

BIOM**ORE**

An Alternative Mining Concept

A new mining concept for extraction
metals from deep ore deposits by
using biotechnology

D6.11

Report summarising capacity
buildings activities and results



EUROPEAN UNION

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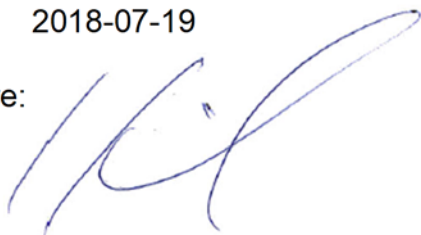
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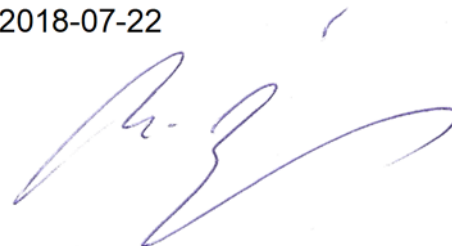


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Executive Summary

Based on the Communication Strategy (see D6.1), several activities were performed due to capacity building. There were 2 main objectives of the activities. First: Getting in touch with external specialists in order to link the BIOMore project work with the latest knowledge and contemporary technological standards. And second: Starting discussions and experience exchange with people involved in other professions, in order to sensitize them to biomining and in particular to the BIOMore approach. Latter is an important aspect due to grow social acceptance.

It is only natural that most of the activities in the field of capacity building are also activities of public relations, scientific exchange, publishing, etc. Therefore some of the aspects discussed in this deliverable were already mentioned in other deliverables of work package 6, e.g. D6.6 to D6.9.

However, with regards to capacity building there were activities in the field of participation in conferences and workshops (both as speaker and as audience joining discussions), presenting BIOMore facts at a booth on technology fairs and symposia, publishing articles and notes on websites, produce contributions for radio programs, video channels, or social media platforms. Roughly 50 activities are mentioned in the attached list, which cover the whole project duration.

In contrast to scientific publishing in journals that are very specific to a certain scientific sector, the performed capacity building activities focused on getting in touch with people that are not looking for biomining aspects themselves, but getting inspired for the BIOMore approach by lively discussions and understandable contributions. By this new channels and pathways of scientific knowledge exchange were created, which were very valuable to the progress of the BIOMore project.

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1. Strategy of Capacity Building

The activities done in the field of capacity building aimed for creating or intensifying contact to external experts, professions of other industrial sectors, as well as people from all social communities, in order to join available mental resources, to increase the input to the work on the BIOMore project and to strengthen the smartness of the project outcomes. Several types of contacting people and presenting BIOMore aspects to a widespread audience were pursued.

Most of the activities that were used for capacity building are also valuable in the meaning of public relations, dissemination of project results, press work etc. That is why some activities discussed in the present deliverable are also mentioned in other deliverables of work package 6.

2. Capacity Building Activities

During 3.5 years of project duration a lot of capacity building activities were done. In the following the different types of activities will be discussed separately. A chronological list of the activities can be found as Annex 1. Often capacity building is also done in various individual discussions and one-to-one talks, which cannot be documented as activities in the manner of this deliverable. However, such events contribute a sustainable effect, too.

2.1. Participation in Conferences as Presenter or Audience

Participating in conferences is a typical way for disseminating information about the project and getting in touch with other researchers and experts from industry. This was done by participation of BIOMore partners as speakers giving presentations on scientific aspects of the BIOMore project or on a general scientific topic and highlighting the BIOMore approach as one major aspect. Alternatively, BIOMore facts were presented by posters. However, attending a conference as audience also offers the opportunity of joining panel discussions and lively individual talks.

Biomore partners presented their topics in oral presentations at more than 10 conferences and showed posters at 3 conferences.

2.2. Booth at Fairs and Conferences

Partners of the BIOMore project attended technology fairs, job fairs as well as scientific congresses and conferences with an information booth. In some cases the booth was exclusively presenting the BIOMore project, in some cases the partners included presentation of BIOMore facts to a booth of their institution. In total the project was presented by an information booth at 10 events.



2.3. Workshops and Lectures

Compared to big conferences, starting contacts and exchanging experiences can be done more individually and intensively at small workshops or colloquia which are only accessible for invited researchers or members of a certain research network. Some of the workshops are held annually. By joining such events regularly, an intensive long-term cooperation can be founded. Giving a lecture at university with having PhD students and researchers in the audience may function in a similar way. In total the BIOMore project was presented at more than 10 events.

