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„Waste Management – GzO’19
Urban Mining”**

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EIT RawMaterials projekt "RESEERVE" – mineralni potencial Jugovzhodne Evrope

EIT RawMaterials "RESEERVE" project - mineral potential of the SEE region

ID 09

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Povzetek

Primarne in sekundarne mineralne surovine so strateškega pomena za sodobno družbo in za čim manjšo odvisnost Evrope od uvoza surovin. Pri tem je pomembna primerna organizacija podatkov o nahajališčih in mineralnih surovinah, zato je večina držav EU že del panevropske mreže za obveščanje o mineralnih surovinah. Dežele Zahodnega Balkana pa predstavljajo vrzel v tej mreži. Cilj projekta RESEERVE je enotni register harmoniziranih podatkov o mineralnih surovin držav Jugovzhodne Evrope: Srbije, Albanije, Bosne in Hercegovine, Makedonije, Črne Gore in Hrvaške, ki trenutno, v veliki večini, še niso vključene v obstoječe podatkovne platforme. Register primarnih in sekundarnih mineralnih surovin držav jugovzhodne Evrope bo predstavljal izhodišče za integracijo regije v panevropsko podatkovno mrežo in njeno približevanje skupnemu evropskemu trgu mineralnih surovin.

Ključne besede: mineralne surovine, register mineralnih surovin, države jugovzhodne evrope, pan-evropska podatkovna mreža.

Abstract

Primary and secondary mineral raw materials are of strategic importance for modern society and reliable harmonised data on European minerals are very important to reduce European dependency on minerals import from third countries. Therefore, most of EU countries are already a part of the pan-European Minerals Intelligence Network but West Balkan region represents a gap in this network. RESEERVE project aim is to map minerals and mineral deposits data of South-East Europe (SEE) countries: Serbia, Albania, Bosnia and Herzegovina, Croatia, FYRO Macedonia and Montenegro, that are mainly not yet included in the existing data platforms. The main project outcome is creation of SEE countries Mineral Register for primary and secondary minerals. The register will be a starting point to integrate the region into pan-European Minerals Intelligence Network and bring it closer to the common European minerals market.

Key words: mineral raw materials, mineral register, see countries, pan-european minerals intelligence network.

1. INTRODUCTION

EU is more and more aware of strategic importance of SEE countries inclusion into its activities in different areas. Final goal of this process has to be SEE countries EU membership. EU support and help on the region's progress towards EU is crucial. Slovenian institutions can play an important role in this process, because of the common past and its own EU projects activities.

Europe tries to reduce its mineral raw materials dependence on imports from other continents.

Political instability and human rights violations are common in these areas. This is the reason of growing Europe's awareness of strategical importance of raw materials self-supply. European Commission recognised mineral abundance of SEE as one of the most important regions for Europe's foreign sources dependency reduction. SEE is abundant with primary mineral resources as well as secondary mineral resources. The last ones are leftovers of mining and metallurgical processing. There are deposits of copper, lead, zinc, chrome, iron, nickel and antimony in SEE region. Explorations also take place in new locations - e.g. lithium deposit in Serbia.

Economical exploitation of secondary raw materials reduces many environmental problems, caused by mineral processing waste deposits in the region - from potential environmental risk and health hazard due to toxic emissions into environment, to danger of collapsing heap or retaining barriers and visual degradation of environment.

Primary and secondary mineral raw materials are of strategic importance for SEE as well as for EU. Most EU countries are already part of the pan European Minerals Intelligence Network which provides continental-level, consistent and organised mineral data information on primary and secondary mineral resources. SEE region represents a gap in this network. RESEERVE EIT RawMaterials project, financed by European Institute of Innovation and Technology (EIT), addresses this challenge by creating SEE countries Mineral Register. Project's consortium includes EIT RawMaterials project partners from EU countries and task partners from SEE region with Geological Survey of Slovenia as coordinator. Beside aforementioned, project will also integrate SEE region into pan-European Minerals Intelligence Network, increase SEE countries mineral resources management capacity, ensure sufficient flow of information on mineral resources for European industry to expand investments in the SEE region, create regional opportunities for start ups and SMEs and generate new jobs opportunities.

