Establishing the European Geological Surveys Research Area to deliver a Geological Service for Europe

Technical review report for project FRAME

This report is part of a project that has received funding by the European Union's Horizon 2020 research and innovation programme under grant agreement number 731166.

INTRODUCTION

Technical review report is part of GeoERA's Monitoring and evaluation process for co-funded projects (*hereinafter: project*). The aim of a technical review is to assess the work carried out under the project over a certain period and provide recommendations. Such technical review evaluates the project reports and deliverables, the proper use of resources, the management of the project and the expected impact.

Technical review report consists of four sections, each representing one level of monitoring and/or evaluation of the project:

Level	Monitor / Reviewer	Input	Aim
1 – Monitoring of progress indicators	Monitoring and reporting officer (GeoZS)	MPPR* FPPR**	Monitoring of the effectiveness of implementation of selected projects with respect to finance, time and administration.
2 – Scientific review	Reviewers (GeoZS)	Submitted deliverables MPPR FPPR	Quality review of the deliverables and review of achieving scientific and professional goals.
3 – Review of the theme progress	Theme coordinators	MPPR FPPR	Review of achieving theme objectives.
4 – GeoERA Progress evaluation	Stakeholder Council member(s)	Sections 1 and 2 of this report Review meetings	Overall project progress and general recommendations.

*MPPR = Midterm Project Progress Report (see PI doc no 2)
**FPPR = Final Project Progress Report (see PI doc no 2)

Monitoring and evaluation process:

M0 = End of reporting period
M1 = Submitted (Final) Project progress Report (MPPR / FPPR)
M2 = 1 – Monitoring & 2 – Evaluation
M3 = 3 – Evaluation of the theme progress
M3 = (Final) Review Meeting & 4 – Progress evaluation

Each project will be reviewed twice: for first project period M1-M18 – Technical review report, and second project period M19-M36 – Final review report.
Technical review report is based on Horizon 2020 templates but adopted to GeoERA needs. Technical reviews of projects shall be carried out on a confidential basis.

GENERAL INFORMATION

ERA-NET Cofund Grant Agreement:	731166
ERA-NET Cofund acronym:	GeoERA
Call identifier:	H2020-LCE-2016-2017/H2020-LCE-2016-ERA
Project full title:	Forecasting and Assessing Europe's Strategic Raw Materials needs
Project acronym:	FRAME
Project reference number:	GeoE.171.010
Project topic:	Raw Materials
Project specific topic:	RM4-Forecasting and assessing Europe's Strategic Raw Materials needs.
Lead partner:	LNEG Laboratorio Nacional de Energia e Geologia I.P. (The National Laboratory of Energy and Geology)
Project website:	http://geoera.eu/projects/frame/; http://www.frame.lneg.pt/

☒ Technical review report

☐ Final review report

Period covered	01/07/2018 – 31/12/2019
Review meeting date	10.02.2020

Contributor:	Role:	Approved on:
Barbara Simić	Monitoring and reporting officer	01.03.2020
Maja Ilić	Monitoring and reporting officer	27.02.2020
Emil Pučko	Scientific Reviewer	04.03.2020
Jasna Šinigoj	Scientific Reviewer	11.03.2020
Matija Krivic	Scientific Reviewer	10.03.2020
Antje Wittenberg	Theme coordinator	12.03.2020
Thomas Crafford	Stakeholder Council member	NA
Andree Bolduc	Stakeholder Council member	26.03.2020

1 LEVEL 1 – MONITORING OF PROGRESS INDICATORS

In this section the project is monitored "remotely" on the basis of the respective reports. This part is filled in by Monitoring and reporting officer with aim to monitor the effectiveness of implementation of the selected projects with respect to finance, time and administration, based on submited MPPR and FPPR.

	Yes	Partially (comment needed)	No
PROJECT MANAGEMENT			
Has the MPPR / FPPR report been submitted on time?	☒		☐
Have there been any changes in project partnership?	☒	See comment no.1	☐
Has the project management been performed as required?	☒		☐
Has the collaboration between partners been effective?	☒		☐
Do you identify evidence of underperforming partners, lack of commitment or change of interest of any partners?	☐ (see comment)		☒
DELIVERABLES and MILESTONES			
Have the planned deliverables for the period been submitted on time according to timeline in Project Agreement?	☐	See comment no.2	☒
Have the planned deliverables for the period been completed (from MPPR / FPPR, sheet 4)	☐		☒
Have any changes to deliverables occurred (type/ dissemination level)? (from MPPR / FPPR, sheet 4 and 5)	☒	See comment no.3	☐
Have planned milestones been achieved for the reporting period? (from MPPR / FPPR, sheet 4)	☒		☐
Have the project partnership identify any difficulties achieving any of the deliverables / milestones?	☐		☒
DEVIATIONS (from MPPR / FPPR, sheet 5)			
Has the project partnership identify any deviations that will not affect projects outputs?	☒		☐
Have any deviations occur on the project, with impact on project outputs?	☐		☒
In case of deviations, have the project adopted corrective measures?	☒		☐
DISSEMINATION, COMMUNICATION			
Has the project adopted its dissemination plan?	☒		☐