2.4. Long-term Knowledge Exchange

Some of the project partners do research work also in cooperation with other international research projects in a similar scientific field or join scientific networks. By this they generate an intensive and sustainable knowledge exchange. Often ideas for further research and future projects are gained. In this matter capacity building was done by involvement into 2 other international projects (SoS RARE and FAME) as well as 1 scientific network (BioFlex).

In addition commercial partners of the BIOMore project such as consulting companies cultivate contacts to relevant customers and business partners and have recurring meetings which are used for capacity building, too.

2.5. Non-scientific Publications

Beside scientific conferences and project cooperation, starting contact to people of different business fields and social communities is a relevant aspect of capacity building. That might intensify symbioses between non-related industry sectors and strengthen political and social acceptance. Due to this the BIOMore project was presented in several non-scientific or popular-scientific media. There was a feature series produced by KGHM and broadcasted by a polish radio channel as well as 2 series of popular-scientific articles at local news platforms in internet. Furthermore there were notes at the websites of the BIOMore partners and short articles on several web platforms.

The Saxon Ministry of Science and Art organized a popular-scientific poster exhibition in Dresden (Germany) which was about international research projects linked to Saxony and financed by European funding. It was named "Europäische Mittel und sächsische Ideen – Wir forschen für die Zukunft!" [European Grants and Saxon Ideas – we research for future!]. The BIOMore project was represented at this exhibition.

2.6. Multimedia

Multimedia was also used in regard with capacity building. The BIOMore project was represented by YouTube videos, a twitter channel and a social group at the career



platform LinkedIn. Further information about this can be found in deliverable D6.7. Furthermore the BIOMore website (www.biomore.info) was used to release actual information over the whole project duration.

2.7. BIOMore events

In addition to attending conferences and workshops by researchers of the BIOMore project, some events were organized by the project itself. In September 2017 there was a press conference about the field test in the KGHM mine Rudna. Even non-attending journalists and stakeholders got informed by a press release which was sent out afterwards. On the next day of the press conference there was the opportunity to visit the underground test field by an excursion to the Rudna mine.

At the end of the project all outcomes and results achieved in 3.5 years of research were presented at the “BIOMore Final Event” which was held in Brussels and contained a lecture workshop as well as a panel discussion.



Annex 1: List of capacity buildings activities



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Deliverable D6.11 – Annex 1

List of capacity buildings activities

(Date 31 July 2018)

	type and name of activity (workshop, lectures etc.)	description / title of contribution / outcomes	extra documents (e.g. curriculum)	number of participants	Date and location	Partner/WP
01	Workshop, Oral presentation / lecture, GTK's Stakeholder Seminar	Nurmi, P.A.: GTK's developing role in the minerals sector, Information about Proposal of BIOMore project	-	>20 *	24 Apr. 2014 Joensuu (Finland)	GTK, WP5
02	Conference, Oral presentation, Goldschmidt 2015, Session Convener	Schippers, A.: Geobiology and Geobiotechnology of Energy and Mineral Resources	Abstract	50	21 Aug. 2015 Prague (Czech Republic)	BGR, WP1
03	Conference, Oral presentation, MINEX Europe Forum	Kaija, J.: The leading European mineral information network structure - Minerals4EU	-	>50 *	17 – 18 Nov. 2015 Vienna (Austria)	GTK, WP5
04	Workshop, Oral presentation / lecture, 6th Workshop of the PhD Network on Reactive Transport Modeling and Experiments	Karimzadeh, L.; Lippmann-Pipke, J.: Porosity, particle velocity, and diffusion coefficient evolution due to kinetic mineral dissolution - application of iCP (interface COMSOL PHREEQC) for reactive transport modelling	-	>20 *	30.11.-01.12.2015 Jülich (Germany)	HZDR, WP2/3
05	Conference and Technology Fair, Information booth, the Prospectors and Developers Association of Canada (PDAC)	dissemination of BIOMore facts via printed flyers and brochures	-	> 500	05 – 08 Mar. 2016 Toronto (Canada)	CNRS, WP1/2/6/7