2. EIT RAWMATERIALS AND RC ADRIA'S ROLE IN APPROACHING SEE REGION TO EU RAWMATERIALS MARKET

Knowledge and innovation community (KIC) EIT RawMaterials, was established in 2014 by the European Institute of Innovation and Technology (EIT). EIT RawMaterials vision is the European Union where raw materials are a major strength. Its mission is to boost competitiveness, growth and attractiveness of the European raw materials sector via radical innovation and guided entrepreneurship. It is the largest and strongest consortium in the mineral raw materials sector worldwide and unites more than 120 European partners who come from more than 20 EU countries. They represent all three sides of the knowledge triangle: education, research and industry and collaborate on finding new, innovative solutions to secure the supplies and improve the raw materials sector all along its value chain – from extraction to processing, from recycling to reuse. With innovative technological solutions it strives to ensure as best as possible EU mineral raw materials self-sufficiency. EIT RawMaterials generates a significant impact on European competitiveness and employment by driving and fostering innovation and empowering students, entrepreneurs and education partners to act towards the circular economy. This results in the introduction of innovative and sustainable products, processes and services, as well as talented people that will deliver increased economic, environmental and social sustainability to European society.

Geological Survey of Slovenia is already, via knowledge and innovation community EIT RawMaterials, strongly connected to SEE region. We are just one of two Slovenian partners of this community and the only Slovenian »core partner«. As a member of EIT RawMaterials, Geological Survey of Slovenia represents raw materials link between EU and SEE region. We are partner of different EIT RawMaterials community projects and cofounder of Regional center (RC) Adria hub, which connects local mineral raw materials ecosystems with EIT RawMaterials community.

Founders of RC Adria are Geological Survey of Slovenia, Slovenian National Building and Civil Engineering Institute and Faculty of Mining, Geology and Petroleum Engineering, University of Zagreb. RC Adria Hub represents a place where mineral raw materials stakeholders from Slovenia and other SEE countries can receive information about EIT projects and activities funded by knowledge and innovation community EIT RawMaterials. It encourages networking, project ideas exchange and offers all other

necessary support to potential new partners of the EIT RawMaterials community. RC Adria represents informational EIT RawMaterials »one stop shop« about mineral resources management knowledge transfer for all regional stakeholders, businesses, education institutions, research organisations and local authorities. At the same time it connects local raw materials communities with their international EIT RawMaterials counterparts. RC Adria represents an excellent opportunity for all regional stakeholders to know better EIT RawMaterials community and to become its member at the end.

3. RESERVE PROJECT

Geological Survey of Slovenia, as member of EIT Raw Materials, became lead partner of RESEERVE project with goal of mapping the mineral resources of the six ESEE countries: Albania, Bosnia and Herzegovina, Croatia, FYRO Macedonia, Montenegro and Serbia. Most of them are currently not included in the existing data platforms for providing raw materials potentials data to interested stakeholders. The main project outcome is creation of the SEE region Mineral Register for primary and secondary mineral resources. The register will be a starting point to integrate the region into pan-European Minerals Intelligence Network and bring it closer to the common mineral market. The RESEERVE project will help to disseminate the knowledge and know how, to facilitate developing new markets for new technologies, to create opportunities for start ups and SMEs, to contribute to new job opportunities and to empower local authorities for better management of mineral resources. Project will be implemented step by step. First of all common SEE Mineral Register for primary and secondary mineral resources will be created. During project's lifetime up to two countries will be connected to the INSPIRE aligned network. After project's lifetime all SEE countries will be connected into the pan European Minerals Intelligence Network. Project will represent starting point for follow up projects, in which other ESEE countries (Slovakia, Czech Republic, Hungary, Romania and Bulgaria) will be included into pan-European Minerals Intelligence Network.