Have the planned dissemination activities been completed for the reporting period? (from MPPR / FPPR, sheet 6)	☒		☐
Have the partners' disseminated project results and information adequately?	☒		☐
Is the project following dissemination plan?	☒		☐
Is the project interacting in a satisfactory manner with other GeoERA projects?	☒		☐
Is the project interacting in a satisfactory manner with national/international bodies?	☐	NA	☐

FINANCE			
To the best of your estimate, have the resources used been utilised for achieving the project? (according to MPPR / FPPR, sheet 9)	☒		☐
To the best of your estimate, have the resources used been in a manner consisted with the principle of economy, efficiency and effectiveness?*	☒		☐
Are there any major deviations in the budget consumptions from the financial plan? (zero consumption in M18; deviation from plan exceeding 20% in M36)	☐		☒
Are there any major deviations in the Person - Months consumptions from the plan? (zero consumption in M18; deviation from plan exceeding 20% in M36)	☐		☒
Are any budget modifications for the project needed? (from MPPR / FPPR, sheet 5)	☐		☒

***The principles of economy, efficiency and effectiveness**: refers to the standard of "good housekeeping" in spending public money effectively. Economy can be understood as minimising the costs of resources used for an activity (input), having regard to the appropriate quality and can be linked to efficiency, which is the relationship between the outputs and the resources used to produce them. Effectiveness is concerned with measuring the extent to which the objectives have been achieved and the relationship between the intended impact and the actual impact of an activity. Cost effectiveness means the relationship between project costs and outcomes, expressed as costs per unit of outcome achieved.

Comments (highlighting the project progress) / deviations / recommendations:

Comment no.1: In March 2019 project partner Institute of Geology and Mineral Exploration IGME-Gr changed its name to Hellenic Survey of Geology and Mineral Exploration H.S.G.M.E. The change had no impact on project implementation.
Comment no.2: In the first reporting period 17 deliverables were due:
10 deliverables were submitted in time
2 deliverables were submitted with eligible delay (amendment 1)
4 deliverables were submitted with eligible delay (amendment 2)
1 deliverble is delayed into the second reporting period (amendment 2)
1 deliverble is advanced into the first reporting period (amendment 2)
Comment no.3: Changes to deliverables:
D2.2: postponed from M1 → M6

D1.1: postponed from M3 → M5
D1.2: postponed from M3 → M5
D1.3: postponed from M3 → M5
D4.1: postponed from M6 → M9
D8.1: postponed from M6 → M14
D8.2: postponed from M12 → M24
D2.4: advanced from M18 → M16
D2.3: advanced from M36 → M6
The changes have no impact on the project outputs.

Project FRAME handles the Critical Raw Materials in a follow up of the EU Commission's concerns regarding the sustainable sourcing of crucial raw materials to industrialised Europe. The project builds on finalized projects SCREEN and ORAMA.
In the first reporting period project achieved most scientific deliverables on time, only deliverable D8.2 is postponed to second reporting period.
The project has adopted the communication and dissemination plan. In this reporting period the consortia reached more than 42.000 people, which is more than average of other GeoERA projects.
Overall financial consumption at the end of first reporting period is 50 %, the project is well on track with its activities.
Project management structure is well defined and efficient. No challenges in achieving project outcomes are recognized, the project lead provides good support to partners with implementation of project activities.

Recommendation to the project is to:

- Remind project partners, who may not be experienced in European funds, to use the support provided to the project by the GeoZS Monitoring team and get familiar with the rules and obligations that these funds require.

Overall assessment of the project:

☐ 5 - **Overachiever** (the project has achieved all objectives and goals for the period and has even exceeded expectations)

☒ 4 - **Excellent progress** (the project has fully achieved its objectives and goals for the period)

☐ 3 - **Good progress** (the project has achieved most of its objectives and goals for the period with relatively minor deviations)

☐ 2 - **Acceptable progress** (the project has achieved some of its objectives; however corrective action will be required)

☐ 1 - **Unsatisfactory progress** (the project has failed to achieve critical objectives and/or is not at all on schedule)

Summary of dissemination activities (detailed activities are annexed to this report):

Activity	Target audience	Number of people reached
Publications	Scientific community	<100
Publications	General public	>3.400
Events	EU institution	>30
Events	Policy makers	>2.200
Events	Scientific community	>300
Events	Other	>25.000
Meetings	EU institution	100-130
Meetings	Scientific community	80-130
Media	EU institution	>1.000
Media	Media	>150
Media	General public	>10.000
		~42.440

Are the dissemination activities adequate? (link to GeoERA WP5)

☐ 5 - **Overachieved** (the projects dissemination activities have exceeded expectations)

☒ 4 - **Excellent** (the projects dissemination activities have fully achieved its expectations)

☐ 3 - **Good** (the projects dissemination activities are adequate; however, some additional activities are needed)