06	Conference, Information booth, Aachen International Mining Symposia (AIMS 2018),	dissemination of BIOMore facts via printed flyers and brochures	-	>50 *	18 - 19 May 2016 Aachen (Germany)	DMT, WP6
07	Workshop, Participation in Discussions, Innovationstag Mittelstand des BMWi (German ministry Trade and Industry)	dissemination of BIOMore facts in panel discussions and via communication with other participants	-	>50 *	02 Jun. 2016 Berlin (Germany)	DMT, WP6
08	Conference, Oral presentation, Annual Conference of the International Mine Water Association 2016 (IMWA 2016)	Lippmann-Pipke, J.; Karimzadeh, L.; Blanc, P.; Eichelbaum, S.; Schymura, S.; Rogó�, T.; Fr�hwirt, K.; Kulenkampff, J.: Reactive transport modelling based on velocity fields obtained on drill core scale	-	>50 *	14 Jul. 2016 Leipzig (Germany)	HZDR, WP2/3
09	Conference, Information Booth, Annual Conference of the International Mine Water Association 2016 (IMWA 2016)	dissemination of BIOMore facts via printed flyers and brochures	-	>50 *	14 Jul. 2016 Leipzig (Germany)	DMT, WP6, GUB, WP6/7
10	Job Fair at University, Information booth, career fair of Technical University Bergakademie Freiberg	dissemination of BIOMore facts via printed flyers and brochures	-	> 300	15 Jun. 2016 Freiberg (Germany)	GUB, WP6/7
11	Popular scientific journal printed article, Geo-Foorumi Magazine	BIOMore facts as part of a short article, printed magazine + online	-	-	since 2016 until today international available	GTK, WP5

12	Workshop, Oral presentation / lecture, Summer School in Biomining,	Schippers, A.: Geomicrobiology of Leaching Organisms	-	30	08 – 10 Aug. 2016	BGR, WP1
13	Workshop, Oral presentation / lecture, Biohydrometallurgy Workshop	Schippers, A.: Biomining	-	30	05 - 10 Sep. 2016 Loja (Equador)	BGR, WP1
14	Conference, Information booth, International Mineral Processing Congress (IMPC)	dissemination of BIOMore facts via printed flyers and brochures	-	> 50 *	11 – 14 Sep. 2016 Quebec (Canada)	CNRS, WP1/2/6/7
15	Conference, Information booth, DGGT Baugrundtagung	dissemination of BIOMore facts via printed flyers and brochures	-	> 100 *	15 Sep. 2016 Bielefeld (Germany)	GUB, WP6/7
16	Conference, Information booth, Meggener Rohstofftage (Raw Materials Day Meggen)	dissemination of BIOMore facts via printed flyers and brochures	-	> 100 *	16 Sep. 2016 Meggen (Germany)	DMT, WP6
17	Conference + Exhibition, Information booth, SIM (Société de l'industrie minérale)	dissemination of BIOMore facts via printed flyers and brochures	-	> 500	12 – 14 Oct. 2016 Grenoble (France)	CNRS, WP1/2/6/7
18	Conference, Information booth, 45. Geomechanical Kolloquium	dissemination of BIOMore facts via printed flyers and brochures	-	>50 *	11 Nov. 2016 Freiberg (Germany)	TUBAF, WP2
19	Website notice (web news), short report about field test, website of Kemakta Konsult AB	dissemination of BIOMore facts via website	-	-	since 2016 until today international available	KEMAKTA, WP5

20	Conference, Participation in Discussions, Raw Materials Week Brussels	dissemination of BIOMore facts in panel discussions and via communication with other participants	-	>50 *	28 Nov. 2016 – 02 Dec. 2016 and 06 – 10 Nov. 2017	GTK, WP5
21	Lecture at University, Oral presentation / lecture, Tampere University	Kinnunen, P.: bioprocesses in the mining industry	-	>20 *	13 Feb. 2017 Tampere (Finland)	VTT, WP3
22	Workshop, Oral presentation / lecture, 7th Workshop of the PhD Network on Reactive Transport Modeling and Experiments	Karimzadeh, L.; Kulenkampff, J.; Schymura, S.; Eichelbaum, S.; Lippmann-Pipke, J.: Our strategic approach: Reactive transport modelling based on parameters obtained from batch and GeoPET column experiments: example from leaching of a fractured drill core	-	>20 *	23 Feb. 2017 Leipzig (Germany)	HZDR, WP2/3
23	Closed Colloquium, Invited oral presentation, Kolloquium der Vereinigung der Aachener Bergakademiker	Schippers, A.: Biomining	-	50	31 Mar. 2017 Aachen (Germany)	BGR, WP1
24	Conference, Oral presentation, DBI-Fachforum GEO-Energie	Weber, F.: Continuum and discontinuum-based hydraulic fracturing simulations.	Publication of the presentation in conference proceeding	>50 *	10 May 2017 Berlin (Germany)	TUBAF, WP2
25	Conference, Oral presentation (Keynote), CSIRO ISR Symposium 2017	Hejny, H., Slabbert, W.: BIOMore – A new approach to in-situ recovery of metals using biotechnology	-	>50 *	01 Jun. 2017 Perth (Australia)	MINPOL, WP8 HATCH, WP4

