials Innovation Network)	ICCRAM	Swot analysis, analysis of the economic relevance of industrial w value chain in the region of Castilla y León region, market analysis, substitutability index, raw materials distribution, raw material resources, industrial applications, publications	IPR Issues (specific internal registration number in ICCRAM)	D6.1
Technology gaps/Barriers in Tungsten value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports from MSP-REFRAM project deliverables	IDENER, AMPHOS 21, Chalmers		No IPR issues	D6.2
	<i>Lack of suitable recycling technologies/ Significant gaps in the knowledge on the reserves of W in end-of-life waste.</i>	NA	Reports from MSP-REFRAM project deliverables and other conclusions made by the Experts Group in the Workshops of the FP7 Project CRM_InnoNet (Critical Raw Materials Innovation Network)	ICCRAM	Swot analysis, analysis of the economic relevance of industrial w value chain in the region of Castilla y León region, market analysis, substitutability index, raw materials distribution, raw material resources, industrial applications, publications	IPR Issues (specific internal registration number in ICCRAM)	D6.2
Technology gaps/Barriers in Tungsten value chain hindering substitution solutions in industrial applications	<i>W Multilevel Perspective</i>	NA	Reports from MSP-REFRAM project deliverables	ICCRAM	Swot analysis, analysis of the economic relevance of industrial w value chain in the region of Castilla y León region, market analysis, substitutability index, raw materials distribution, raw material resources, industrial applications, publications	IPR Issues (specific internal registration number in ICCRAM)	D6.3
Innovative pathways to supply the future EU Tungsten demand, unlocking the technology gaps/barriers	<i>Innovation potentials for W valorization</i>	NA	Reports from MSP-REFRAM project deliverables	ICCRAM	SWOT analysis for the transition pathways.	IPR Issues (specific internal registration number in ICCRAM)	D6.4
	<i>W Multilevel Perspective:</i> • Promote exploration at EU level (H2020, ESIF, etc.) • Update Prospecting Guides • Future Applications in: - Deep Drilling - Medical Industry • More R&D is needed; pilot scale trials should be carried out to improve the economic, environmental and technological feasibilities of mineral processing.	NA	Reports from MSP-REFRAM project deliverables	ICCRAM	SWOT analysis for the transition pathways.	IPR Issues (specific internal registration number in ICCRAM)	D6.4

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WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Tungsten	EU Critical Raw Materials list	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Tungsten			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Tungsten		ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Tungsten in WEEE products			Reports, books, articles, theses	IMN	Mapping the Tungsten in WEEE products	No IPR issues	D8.1
Mapping of technologies and EOL infrastructures for recycling of Tungsten			Reports, books, articles, theses	IMN	Mapping of technologies and EOL infrastructures for recycling of Tungsten	No IPR issues	D8.1
Financing of Tungsten recycling							D8.1
Mapping of concentrations and accessibility of Tungsten							D8.1
Upgrade of regulations and standards							D8.2

2.2.2.34. YTTRIUM

Critical Metal: Yttrium	Example?	Existing info		Partner	Info to be produced	IPR status	DELIV.
		Structured data	Unstructured data				
WP2 - Current and Future Use of Yttrium (WP Leader: Fraunhofer)							
Current use of Yttrium in Europe	Total current European use (grouped as part of Heavy Rare Earths), by application.		Reports, articles from EC	CML	Overview of information in existing literature (qualitative & quantitative)	No IPR issues	D2.1
Possible New Applications of Yttrium in Europe							D2.3
Future Yttrium demand - Industrial and consumer trends							D2.2
Yttrium global value chains							D2.1
WP3 - Mapping Yttrium supply for EU from primary and secondary sources (WP Leader: GTK)							
Yttrium primary resources in EU	Number of mines..location..annual production in EU..	Mineral deposit database of GTK, FODD database covering Finland, Sweden and Norway	GTK Report Archive	GTK	Update on REE deposits in the Fennoscandia area (GTK) and EU (all WP partners)	Copyright GTK (Finland), SGU (Sweden), NGU (Norway)	D3.1
	Annual production by country; refinery production	Database		BGR	EU Deposits	The database is confidential	D3.1
Yttrium secondary resources in EU	Production of 2 ^o resources containing metal..mapping of resources...		Reports, articles	Amphos21, SGU	Identification and quantification of Yttrium secondary resources	No IPR issues	D3.2
Challengues of Yttrium supply in EU	Mines, annual production, exploration, processing, fefining		Reports, fact sheets, studies	BGR	Market Analysis	No IPR issues	D3.3