☐ 2 - **Acceptable** (the projects dissemination activities need corrective actions; additional activities are needed)

☐ 1 - **Unsatisfactory** (the project has failed to disseminate)

Cummulative financial statement:

	Person months	Total eligible costs	Reimbursement rate	GeoERA contribution	In-kind contribution
Plan	421,90	3.151.935	29,7%	932.472	2.219,463
1st period consumption	191,62	1.119.042	29,7%	332.355	786.687
2nd period consumtion					

2 LEVEL 2 – SCIENTIFIC REVIEW

In this section the project is reviewed ”remotely” on the basis of the respective reports. This part is filled in by reviewer with aim to review the quality of the deliverables and review of achieving scientific and professional goals. Scientific review is based on submitted deliverables and reported Impact statement in MPPR/FPPR.

Impact statement (from MPPR / FPPR, sheet 8):

FRAME and the objectives were presented in several fora and there has been a lot of interest in the results achieved so far. Work is steadily progressing according to the FRAME schedule and everything is gearing up for a successful project with new and innovative results that are already under the watch of JRC and DG GROW. Given the expertise, enthusiasm and dedication of the participating consortium and the link to EGS members through MREG, FRAME is on track to deliver what it has promised in the project proposal.

Expected impact (from Project Agreement):

The EU have deemed critical raw materials a core topic and that shows from the work continuously carried out and funded, e.g. EIP on Raw Materials, CRM list, ERECON, M4EU, EuRare, ProSUM, ProMine and SCRREEN. Additionally, geopolitical events make the chosen elements vary and some of the elements not initially contemplated as critical may become strategic in nature. Their longevity on either of these “lists” or “labels” is a constant analysis of several factors at a particular point in time. The FRAME Consortium is continually working to update and improve the concept and data used in those EU programmes. An important output from the M4EU project is European Union Raw Materials Knowledge Base (EURMKB), and the Minerals Yearbook. The ProSUM project which has just finished at year end 2017 delivered the EU Urban Mine Knowledge Data Platform (EU-UMKDP), including also mining wastes. There are also national projects going on targeting the ore potential of CRMs at country level. EuRare has compiled an overview of REE metallogenetic belts in Europe. The European Commission[1]has already acknowledge SRM metallogenetic knowledge is crucial to a wide range of societal issues, including sustainability in the area of energy, minerals, water)EIP Raw Materials Strategic Implementation Plan), environmental monitoring, health and safety of citizens, and the development of secure infrastructure (natural hazards). The mineral resources sector is the source of a significant proportion of CRM on which the society depends on. It supports regional communities, creates employment, provides facilities and enhances services, including health, education and welfare, through its contribution to local, regional and national economies. Access to STR and CRM is essential to industrial and social development and economic growth and wellbeing of Europe. Europe’s geology favours the formation of exploitable ore deposits for primary sourcing of many CRM and the project will

highlight regions with greatest potential and thereby generate predictive targets and increase the exploration investments on best quality prospects. This will make a key action concerning the improvement of the pan-European critical minerals deposit and mineral-based waste database, ensuring that all available European data are current and have been checked for quality and accuracy at the national level, and to make them accessible in a seamless way to all users helping business and other stakeholders to optimise their investment. RM4's FRAME (Forecasting and assessing Europe's Strategic Raw Materials needs) 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 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 shareholders, 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. The main impacts already referred to in the Scientific Scope of the Call are reinforced by specific impacts of project FRAME - Forecasting and assessing Europe's Strategic Raw Materials needs:
• Continuously reinforced synergy at international level and reduced fragmentation of raw materials research and associated innovation efforts across Europe facilitating a more efficient use of natural resources, minimizing waste and improving recycling; o WP 2 and WP 3 will facilitate the generation of a holistic and common view for Europe of exploration knowledge and reserves of Strategic Raw Materials in Europe and internationally. o Better understand the metallogeny and ore prospectivity of EU's primary and secondary CRM and STR resources on land and the marine environment. This will improve the knowledge base and thereby increase the potential for secure and sustainable supply and also an expected impact in the minerals markets. o Dissemination of an innovative approach for the better use of STR through the EU stakeholders' network. o Promotion of better mining practices by promoting recycling and reusing of old tailings reevaluated for strategic commodities.
• Technical solutions helping the market to enhance the exploration phase, making it more efficient and less invasive, and optimising the performance and cost of deposit exploration (e.g. re-evaluating old mines); o Promote innovative geophysical techniques developed in projects such as SmartExploration throughout European mineral projects of strategic raw materials to reduce exploration investments and increase scarce but high value commodities. o Increasing knowledge of Strategic and Critical Raw Materials by-products of old and ongoing mines. FRAME will focus WP 2 and WP 3 in looking for new markets for the studding commodities in order to bring awareness of new uses for those commodities.
• Innovative solutions for mineral exploration and development (e.g. KDD techniques, including Data Mining, of newly created Knowledge Bases such as EU-RMKB), helping

