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STRATEGIC RAW MATERIALS NEEDS

## DELIVERABLE D5.6

Provide INSPIRE-compliant harmonised data on deposits and prospects of natural graphite, lithium and cobalt.



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FORECASTING AND ASSESSING EUROPE'S  
STRATEGIC RAW MATERIALS NEEDS

## Contents

Deliverable D5.6.....	3
Disclaimer .....	4
Introduction .....	5
Material and methods, earlier reports, presentations and publications. ....	5
<b>Previous deliverables of work package 5.....</b>	<b>5</b>
<b>Presentations and publications.....</b>	<b>7</b>
<b>Exhibitions and trade shows.....</b>	<b>7</b>
<b>Web material .....</b>	<b>8</b>
Concluding remarks & acknowledgements.....	8

## Figures

Figure 1. Example of the interactive maps (Li, Co and graphite in Europe) made by FRAME.

Source:[EGDI\(geus.dk\)](http://EGDI(geus.dk)).....8





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FORECASTING AND ASSESSING EUROPE'S  
STRATEGIC RAW MATERIALS NEEDS

## Deliverable D5.6

Provide INSPIRE-compliant harmonized data on deposits and prospects of natural graphite, lithium and cobalt

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STRATEGIC RAW MATERIALS NEEDS

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STRATEGIC RAW MATERIALS NEEDS

## Introduction

D5.6 is the last deliverable of the work package 5 of the FRAME project. The two previous deliverables D5.4 and the D5.5 report the deliverable of the final work package data and products. All these three deliverables are related to products and data where the main results are presented on the web only.

*D5.6 with the title: Provide INSPIRE-compliant harmonised data on deposits and prospects of natural graphite, lithium and cobalt* aims to deliver the data collected by the work package, to the GeoEra consortium and to upload the raw data, as comma separated file (CSV) format, to the European Geological Data Infrastructure (EGDI). The CSV file can then be integrated and downloaded to be used individually or with other data sets and web applications. Data is harmonised according to INSPIRE data specifications as far as it is possible. Since the main product of this deliverable is the release of the raw data and its availability on the net, this deliverable will be very concise.

## Material and methods, earlier reports, presentations and publications.

It was evident from the start, due to the large differences in the participating organisations, and the content of national databases within the EU members states and associated countries, and the fact that large number of member states are not partner in the FRAME project, a uniform, completely INSPIRE compliant database would be difficult to compile. Collection of data was structured to be as simple as possible. Therefore, to answer to what was decided on the project plan, a description is given in the first milestone of the project (M5.1).

An excel-based questionnaire regarding occurrences of Li, graphite, and Co was sent out to project partners, as well as members of EuroGeoSurveys (EGS) and Mineral Resource Expert Group (MREG), requesting data on occurrence name, geographical location (country, lat-long coordinates) and also genetic type of the occurrence. Some individual researchers working on the same topic also supplied data to work package 5. The complexity of genetic types increases significantly from graphite, with a relatively few number of types to lithium and to cobalt, which occurs in a high number of different deposits types. It became obvious that it was not always possible to ascribe the genetic types to those present in the INSPIRE code list. Therefore additional genetic types have been suggested to be included in the INSPIRE Deposit Type code list (D3.4).

## Previous deliverables of work package 5

The following deliverables and milestone reports have been written during the project period. In addition to present deliverable these are:





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FORECASTING AND ASSESSING EUROPE'S  
STRATEGIC RAW MATERIALS NEEDS

M5.1: Establish an overview of known European prospects and deposits of natural graphite, hard rock lithium and cobalt as a working base for WP5. 30.10. 2018

D5.2: Develop and/or review models for the formation of natural graphite, lithium and cobalt in Europe. 10.04.2021

D5.3: Energy critical elements and minerals in Europe; occurrence, types, characteristics, formation, and future potential for European production (Part 1 report). 20.05.2021

D5.3: Energy critical elements and minerals in Europe; occurrence, types, characteristics, formation, and future potential for European production (Part 2 data). 20.05.2021

D5.4: Map of Cobalt, graphite, lithium deposits (including deposits where cobalt is a significant by product. 26.05.2021

D5.5: Relevant metallogenetic maps 26.05.2021

In addition, the data collected by work package 5 was integrated, and essential part of the following deliverables from other FRAME work packages:

D3.2: Providing a data platform, digital version of metallogenetic map and related description report highlighting the endowment and exploration potential of CRM in Europe. 24.10.2020

D3.3: Producing a predictivity map outlining the CRM exploration potential areas and the major prospective minerals belts. 15.11.2020

D3.4: Providing CRM data and intelligence to EURMKB (RM1) and the GeoERA information platform. 07.06.2021.





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FORECASTING AND ASSESSING EUROPE'S  
STRATEGIC RAW MATERIALS NEEDS

## Presentations and publications

G. Bertrand, B. Tourlière, E. Gloaguen, M. Sadeghi, H. Gautneb, T. Törmänen, D. De Oliveira 2020. Mineral Prospectivity Mapping for energy critical elements in Europe: the Cell Based Association approach. Mineral Exploration Symposium, 17-18 September 2020.

Daniel P. S. de Oliveira, Maria João Ferreira, Martiya Sadeghi, Nikolaos Arvanitidis, Guillaume Bertrand, Sophie Decrée, Håvard Gautneb, Eric Gloaguen, Tuomo Törmänen, Helge Reginiussen, Henrike Sievers, Lídia Quental, Antje Wittenberg. FRAMES's (Forecasting and Assessing Europe's Strategic Raw Materials Needs) innovative research in mineral raw materials on the eve of the EU's "Green Deal". GeoUtrecht 2020, 25 August 2020.

