FRAME is a critical look beyond the traditional CRM list taking into account the mineral expertise present in the project consortium and member states in order to impact generally on:

1. Develop an updated knowledge base based on existing and newly acquired minerals data;
2. Define the state-of-the-art with regards these elements and minerals;
3. Inventory possible secondary sources of these elements and minerals in historic mine sites;
4. Develop new products that make visualization of the data simpler, e.g. maps;
5. Develop new metallogenic models for CRM and strategic minerals and hence;
6. Develop predictability maps where possible;
7. Disseminate the knowledge base through a wide community of potential stakeholders, European, national and regional policy makers, exploration companies and the general public;
8. Significantly contribute towards a common spatial data platform and one-stop-shop for verified, quality minerals data.

Project structure – The FRAME consortium is made up of 19 Geological Surveys and the project contains 8 work packages, 5 of which are technical work packages(*)

WP1 – Project Coordination

WP2 – Communication, dissemination and Exploitation. Objectives: To widely disseminate the project results during the duration of the project, as well as to maximise its impacts after the end of the project.

(*)**WP3** – Critical and Strategic Raw Materials Map of Europe. Objectives: To develop metallogenic research and models at regional and deposit scales as well as prospectivity maps, with special attention to strategic and critical minerals in support of more efficient exploration and mining.

(*)**WP4** – Critical Raw Materials in phosphate deposits, and associated black shales. Objectives: Assessing the economic potential of igneous and sedimentary phosphate deposits and their host black shales in Europe, especially regarding their Critical Raw Materials content.

(*)**WP5** – Energy Critical Elements. Objectives: Will research, generate and compile data on the occurrence and production of the "Battery Raw Materials" or "energy critical elements" to provide a better and more accurate basis for exploration and exploitation, land use management, and to provide high quality mineral intelligence data to the European data portals.

(*)**WP6** – Conflict free Nb-Ta for the EU. Objectives: Survey of the pan-European distribution of the conflict metals Nb-Ta and also enhance their exploration interest and potential in order to produce them ethically and indigenous to the Community.

(*)**WP7** – Historical mining sites revisited. Objectives: will contribute to better understanding of the metallogeny and ore prospectivity of EUs secondary CRMs resources on land in previously worked areas.

WP8 – Link to Information Platform.

Relation to existing programmes and projects - European projects including the CRM scope are M4EU, EuRare, ProSUM, ProMine and SCRREEN. An important output from the M4EU project is the European minerals knowledge data platform (EUMKDP) and the Minerals Yearbook. The completed (2017) ProSUM project delivered the EU Urban Mine Knowledge Data Platform (EU-UMKDP), which also included mining wastes. There are also national projects going on targeting the ore potential of CRM at country level. EuRare has compiled an overview of REE metallogenetic belts in Europe. However, no pan-European map of major metallogenic provinces for a suite of SRM and CRM has been published.

Additionally, FRAME supports Europe's Raw Materials Policy and Strategy and is in line with the Raw Materials Initiative (RMI) and in particular Pillar 2 Sustainable supply of raw materials from EU sources; COM(2008) 699 final; COM(2011) 25 final. It complements the Strategic Implementation Plan (SIP) of the European Innovation Platform on Raw Materials by supporting the three Priority Areas, in particular Access to Mineral Potential in the EU. FRAME also adds to the Strategic Action Plan for Batteries COM(2018)293 final and assists the achievement of the UN's Sustainable Development Goals and UNECE's framework classification for resources.

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FRAME

FORECASTING AND ASSESSING EUROPE'S STRATEGIC RAW MATERIALS NEEDS

Forecasting and Assessing Europe's Strategic Raw Materials Needs

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Background – As a result of Europe's concerns with decarbonising the circular economy and striving towards e-mobility there is an inevitably growing and accelerating consumption of mineral raw materials. Presently the question whether supply to meet these demands is adequate or not cannot be answered with any certainty, as secure supply is a matter of knowing the resources and the ability to exploit them with respect to sustainability.

We recognise that non-energy minerals underpin our modern economy and society as a whole. They are essential for maintaining supply chains, manufacturing and renewable ("green") energy supply. Most of the environmental technologies and applications (e.g. aero generators, photovoltaic cells, electric and hybrid vehicles) allowing energy production from renewable resources use, the so called, high-tech metals [e.g. Rare Earth Elements (REE), Platinum Group Elements (PGE), niobium, lithium, cobalt, indium, gallium, vanadium, tellurium, selenium] that are derived or refined from minerals, which Europe is strongly import dependent on.

The high import dependence of strategic (STR) and critical raw materials (CRM) has a serious impact on the sustainability of the EU manufacturing industry. This can only be solved by more intense and advanced exploration for new mineral deposits on land and the marine environment. Seafloor mineral resources receive growing European interest with respect to the exploration potential of REE, cobalt, selenium, tellurium and other high-tech metals.