business and other stakeholders to optimize their investment; o Modelling techniques and predictive mapping may be of high importance to develop decisions in exploration and further in exploitation will be tested in WP 4, WP 5 and WP 6 to increase exploration frontiers. o New analytical approaches may also open frontiers to new Strategic raw materials in known and unknown areas and Strategic commodities. o Develop new viable uses/markets for strategical raw materials such as lithium, passing from ceramic industry to energy industry. • Data and tools to facilitate the re-use and recycling of mineral-based waste; o WP 7 tasks and achievements will contribute to better understanding of the metallogeny and ore prospectivity of EUs secondary CRMs resources on land in previously worked areas. This will improve the CRM knowledge base and thereby increase the potential for secure and sustainable supply indigenous to the EU. o This will make a key action concerning the improvement of the pan-European critical minerals deposit and mineral-based waste database, ensuring that all available European data are current and have been checked for quality and accuracy at the national level, and to make them accessible in a seamless way to all users helping business and other stakeholders to optimise their investment. • Reduction of the import dependency of Europe's industries for critical raw materials o WP 4, WP 5 and WP 6 will extend reserves throughout an exploration effort of commodities such as phosphates, lithium, graphite, cobalt, niobium and tantalum in with the aim to reducing dependence from outside countries.

Evaluation of deliverables

Deliverables list status			
No.	Title	Status (Approve/ Reject)	Comments
D1.1	Description of work	Approve	/
D1.2	Ethical requirements (consent procedures, protection of personal data)	Approve	/
D1.3	Terms of reference (governance)	Approve	/
D1.4	Management report (submission of consolidated report to the European Commission)	Approve	/
D2.1	Communication strategy	Approve	/
D2.2	Visual identity (Logo, Templates, Project site, etc.)	Approve	See below
The project web site is working well and, in my opinion, provides sufficient information regarding the project. I have noticed that not all deliverables are uploaded on the webpage. The interactive map is working well, I would suggest adding a feature of mouse hover (when a user places a mouse over a certain symbol on the map, to display a small information window with some basic information).			
D2.4.1	Organization of events: Workshop	Approve	/
D2.5	Triannual newsletters_1st newsletter	Approve	/

D2.5	Triannual newsletters_2nd newsletter	Approve	See below
D2.5	Triannual newsletters_3rd newsletter	Approve	
D2.5	Triannual newsletters_4th newsletter	Approve	
Newsletters 2, 3 and 4 are loaded on the project web page http://www.frame.lneg.pt/#News/Events			
D3.1	Producing a report describing the methodology used for the identification and selection process of the CRM to be included in the metallogenetic map	Approve	/
D4.1	Overview of phosphate deposits and occurances in Europe under the form of a database and map(s)	Approve	/
D7.1	Identification of potential target areas for case studies	Approve	See below
Comprehensive report on potential target areas. Unfortunately, not much data exists from old drill cores, ideally a combined database of old cores (with assays) from EU countries would need to be establish (probably not in scope of this project). There is also no standardised methodology for data collection. A geophysical investigation on a larger scale (covering a number of EU countries) would also be very beneficial for identifying potential new deposits (probably also not in scope of this project).			
D7.2	Template for content of case studies to ensure consistent data collection in line with requirements of the GeoERA Information Platform	Approve	See below
The template is set up to collect relevant information. The one thing that is missing from the selection, and would in my opinion be useful, is to record if the mines are flooded or not flooded.			
D8.1	Deliver, in conjunction with the central GeoERA Information Platform a norm for data format and delivery	Approve	/
D8.2	Implement IT equipment infrastructure capable of interacting with internal system requirements to ensure delivery and increase the reliability of data and information to the EURMKB		Postponed to 2nd period
D2.3	Collection of Information materials (Leaflet, Website, Media kits etc.)	Approve	Advanced from 2nd period

Has the quality as a whole been achieved according the objectives? Has the project as a whole been making satisfactory progress?

☐ 5 - **Overachiever** (the project has achieved all objectives and goals for the period and has even exceeded expectations)

☒ 4 - **Excellent progress** (the project has fully achieved its objectives and goals for the period)

☐ 3 - **Good progress** (the project has achieved most of its objectives and goals for the period with relatively minor deviations)

☐ 2 - **Acceptable progress** (the project has achieved some of its objectives; however corrective action will be required)

☐ 1 - **Unsatisfactory progress** (the project has failed to achieve critical objectives and/or is not at all on schedule)

Comments (highlighting the project progress) / deviations / recommendations:

We dont have any additional recommendations or comments, and therefore we approve the scientific part of the FRAME project.

3 LEVEL 3 – REVIEW OF THE THEME PROGRESS

In this section the project is reviewed ”remotely” on the basis of the respective reports. This part is filled in by Theme coordinator with aim to review the achieved scientific goals in accordance with theme objectives, on the basis of Sheet 3 in MPPR / FPPR – Project contribution to GeoERA project.