Daniel P. S. de Oliveira, Maria João Ferreira, Martiya Sadeghi, Nikolaos Arvanitidis, Sophie Decrée, Håvard Gautneb, Eric Gloaguen, Tuomo Törmänen, Helge Reginiussen, Lídia Quental, Antje Wittenberg. FRAMES's (Forecasting and Assessing Europe's Strategic Raw Materials Needs) contribution to the "European Green Deal". EGU General Assembly 2020.

Håvard Gautneb, Eric Gloaguen, and Tuomo Törmänen 2020. Lithium, Cobalt and Graphite occurrences in Europe, Results from GeoEra FRAME project WP5. EGU General Assembly 2020.

Håvard Gautneb, Janja Knežević, Eric Gloaguen, Jérémie Melleton, Blandine Gourcerol, Tuomo Törmänen 2019. Occurrences of energy critical elements; Lithium – Cobalt and Graphite in Europe, a preliminary overview. 15th Biennial SGA Meeting Glasgow, Scotland. August 27-30 2019.

M. Sadeghi, G. Bertrand, D.P.S. De Oliveira, N. Arvanitidis, S. Decrée, H. Gautneb, E. Gloaguen, T. Törmänen, H. Reginiussen, H. Sievers, L. Quental, M. João Ferreira and A. Wittenberg 2020. Prospectivity mapping of critical raw material at the continental scale- a part of the FRAME project. Mineral Exploration Symposium, 17-18 September 2020.

## Exhibitions and trade shows

Maps from work package 5 was displayed at the following trade shows:

Euromine Expo, Skellefteå, Sweden 2019 [Euro Mine Expo](#)

Prospectors & Developers Association of Canada, 2019, [Prospectors & Developers Association of Canada \(pdac.ca\)](#)







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FORECASTING AND ASSESSING EUROPE'S  
STRATEGIC RAW MATERIALS NEEDS

Prospectors & Developers Association of Canada, 2020, [Prospectors & Developers Association of Canada \(pdac.ca\)](https://pdac.ca)

## Web material

The maps and data collected and compiled by work package 5 can be found here

[EGDI \(geus.dk\)](https://geus.dk) and an example of such map is shown on figure 1 below.

A CSV file can be downloaded at the [EGDI Document Repository](#) under the open access license class: CC-BY-NC-SA. See [About CC Licenses - Creative Commons](#) for details about open access licenses.

## Concluding remarks & acknowledgements

The above maps and deliverables give the authors view, a representative overview of the potential for Lithium, cobalt and graphite in Europe. A next step would be to make more country specific studies to get grade and tonnage data more completely compiled or studies of deposits types with a common metallogenetic type. For further details we refer to the reporting in our earlier deliverables (D5.2 D.5.3)

The authors wish to thanks all our contributors and partners for their effort in supplying us with national data. In particularly we thank the FRAME project partners for the very fruitful sharing of information and dedicated personal work, which excellently shows that our merged work resulted in something much significant than the sum of the individual pieces would have alone.





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STRATEGIC RAW MATERIALS NEEDS

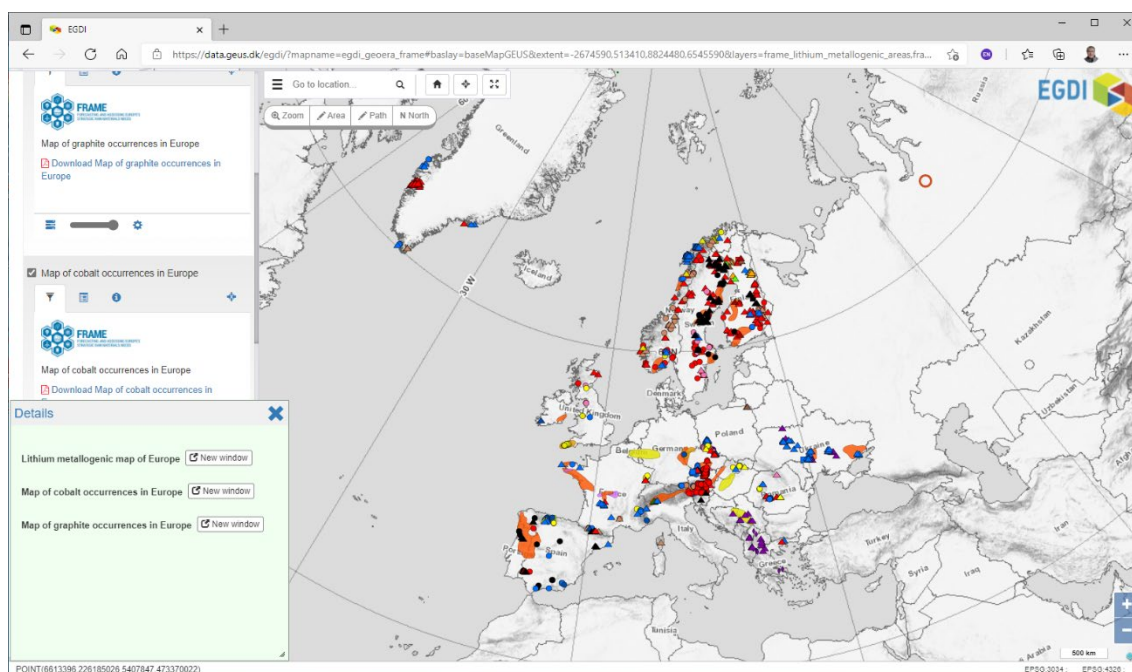


Figure 1. Example of the interactive maps (Li, Co and graphite in Europe) made by FRAME.  
Source: [EGDI \(geus.dk\)](https://data.geus.dk)