26	Conference, Oral presentation, 12 th Freiberg-St. Petersburg Colloquium of Young Scientists	Yildizdag, K.: The results of 3D <i>in-situ</i> stress modelling.	Publication in conference proceedings	50	08 Jun. 2017 Freiberg (Germany)	TUBAF, WP2
27	Workshop, Scientific knowledge exchange, Microbial effects in leaching operations with focus on in-situ recovery (ISR), UIT Dresden 2017	presentation about the BIOMore project, experience exchange about in-situ recovery (ISR), geochemistry, kinetics and reactive transport	-	15	21 – 22 Sep. 2017 Dresden (Germany)	UIT, WP2
28	Conference, Oral presentation, International Biohydrometallurgy Symposium IBS 2017	Zhang, R. and Schippers, A.: Bioleaching of copper ore at elevated pressure by acidophilic microorganisms	Publication in conference proceedings	200	24 - 27 Sep. 2017 Freiberg (Germany)	BGR, WP1
29	Conference, Poster presentation, International Biohydrometallurgy Symposium IBS 2017	Ballerstedt, H., Schippers, A., Pakostova, E., Johnson, D.B.: Approaches to eliminate bacteria introduced during active bioleaching from the deep subsurface	Publication in conference proceedings	200	24 - 27 Sep. 2017 Freiberg (Germany)	BGR, WP1
30	Press Conference, Oral Presentation, KGHM Polska Miedz Head Office	dissemination of BIOMore facts via short presentations, printed flyers and brochures, discussions	press release	20	28 Sep. 2017 Rudna (Poland)	KGHM, WP3
31	Demonstration of field test facilities, field trip / excursion, underground field test, Rudna mine		-	10	29 Sep. 2017 Rudna (Poland)	KGHM, WP3

32	Local radio reporting series of podcasts Radio Wrocław	dissemination of BIOMore facts via several short features in a podcast series about innovative activities at KGHM mine	-	-	since 2017 until today international available	KGHM, WP3
33	Online journal / newspaper, series of popular scientific articles regionfan.pl	dissemination of BIOMore facts via several short articles within a report series about innovative activities at KGHM mine	-	-	since 2017 until today international available	KGHM, WP3
34	Website notice (web news), short report and video clip about field test, website of KGHM	dissemination of BIOMore facts via website and video clip	-	-	since 2017 until today international available	KGHM, WP3
35	Conference, Poster presentation, Reactive Transport in the Earth and Environmental Sciences in the 21st Century	Karimzadeh, L.; Schymura, S.; Kulenkampff, J.; Franke, K.; Eichelbaum, S.; Lippmann-Pipke, J.; Fischer, C.: Reactive transport modelling based on actual parameters obtained from GeoPET analysis of column experiments	-	>50 *	02 – 06 Oct. 2017 Amboise (France)	HZDR, WP2/3
36	Conference + Exhibition, Information booth, SIM (Société de l'industrie minérale)	dissemination of BIOMore facts via printed flyers and brochures	-	> 500	18 – 20 Oct. 2017 Metz (France)	CNRS, WP1/2/6/7
37	Conference, Oral presentation, International Society for Subsurface Microbiology Conference (ISSM 2017)	Zhang, R. and Schippers, A.: Bioleaching of copper ore at elevated pressure by acidophilic microorganisms	Abstract	150	06 – 10 Nov. 2017 Rotorua (New Zealand)	BGR, WP1