Project contribution to GeoERA project (from MPPR / FPPR, sheet 3):

FRAME is one of the cornerstones of the GeoERA Raw Materials theme. This project handles the Critical Raw Materials (even bejond the current list) in relation to the EU Commission’s concerns regarding

- to ensure the sustainable sourcing of crucial raw materials to an industrialised Europe,
- the improved contribution to the Circular Economy (reducing waste and using secondary raw materials),
- the Battery Alliance and the vision to establish the full value chain of batteries within Europe
- to realise the decarbonisation of the economy, and thus,
- achievement of the UNSGD and the European measures required by the Green Deal.

FRAME is already taking future requirements into account. FRAME therefore also takes into account aspects of the sustainable procurement of the four minerals tin, tantalum, tungsten and gold (3TG), which will receive special attention with the entry into force of the "Conflict Minerals Regulation" ((EU) 2017/821 and supplement 2019/429) on January 1, 2021.

Method developments (technical and thematic), identification of new raw material potential, including historical mining areas and their unused heritage are therefore special and future-oriented focal points in FRAME.

The combination of all those knowledge improving activities supported by the overall philosophy of research that are of high importance for Europeas economy, and well-being of the society and the underpinning communication strategy and visibility through various media and events adds significantly to the main objective of GeoERA, which is to contribute to the optimal use and management of the subsurface. GeoERA that will aim to support 1) a more integrated and efficient management and 2) more responsible and publicly accepted, exploitation and use of the subsurface.

Theme objectives:

The objectives of the raw material theme are described by the social challenges defined by the European Union (Commission and Member States) and the UNSDG. In addition, the raw material and industry-specific strategies of the Member States and the EU (especially the Raw Materials Initiative, hereafter RMI) set the

benchmarks for the topic-specific objectives in GeoERA. Particularly the security and sustainability of mineral raw materials supply from EU domestic sources and other sources (primary and secondary).

FRAME focus is set on new and harmonised information on Critical and Strategic Raw Materials (SCRM) by the development of new data, interpretations, models and methods such as prospectively maps obtained from European sources and the related aspects on sustainable mining / responsible sourcing. Illustration of crucial mineral raw materials required to realise the Green Deal and to ensure the societal wealth is an important source of information to the society in large and decision makers/investors in particular.

FRAME has an important function among the GeoERA Raw Materials projects as it

- contributes to MINTELL4EU in relation to inventory aspects and quality check of data through new data; adds to e-Mineral Yearbook through forecast information and by providing scientific specialist knowledge on resources and reserves allowing plausibility checks of harmonised data sets in particular in those regions where no data providers are MINTELL4EU partners;
- it brings (with the focus on SCRM) scientific research on marine raw materials sources provided by MINDeSEA and on those of land based resources in line. That helps to identify areas with high potential for further successful prospection (and supports Europe's manufactures – by increasing access to a reliable supply of sustained produced raw materials).

Moreover, the new (geochemical and mineralogical) data on i.e. phosphate deposits and the connection of various compiled data allow better prospectivity forecasts and understanding of the genesis of SCRM enrichment processes. The RMI objective "the management of competing uses of the European surface and subsurface" outlined in the RMI is indirectly served by FRAME through its work on raw materials potential within the European territory.

FRAME has already established good relations among the scientific raw materials community within the European Geological Surveys, in particular through the integration of the EGS MREG and as an active partner for the various groups that support the EC's requirements for criticality assessments (e.g. SCRREEN, RMSG). The scientific impact is proved by several peer reviewed contributions either in the form of publ. papers or contributions to scientific conferences.

Therefore, FRAME serves the GeoERA theme objectives as well as the overall GeoERA objectives.

Has the project as a whole achieved the objectives and expected impact of the theme?

☐ 5 - **Overachiever** (the project has achieved greater impact on project theme and/or other themes than expected)

☒ 4 - **Excellent progress** (the project has fully achieved its objectives and goals towards the theme as expected)

☐ 3 - **Good progress** (the project has achieved most of its impact towards the theme for the period with relatively minor deviations)

☐ 2 - **Acceptable progress** (the project has minor impact; corrective action will be required)

☐ 1 - **Unsatisfactory progress** (the project has failed to achieve critical objectives and/or is not at all on schedule and/or has no impact on the theme; corrective actions are required)

Comments / deviations / recommendations:

Due to the nature of GeoERA the structure of the project is designed to align within the Geological Surveys of the Member States. Thus, FRAMErs have been able to response to DG GROW and JRCs sudden requests on a) SCRM, b) Europe's unused raw materials potential, and in particular regarding the c) EU Battery Alliance, the incoming regulations on d) Conflict Minerals Regulation and e) the EUs Criticality List. Hence, FRAME already lives the system of a common European Geological Knowledge Base and joint research focusing on European policy.

FRAME can be considered as a cornerstone within the GeoERA Raw Materials Theme and pan thematic as well as even its preliminary results made impact to EC works success and to potential investors (impact made at PDAC for example). This important function of FRAME is also reflected by the size of the project which effects the speed and communication within the project and but also towards the stakeholders. Precisely because the group does not start from zero, it is difficult to see how new entries (D 3.1) are integrated, especially by newcomers.