Many critical minerals and metals may be collected through recycling of mining related waste materials and end-of-life (EOL) products. However, even with the small but important contribution from recycling to secure efficient resource supply, it will still be necessary to extract primary mineral deposits. Therefore, there is a need to focus on applying new deep exploration and mining technologies, turning low- grade ores into profitable resources and reducing generation of mining wastes and large tailings by converting them to exploitable resources, reducing the environmental footprint and land-use challenges, and with a positive social impact.

As well as the dependence on extra-EU supply concerns, the production of many raw materials is reliant on a few countries. This

Production concentration of critical raw mineral materials

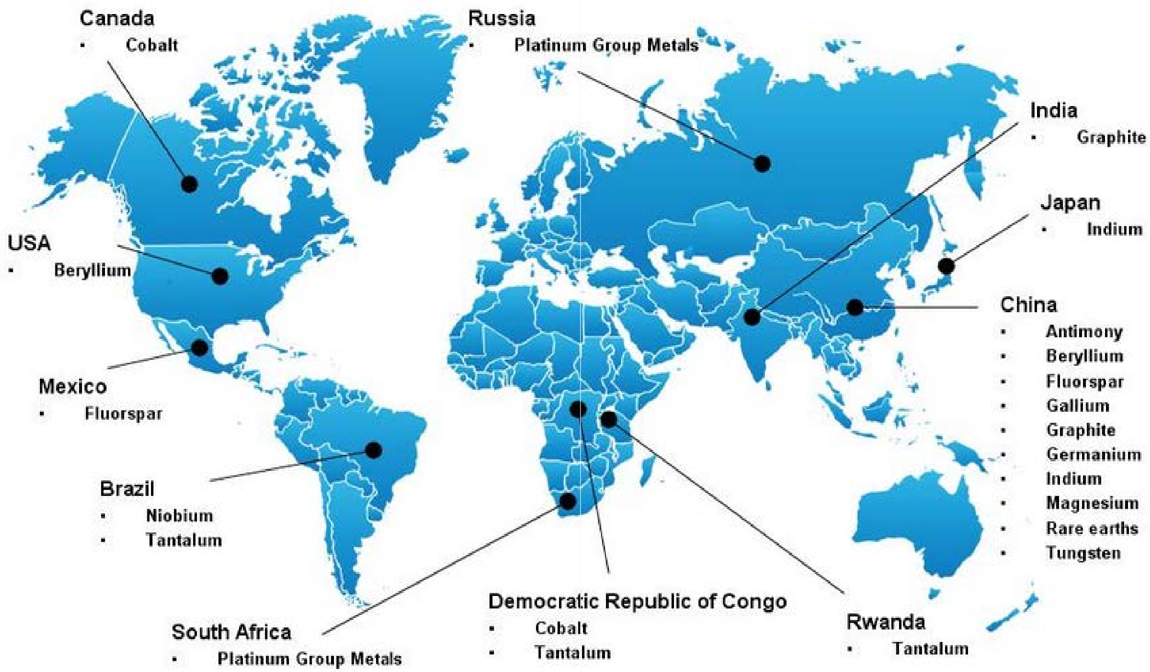

Fig. 1 – Global Production Sources of EU Critical Raw Materials (EU Press release Memo, 2013; http://europa.eu/rapid/press-release_MEMO-13-92_en.htm)

concentration of supply also poses concern as these few countries dominate supply of individual or several materials, e.g. Brazil (niobium), USA (beryllium), South Africa (platinum), Democratic Republic Congo (cobalt) and China (REE, antimony, magnesium, and tungsten). Twenty countries are the largest suppliers of the CRM contributing with 90% of supply. All major suppliers of the individual critical raw materials fall within this group of twenty countries (Fig. 1).

Aims and objectives - Unlike "more common metals" such as copper, zinc, lead and iron, many CRM do not form the main commodity (-ies) produced from operating mines, but are instead recovered as by-products ('companion metals') of the primary metal/mineral at some stage during processing. Europe has a rich and diverse mineral endowment including CRM, and a map showing the distribution of selected CRM deposits of Europe, based on the ProMine database was published by EGS's Mineral Resources Expert Group during 2016 and an updated version base on the new CRM list was delivered in December 2017. Despite these efforts, there is still need for a more comprehensive pan-European identification and compilation of mineral potential and metallogenic areas of CRM. Such metallogenic areas can be defined by the presence of mineral occurrences and deposits, past and active mines, previous and ongoing exploration activities, favorable bedrock geology, geophysical signatures, geochemistry and predictive/prospectivity mapping.