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WP4 - Production (WP Leader: VTT)							
Main processing technologies for Yttrium primary sources	<i>Xenotime ores processing</i>		Technical books, reports and articles	MEFOS , IMN, Chalmers, VTT	Published books, articles and industrial operational reports	Information is quotable for free, but reproduction of	D4.1
Main processing technologies for Yttrium secondary sources	<i>Y from ores, contaminated solutions, WEEE and generic wastes.</i>		Reports and articles	IDENER, Chalmers	A review of SoA Yttrium recovery from secondary sources	No IPR issues	D4.2
	<i>Recovery and purification by hydrometallurgy (see WP8) * (possible input from participation in EGs, not direct</i>			ENEA (see WP8)			
Main processing technologies for Yttrium recycling	<i>Y from ores, contaminated solutions, WEEE and generic wastes.</i>		Reports and articles	IDENER, Chalmers	A review of SoA Yttrium recycling	No IPR issues	D4.2
	<i>Recovery and purification by hydrometallurgy (see WP8) * (possible input from participation in EGs, not direct contribution)</i>			ENEA (see WP8)			
Estimated recovery rates of Yttrium							D4.2
Estimated costs for Yttrium processing technologies							D4.2
Environmental and circular economy aspects concerning Yttrium processing technologies							D4.3
Main Yttrium producers							D4.1
WP5 - Substitution (WP Leader: KTN)							
NO DATA							
WP6 - Technology gaps/barriers and innovation pathways in Yttrium value chain (WP Leader: NTUA)							
Technology gaps/Barriers in Yttrium value chain inhibiting their extraction from primary resources	<i>Lack of efficient methods that allow an effective extraction, availability of primary resources for industrial applications</i>		Reports, articles	Chalmers, Amphos21	Identification of technological gaps on primary resources	No IPR issues	D6.1
Technology gaps/barriers in Yttrium value chain inhibiting their extraction from secondary resources	<i>Lack of efficient methods that allow an effective extraction, availability of secondary resources for industrial applications</i>		Reports, articles	Amphos21, Chalmers	Identification of technological gaps on secondary resources	No IPR issues	D6.2
	<i>Review on existing LCA studies on extraction from secondary resources</i>			ENEA			D6.2
Technology gaps/Barriers in Yttrium value chain hindering substitution solutions in industrial applications							D6.3
Innovative pathways to supply the future EU Yttrium demand, unlocking the technology gaps/barriers							D6.4

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WP7 - Policy Issues (WP Leader: MINPOL)							
Standards, policies, strategies and regulatory frameworks in EU relevant to Yttrium	<i>EU Critical Raw Materials list</i>	CRM Factsheets		SGU	Pan-EU policy framework/conflict minerals		D7.1 D7.2 D7.3
Policy gaps in EU related to Yttrium			National databases				D7.1 D7.2 D7.3
Policy recommendations for EU concerning Yttrium	<i>Cobalt Development Institute</i> (http://www.thecdi.com/institute)	ProMine, Minerals4EU		SGU	Pan-EU policy framework/conflict minerals		D7.4
WP8 - WEEE Issues (WP Leader: UNU)							
Mapping the Yttrium in WEEE products	<i>In converters of some white LEDs</i>			UNU	Mapping of CRM-related products	Public	D8.1
	<i>Project Valoplus (Fluorescent lamps), TVs</i>		Report	BRGM			D8.1
	<i>Phosphorescent powder of Cathode Ray tube</i>						D8.1
Mapping of technologies and EOL infrastructures for recycling of Yttrium	<i>No recycling, technologies available</i>	x		UNU	Relevance of recycling, mapping of technologies and EOL infrastructures for recycling of	Public	D8.1
	<i>Process recovery of rare earth elements from WEEE</i>		Literature survey	BRGM			D8.1
	<i>Hydrometallurgy for recovery/purification of Y from exhausted fluorescent lamps</i>			ENEA			D8.1
Financing of Yttrium recycling		x		UNU	Potential cost/benefit, financing of recycling if relevant		D8.1
				ECODOM	To be investigated		D8.1
Mapping of concentrations and accessibility of Yttrium	<i>Reasonable concentration in converters</i>	x		UNU	Mapping of concentrations and accessibility	Public	D8.1
				ECODOM	To be investigated		D8.1
Upgrade of regulations and standards	<i>CENELEC Standard on WEEE treatment Batteries Directive and WEEE Directive</i>	EN50625 series 2006/66/EC 2012/19/eu		ECODOM	Necessary upgrades of regulations and (treatment) standards in order to enable CRM recycling		D8.2

3. PRELIMINARY EXPLOITATION OF THE KNOWLEDGE SURVEY/MAPPING AND RECOMMENDATIONS

After a deep analysis of the results from knowledge survey/mapping, the knowledge which does not exist in SCRREEN consortium was identified:

METALS OR COMMODITIES	MISSING KNOWLEDGE IN SCRREEN CONSORTIUM
Borates	<ul style="list-style-type: none"> - Map of supply for EU from primary and secondary sources - Substitution - Technology gaps/barriers and innovation pathways in CRM value chain - Policy issues - WEEE issues
Chromium, Magnesite	<ul style="list-style-type: none"> - Policy issues - WEEE issues
Fluorspar	<ul style="list-style-type: none"> - Production - Technology gaps/barriers and innovation pathways in CRM value chain
Iridium, Osmium	<ul style="list-style-type: none"> - Technology gaps/barriers and innovation pathways in CRM value chain - WEEE issues
Magnesium, Rhodium, Ruthenium, Phosphate rock	<ul style="list-style-type: none"> - WEEE issues
Erbium, Lanthanum	<ul style="list-style-type: none"> - Substitution
Silicon metal	<ul style="list-style-type: none"> - Map of supply for EU from primary and secondary sources - Policy issues

This missing knowledge (if existing) would have to be acquired from external sources.

The majority of the data are non-structured data, being available few databases, and some of them are confidential.

4. CONCLUSIONS

A deep and extensive exercise of knowledge identification and measurement has been carried out as the first step in knowledge management within SCRREEN. The procedure that has been followed has required a strong cooperation between the Knowledge Manager, all SCRREEN partners and the WP leaders.

The knowledge map presented herein can be considered as a preliminary map of all the knowledge to be generated during the project, and can be used by WP leaders as a guideline in organising duties and responsibilities related to information generation, retrieval and production. Also, this knowledge mapping can serve to stakeholders who desire to find partners with knowledge in a specific element.

Finally, this knowledge mapping will also be used when defining which applications will be built above the SCRREEN Central Diffusion Database (WP9 – Task T9.5) in order to bring the best possible updated information,

in an attractive and seamless way to our end users, from the Commission, to the public and private decision-makers, the academic world and the general public.

5. REFERENCES

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