The final report (general story) of SCRM in Europe would benefit from an improved interaction between WPs, communication within the project itself and towards other GeoERA projects during the last phase of the project.

The experience of the project in terms of internal communication, responding quickly to societal needs and responding to inquiries from EU bodies will be important for any follow-up to a collaborative service by the European Geological Services. It is recommended to observe and report on these experiences.

FRAME has made convincing progress in setting up the "European Geological Surveys Research Area" (GeoERA objective) and has made good use of existing structures such

as the MREG (semi-annual meeting), raw material networks (e.g. EIT RawMaterials, ERA-MIN2, COST-EXTREM) CRM, SCRREEN) as well as results of previous projects.
Interim results that have already been used by stakeholders are hardly mentioned and the impacts are not described. The project specific communication is impressive, but might benefit from target group oriented focus and further support by GeoERA general communication strategy (e.g. via GeoERA LinkedIn, posts of FRAME Newsletters etc. on https://geoera.eu/projects/frame2/).

Improving cross-thematic interactions should be seriously in the last half of the project to identify further synergies and collaboration with added value. This type of cooperation requires a good understanding of the (topic-specific) database and can therefore only be achieved if largely harmonized data is available. Intensive exchange between the GeoERA projects, especially with MINTELL4EU, is still required here. The uniform presentation of the results (affects all projects) must also be optimized in the further course in order to avoid irritation and to ensure maximum user friendliness.

4 LEVEL 4 – GEOERA PROGRESS EVALUATION

In this section the project is reviewed on the Review meetings, where projects present their overall progress and achievements. This section relates to particular project, broader impact of GeoERA as a whole on policies will be covered at the Final Review meeting with questionnaire and interview with Evaluator.

Based on technical review summaries provided by Sections 1 – 3 of this report, and project presentation on the (Final) Review meeting:

Has the project as a whole been making satisfactory progress according to your own understanding and expectations of the GeoERA project?

☐ 5 - **Overachiever** (the project has exceeded expectations)
☒ 4 - **Excellent progress** (as expected)
☐ 3 - **Good progress** (minor recommendations given below)
☐ 2 - **Acceptable progress** (below expectations; minor corrective action will be required)
☐ 1 - **Unsatisfactory progress** (the project has failed; corrective actions are required)

Overall comments for the project (overall recommendations, modifications, corrective actions, or re-tuning the objectives to optimize the impact or keep up with the State of the Art, re-focusing, or a simple praise)

The FRAME project has already achieved some very impressive results. Of note, the interactive map is a tool that will certainly be very useful to all.
Regarding the number of dissemination activities and audience reached, I wish there was a representation from industry in the clientele. I understand FRAME was at PDAC 2020, and perhaps that is where industry was reached, but it would be good to show that European industry has also been reached. It may have thru some of the scientific events, but it doesn't show.
While the possibility of using AI in some of the workpackages appears difficult (harvesting of non-harmonized data), this might be an area to explore more, or to give an indication of what would be required for it to be feasible. AI may not provide answers to specific questions, but may help focus the research agenda.

Good job!

Stakeholder Mr Thomas Crafford participated at the review meeting and provided recommendations for the projects. Due to personal reasons, he wishes not to participate further in the GeoERA monitoring and evaluation process. The "date of approval" of this document is therefore NA.

Annex 1: Review meeting participants

Name	Role	Organisation
Tessa Witteman	GeoERA coordinator	Netherlands Organisation for Applied Scientific Research
Barbara Simić	Monitoring and Reporting Officer	Geological Survey of Slovenia
Emil Pučko	Scientific Officer	Geological Survey of Slovenia
Matija Krivic	Scientific Officer	Geological Survey of Slovenia
Antje Wittenberg	Raw Materials Theme Coordinator	Federal Institute for Geosciences and Natural Resources, Germany
Andrée Bolduc	Stakeholder council Member	Geological Survey of Canada
Tom Crafford	Stakeholder council Member	US Geological Survey
Daniel de Olivera	Project manager	The National Laboratory of Energy and Geology, Portugal
Maria João Ferreira	Project member	The National Laboratory of Energy and Geology, Portugal
Henrike Sievers	Project member	Federal Institute for Geosciences and Natural Resources, Germany
Håvard Gautneb	Project member	Geological Survey of Norway
Tuomo Törmänen	Project member	Geological Survey of Finland
Sophie Decrée	Project member	Geological Survey of Belgium