Beneficiaries of the RESEERVE project are:

- SEE countries, which increase their capacity for national mineral management,
- Potential investors into SEE region, for whom Mining Registry represents better opportunity to decide about their potential investment options,
- With utilization of RESEERVE project national events, community building within and between regions, creation of local ecosystems, as well as new education or business creation will be possible,
- Wider EU community will be provided with SEE Mineral register for primary and secondary mineral resources,
- RESEERVE project represents also opportunity for starting other projects, based on results of this project.

The project RESEERVE is based on important EU initiatives/ strategies. It is in line with Raw Materials Initiative meeting our critical needs for growth and jobs in Europe (Brussels, COM(2008)699) and its three pillars:

1. To ensure access to raw materials,
2. To foster sustainability supply of raw materials from European sources,
3. To boost resources efficiency.

The project's objectives are also aligned with the Europe 2020 Flagship Initiative on Resource Efficiency and the Roadmap to a Resource Efficient Europe, adopted in September 2011, as well as with the INSPIRE Directive (2007/2/EC) establishing an infrastructure for spatial information. The project's objectives (regarding secondary resources) represent a basis for future implementation of Article 20 of the Directive 2006/21/EC on the management of waste from extractive industries in EU candidate countries.

RESEERVE project consortium consists of 13 partners from 11 countries. Project coordinator is Geological Survey of Slovenia (Slovenia). Other partners are:

- DMT GmbH & Co KG (Germany),
- Faculty of Mining, Geology and Petroleum Engineering University of Zagreb (Croatia),
- National Technical University of Athens (Greece),

- Montanuniversitaet Leoben (Austria),
- French Geological Survey (France),
- Geological Survey of Denmark and Greenland (Denmark),
- Croatian Geological Survey (Croatia).

From SEE region following task partners are included:

- University of Belgrade, Faculty of Mining and Geology (Serbia),
- Geological Survey of the Republic of Srpska (Republic of Srpska),
- Geological Survey of the Federation of Bosnia and Herzegovina (Bosnia and Herzegovina),
- Geological Survey of Montenegro (Montenegro),
- Geological Survey of Albania (Albania).

Partners come from research, education and business. Among them 8 partners come from EU, 5 from EU candidate and potential candidate countries. Vast majority of them - 9 come from the SEE region. Research partners, represented by SEE national geological surveys, have task to capture, evaluate, store and provide national geo data (including on mineral resources) and they also manage the most relevant mineral datasets. Education and business partners contribute their needs, experience and knowledge, related to potential investments in primary and secondary mineral resources exploitation.

Geological Survey of Slovenia has already prepared tables with common attributes about primary and secondary raw materials, which will be completed by task partners. Bilateral meetings with majority of task partners have already taken place. At these meetings we together identified relevant mineral raw materials data providers and examined existing data quantity, quality, format and availability. Faculty of Mining, Geology and Petroleum Engineering University of Zagreb, as Community building work package leader analyses relevant SEE stakeholders associated with mineral raw materials and their needs and competences in SEE region. Evaluation of applicability of the primary mineral resources for use within resource assessment work package leader will compile documents and reports which are relevant for potential investors - mining and exploration companies. Primary mineral resources database structure will be evaluated towards compatibility with requirements of JORC and NI 43 101. By doing all aforementioned activities, current status of mineral raw materials sector in the region will be analysed and solid base for further activities will be established.

Based on the recognised quality, quantity and format of primary mineral raw materials data, existing data will be examined, publicly accessible data extracted and gaps in the mineral information from SEE region identified. In most countries of the region all mineral commodities are under State property, but in spite of that fact, some specific data are not public, therefore in that case, data aggregation process might be needed. It is expected that regarding to differences in: mineral wealth, level of exploration, level of data details and technical tools in use, the extent of data is supposed to be different for each particular task partner country. Therefore a comparison of datasets from involved SEE countries will be performed and mineral raw materials information validated. A common set of attributes will be established to ensure a balance between provided data on national level and these data are going to be put on the same denominator and common Mineral Register will be generated by Geological Survey of Slovenia.