38	Workshop Oral presentation / lecture EASME Cluster event (HORIZON 2020)	dissemination of BIOMore facts via presentation and discussion with other researchers	-	>20 *	12 Dec. 2017 Brussels (Belgium)	MINPOL, WP8
39	Popular Science Exhibition, Poster Presentation, 'Europäische Mittel und sächsische Ideen – Wir forschen für die Zukunft!' [European Grants and Saxon Ideas – we research for future], hosted by Saxon Ministry of Science and Art	permanent poster about the BIOMore project at the public exhibition	-	-	05 Dec. 2017 - 02 Feb. 2018 Dresden (Germany)	TUBAF, WP2
40	Workshop, Oral presentation / lecture, ³Revolution Reduce, Reuse, Recover, hosted by the National Contact Point for Research Programmes of the European Union and the Embassy of the Republic of Poland	Pilut, R. and Kowalczyk, W., lecture about BIOMore	-	>20 *	18 – 19 Apr. 2018 Brussels (Belgium)	KGHM, WP3
41	Conference, Oral presentation, ALTA 2018 (ISR Symposium)	Roberto, F.; Johnson, B.: In Situ Metal Recovery: A Role for Microbiology	conference proceedings	>50 *	23 May 2018 Perth (Australia)	Bangor, WP1
42	Conference, Oral presentation (Keynote), Mines of the Future, Aachen International Mining Symposia (AIMS2018)	Schymura, S.; Karimzadeh, L.; Gründig, M.; Barthen, R.; Hildebrand, H.; Mansel, A.; Franke, K.; Kulenkampff, J.; Fischer, C.; Lippmann-Pipke, J.: GeoPET data for parametrization of reactive transport codes	-	230 *	23 – 24 May 2018 Aachen (Germany)	HZDR, WP2/3

43	Conference, Oral presentation (Keynote), Mines of the Future, Aachen International Mining Symposia (AIMS2018)	Johnson, B.: The evolution, current status and future prospects for using biotechnologies in the mineral extraction and metal recovery (Keynote) Hejny, H.: BIOMore – In-situ bioleaching to extract industry metals from deep buried deposits Karimzadeh, L.; Kulenkampff, J.; Schymura, S.; Lippmann-Pipke, J.: Benchmark 3D reactive transport modelling of leaching of fractured calcareous sulfide ores	-	230	23 – 24 May 2018 Aachen (Germany)	Bangor, WP1 MINPOL, WP8 HZDR, WP2/3
44	Conference, Oral presentation, BHT Research Forum TU Bergakademie Freiberg	Kalka, H.; Märten, H.: Potential and limits of biotechnology in in-situ mining applications	-	35	07 Jun. 2018 Freiberg (Germany)	UIT, WP2/3/7
45	Conference, Poster presentation, Biohydrometallurgy '18	Zhang, R. and Schippers, A.: Ferric iron reduction coupled to sulfur oxidation at elevated pressure by acidophilic microorganisms	Abstract	50	11 - 13 Jun. 2018 Windhoek (Namibia)	BGR, WP1
46	BIOMore event / workshop, Oral presentations / lectures, BIOMore Final Event	dissemination of results of the BIOMore projects via presentations and a panel discussion	-	45	06 Jul. 2018 Brussels (Belgium)	all WPs

47	Long-term cooperation with other researchers, Scientific knowledge exchange in the project "FAME" (HORIZON 2020 Program)	contributions in the field of accessing small deposits and processing technologies	project report	-	2015 – 2018, international cooperation	GTK, WP5
48	Long-term cooperation with other researchers, Scientific knowledge exchange in the project "SoS RARE" (SoS Minerals Program)	contributions in the field of processing of ion adsorption deposits	project report	-	2015 – 2018, international cooperation	UIT, WP2/3/7
49	Long-term cooperation with other researchers, BioFlex Network (ZeroWaste Cluster by EIT RawMaterials)	contributions in the field of bioleaching and biometallurgy	-	-	2016 – 2018, international cooperation	VTT, WP3
50	Customer Meetings, Knowledge exchange with several experts of metal leaching, individual discussions	dissemination of BIOMore facts via printed flyers and brochures	-	> 20	2016 – 2018 international cooperation	HATCH, WP4
	Furthermore: all activities of the press bureau including contributions at video channel and social media platforms		several	-	2015 - 2018	WP6

* there were no information about number of participants available. However, it is expected to have more than 50 participants in case of conferences and more than 20 participants in case of workshops. In case of dissemination of BIOMore facts via websites, online newspapers, and radio programs no assumptions are made.