Annex 2: Communication and dissemination activities

Please select activity	Subcategory	Date	Target audience	Number of people reached	Short name of project participant	Author(s)	Link (if applicable)
MEDIA	OTHER	01.07.2018	GENERAL PUBLIC	>1000	WP2	Filipe Barreira/ MJ Fereira/ Daniel Oliveira-WP2	www.frame.lneg.pt
PUBLICATIONS	PROJECT SPECIFIC PUBLICATION (please specify: leaflet, poster, catalogue, …)	31.10.2018	GENERAL PUBLIC	>100	WP2	All	http://www.frame.lneg.pt/wp-content/uploads/2018/10/FRAME-Newsletter-Issue-1.pdf
PUBLICATIONS	PROJECT SPECIFIC PUBLICATION (please specify: leaflet, poster,	28.02.2019	GENERAL PUBLIC	>100	WP2	All	http://www.frame.lneg.pt/wp-content/uploads/2019/02/FRAME-Newsletter-Issue-2.pdf

	catalogue, …)						
PUBLICATIONS	**PROJECT SPECIFIC PUBLICATION (please specify: leaflet, poster, catalogue, …)**	30.06. 2019	GENERAL PUBLIC	>100	WP2	All	http://www.frame.lneg.pt/wp-content/ uploads/2019/06/FRAME-Newsletter-Issue-3.pdf
PUBLICATIONS	PROJECT SPECIFIC PUBLICATION (please specify: leaflet, poster, catalogue, …)	31.10. 2019	GENERAL PUBLIC	>100	WP2	All	http://www.frame.lneg.pt/wp-content/ uploads/2019/10/GeoERA_FRAME-Newsletter-Issue-4.pdf
PUBLICATIONS	SCIENTIFIC PUBLICATION	28.09. 2018	SCIENTIFIC COMMUNITY	Unknown	KT	Klemen Teran	https://www.mineral-revija.si/1875/ Geoloska-sluzba-za-Evropo-(GeoERA)?cctest&src=XNASLZAD
PUBLICATIONS	PROJECT SPECIFIC PUBLICATION (please		GENERAL PUBLIC	Unknown	WP5	Håvard Gautneb, Eric Gloaguen	http://www.frame.lneg.pt/#News/Events

	specify: leaflet, poster, catalogue, …)					and Tuomo Törmänen	
MEETINGS	**Meeting with international body**	17.10. 2018	EU INSTITUTION	50-80	WP1	Daniel de Oliveira	http://www.frame.lneg.pt/#News/Events
EVENTS	PITCH EVENT	12-16/11/ 2018	POLICY MAKERS	400-600	WP1	Daniel de Oliveira	http://www.frame.lneg.pt/#News/Events
EVENTS	CONFERENCE (tele-conference)	13.11. 2018	POLICY MAKERS	100	WP1	Daniel de Oliveira	file:///C:/Users/daniel.oliveira/ Downloads/4.%20Responsible%20supply %20of%20Raw%20Materials.pdf
PUBLICATIONS	NON-SCIENTIFIC PUBLICATION	14.12. 2018	GENERAL PUBLIC	>1000	HG	Håvard Gautneb	http://www.frame.lneg.pt/#News/Events
EVENTS	**EXHIBITION**	07.03. 2019	OTHER (customers)	>25000	DO	Daniel de Oliveira	http://www.frame.lneg.pt/#News/Events
MEDIA	ONLINE MEDIA	13.03. 2019	GENERAL PUBLIC	>1000	DO	Daniel de Oliveira	http://www.frame.lneg.pt/#News/Events
MEDIA	ONLINE MEDIA	07.05. 2019	GENERAL PUBLIC	>1000	DO	Daniel de Oliveira	http://www.frame.lneg.pt/#News/Events
MEETINGS	Meeting with other	13.05. 2019	SCIENTIFIC COMMUNITY	30-50	WP1	Daniel de Oliveira	http://www.frame.lneg.pt/#News/Events

	GeoERA projects						
MEETINGS	Meeting with other GeoERA projects	27.11. 2018	SCIENTIFIC COMMUNITY	30-50	WP1	Daniel de Oliveira	-
MEDIA	ONLINE MEDIA	10.07. 2019	GENERAL PUBLIC	>1000	WP4	Sophie Décree	http://www.frame.lneg.pt/#News/Events
MEDIA	ONLINE MEDIA	15.07. 2018	GENERAL PUBLIC	>1000	WP5	Eric Gloaguen, Janja Knežević, Håvard Gautneb and Tuomo Törmänen	http://www.frame.lneg.pt/#News/Events
MEDIA	ONLINE MEDIA	19.07. 2019	GENERAL PUBLIC	>1000	WP5	Håvard Gautneb	http://www.frame.lneg.pt/#News/Events
MEDIA	ONLINE MEDIA	23.07. 2019	GENERAL PUBLIC	>1000	WP4	Daniel de Oliveira	http://www.frame.lneg.pt/#News/Events
EVENTS	WORKSHOP	18.09. 2019	SCIENTIFIC COMMUNITY	30-50	WP8	Lídia Quental.Daniel de Oliveira	http://www.frame.lneg.pt/#News/Events
MEDIA	ONLINE MEDIA	01.10. 2019	GENERAL PUBLIC	>1000	WP5	Tuomo Törmänen, Håvard Gautneb,	http://www.frame.lneg.pt/#News/Events