Information about the mine and metallurgic waste sites in involved SEE countries will also be acquired. Not just in the region but also in other parts of the Europe secondary mineral resources have been relatively neglected due to massive primary mineral extraction. Therefore is expected that these data are relatively scarce and poorly organized. Very often, due to traditional technological processes, only one or two metals have been extracted from the polymetallic ore deposits. Thus, mine and metallurgic waste from ore extraction are still rich with valuable minerals. Due to the foreseen varying levels of accessible information details in the involved SEE countries, there is a strong likelihood that certain attribute data might be missing for some countries. Based on the data sets created, evaluation of mine and metallurgic waste as potential source of raw materials, will be performed. In order to predict their potential, expert knowledge of secondary and related primary resources will be combined. It is especially relevant in case of minor and critical metals that have not been previously analysed and recovered. Especially these elements will play an important role in turning mine and metallurgic waste into future resources.

Existing primary raw materials data will be transformed into INSPIRE compliant data. It is expected that the harmonisation will be feasible only in some of the involved SEE countries. For the rest of the countries it remains as post project activity. None of the task partner countries, with the exception of Croatia, have INSPIRE – aligned mineral data so far. Our goal is to connect one to two case study countries with primary resource data to EU Minerals Intelligence Network. The same it counts for secondary mineral resource data, to connect up to two countries into classification system (the future EU Urban Mining Knowledge Data Platform (EU UMKDP)).

At the same time SWOT/GAP analysis and business opportunities in the SEE region will be made. Potential of turning the identified primary and secondary resources into marketable products will be examined and roadmap of actions for valorising these findings created. At the beginning of the SWOT/GAP analysis current state of the mining sector in the SEE region will be recorded. Identified raw materials resources in previous activities will be, with the help of identified stakeholders, evaluated as business opportunities of the raw materials sector in the SEE region. Afterwards SWOT/Gap analysis for each of the SEE region countries will be performed and roadmap as a guideline for the exploitation of the identified business cases created. At country level it will be taken into account also industrial capacity, the innovation capacity, minerals production etc. SWOT analysis will be performed for the SEE region in order to categorise and indicate the Strengths, Weaknesses, Opportunities and Threats of the specific area in the raw materials sector. In addition, a Gap analysis will be performed for each one of the SEE region countries in terms of barriers and obstacles (legislative, regional, technological etc.) for the development of the raw materials sector in the SEE region. After that short, mid and long term roadmap of actions for the exploitation of mineral raw materials in the SEE region will be produced.

Project represents an excellent case study for providing methodology on how to gather and organise data from different sources, different countries, prepare them for harvesting into INSPIRE aligned pan-European Intelligence Network and by doing so to make them publicly accessible.

REFERENCES

- [1] Drakslar, et.al. 2018. Aktivnosti Geološkega zavoda Slovenije v Jugovzhodni Evropi in priložnosti slovenskega gospodarstva na področju mineralnih surovin.
- [2] Drakslar, et. al. 2018. Vključevanje Zahodnega Balkana v EU in aktivnosti Geološkega zavoda Slovenije na tem področju.
- [3] EIT RawMaterials, <https://eitrawmaterials.eu/>. GeoZS – EIT RM team. 2018. National Activities within EIT RawMaterials Community, Bulletin Mineral Resources in Slovenia.
- [4] Minerals4EU, <http://www.minerals4eu.eu/>.
- [5] Rokavec, at al. 2017, RESEERVE Project Proposal.
- [6] Rokavec, at al. 2018. Mineralni potencial Južne in Jugovzhodne Evrope - projekt RESEERVE, Mineral.
- [7] Rokavec et. al. 2018. Skupnost znanja in inovacij »KIC« EIT RawMaterials in aktivnosti GeoZS na tem področju. Geološki zavod Slovenije, Bilten mineralne surovine.