						Eric Glouagen, Daniel de Oliveira	
MEETINGS	Meeting with other GeoERA projects	05.10. 2019	SCIENTIFIC COMMUNITY	20-30	WP1	Daniel de Oliveira	http://www.frame.lneg.pt/#News/Events
EVENTS	**MEETINGS**	22.11. 2019	POLICY MAKERS	>1000	WP1	Daniel de Oliveira	https://orama-h2020.eu/event/orama-final-event/
EVENTS	SEMINAR	23.10. 2019	SCIENTIFIC COMMUNITY	>200	WP1	Daniel de Oliveira	https://www.fct.unl.pt/sites/default/files/imagens/noticias/2019/10/programa_rmud_1.pdf
EVENTS	MEETINGS	18-22/11/ 2019	POLICY MAKERS	>500	WP1	Daniel de Oliveira	-
PUBLICATIONS	ABSTRACTS	27-30/08/ 2019	SCIENTIFIC COMMUNITY	Unknown	WP4	Sophie Décree et al	

PUBLICATIONS	ABSTRACTS	22-25/09/2019	SCIENTIFIC COMMUNITY	Unknown	WP7	Henrike Sievers et al	
PUBLICATIONS	ABSTRACTS	22-25/09/2019	SCIENTIFIC COMMUNITY	Unknown	All	Antje Wittenberg et al	
PUBLICATIONS	PROJECT SPECIFIC PUBLICATION (please specify: leaflet, poster, catalogue, …)	01.07.2018	GENERAL PUBLIC	>2000	WP1	Daniel de Oliveira	
MEDIA	OTHER	01.07.2018	GENERAL PUBLIC	>2000	WP1	Daniel de Oliveira	
MEETINGS	Meeting with international body	3-5/9/2019	EU INSTITUTION	>50	WP1	Daniel de Oliveira	

MEDIA	ONLINE MEDIA	01.07. 2018	MEDIA	>100	WP1/ WP2	Daniel Oliveira/Teresa Calabaça/ MJ Ferreira	https://www.facebook.com/ FRAME-Forecasting-and-Assessing-Europes-Strategic-Raw-Materials-Needs-253771581936142
MEDIA	ONLINE MEDIA	09.10. 2019	MEDIA	>50	WP1/ WP2	Daniel Oliveira/Teresa Calabaça/ MJ Ferreira	https://www.linkedin.com/company/frame-project/
PUBLICATIONS	SCIENTIFIC PUBLICATION	29.11. 2019	SCIENTIFIC COMMUNITY	unknown	WP5	Gorazd Žibret, Janja Knežević, Håvard Gautneb, Eric Gloaguen, Tuomo Törmänen, Klemen Teran	
MEDIA	ONLINE MEDIA	04.12. 2019	EU INSTITUTION	>1000	WP2	Daniel Oliveira/Teresa Calabaça/ MJ Ferreira	

EVENTS	SEMINAR	15.10. 2019	EU INSTITUTION	20-30	WP6	Susana Mª Timón	
MEDIA	ONLINE MEDIA	04.03. 2019	EU INSTITUTION	unknown	WP3	Martiya Sadeghi	https://www.sgu.se/en/about-sgu/ news/2019/march/sweden-important-when-the-eu-looks-for-sources-of-critical-raw-materials/
MEDIA	ONLINE MEDIA	?	EU INSTITUTION	unknown	WP7	Henrike Sievers	https://www.bgr.bund.de/DE/ Themen/Min_rohstoffe/Projekte/Rohstoffverfuegbarkeit-laufend/GeoERA.html
MEDIA	ONLINE MEDIA	01.07. 2018	EU INSTITUTION		WP2	Mj Ferreira/Teresa Calabaça	http://www.lneg.pt/iedt/projectos/613/
PUBLICATIONS	SCIENTIFIC PUBLICATION	10.11. 2019	SCIENTIFIC COMMUNITY	unknown	WP2/ WP3	Klemen Teran	http://prenit.geo-zs.si/geozs/PDF/PeriodicnePublikacije/bilten_ms_eng/Bilten_2019.pdf
PUBLICATIONS	SCIENTIFIC PUBLICATION	10.11. 2019	SCIENTIFIC COMMUNITY	>100	WP2	Klemen Teran	http://www.geo-zs.si/PDF/PeriodicnePublikacije/Bilten_2018.pdf
PUBLICATIONS	ABSTRACTS	29.11. 2019	SCIENTIFIC COMMUNITY	>50	WP2/ WP3/ WP5/ WP7	Klemen Teran, Gorazd Žibret, Eric Gloaguen, Janja	

						Knežević, Håvard Gautneb and Tuomo Törmänen	
EVENTS	CONFERENCE (tele-conference)	29.11. 2019	SCIENTIFIC COMMUNITY	>50	WP2/ WP3/ WP5/ WP7	Klemen Teran, Gorazd Žibret, Eric Gloaguen, Janja Knežević, Håvard Gautneb and Tuomo Törmänen	