

1/2015



Euromines External Newsletter

European Association of Mining Industries, Metal Ores & Industrial Minerals

June 2015

New Technologies and Policies for Mining and Mining Products

Editorial

1/2015

Editorial

Implementation of innovative technological solutions to reduce raw material dependency in the EU and the introduction of clearer and more effective minerals policies seem to be one of the two major challenges in the EU mineral policy debate. Some EU Member States have already updated and implemented new mineral policies. Their aim is closely linked to their national economic strategies, i.e. traditional mining countries tend to focus on ensuring investment and proper exploitation of resources (e.g. Portugal), but others like the Netherlands are securing more the availability and improved sustainability of raw materials by seeking new supplies, and seeking to close cycles (re-use, recovery, and recycling). Generally the implementation of the countries' minerals policies should help to build foundations for sustainable minerals and/or the recycling sector by encouraging the participation of all stakeholders, and boosting the introduction of new innovative technological solutions. Those countries that have already introduced a new mineral policy often develop special research programmes supporting innovation in mining and recycling, e.g.:

- in Sweden the Strategic innovation programme for the Swedish Mining and Metal producing



Industry, STRIM (2013-2016), whose aim is to contribute to sustainable growth and strengthen the Swedish mining and metal extraction industry,



- in Finland the Green Mining programme (2011-2016), with its main objective to make Finland a global leader of sustainable mineral industry by 2020, with two main thematic areas: intelligent and minimum-impact mines and new mineral resources.

There are now also programmes in the EU focusing on innovation in mining, metal and mineral processing or assessing elements to improve related EU policies within and through Horizon 2020, the EIT KIC Raw MatTERS, or the network Era-Min (FP7). In one of the Horizon 2020 calls (SC5-13c-2015) it was assessed that mineral policies are sometimes not clear, too dispersed in their implementation or insufficiently linked to other national related policies (e.g. land-use planning) to be fully effective. To improve national mineral policies or to develop new ones, especially in newer EU members like Poland ([Assumptions for the Action Plan in the field of security of Polish non-energy raw materials has been approved by the Ministry of Economy in March 2015](#); - for more information about Mineral Policy in Poland [click here](#)) the best practice guidance developed by a Commission/Member States

Editorial

1/2015

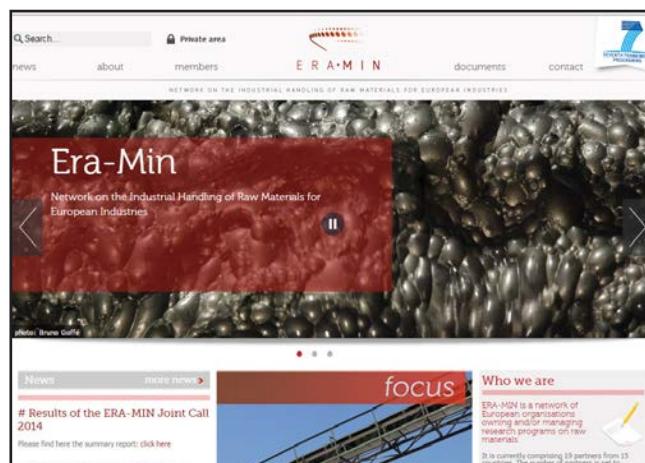
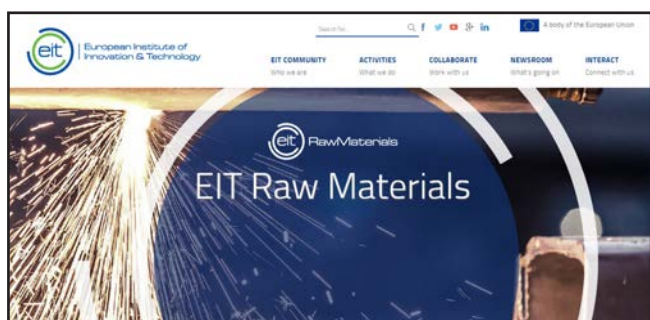
expert group including interdisciplinary knowledge on economic, environmental, social and legal aspects can help the valuation of existing and potential mineral resources in EU. Moreover, mineral policies should take into account other EU policies and regulations such as for example:

- the obligation of some large companies for non-financial reporting (Corporate Social Responsibility) introduced by The [Directive 2014/95/EU on disclosure of non-financial and diversity information by certain large undertakings and groups](#) amending the [Accounting Directive 2013/34/EU](#), entered into force on 6th December 2014. It requires companies concerned to disclose in their reporting, information on policies, risks and outcomes as regards environmental matters, social and employee aspects, respect for human rights, anticorruption and bribery issues, and diversity in their board of directors. This will provide investors and other stakeholders with a more comprehensive picture of a company's performance,
- the proposal for implementation of Life Cycle Assessment into European environmental policy by creating the environmental footprint for a product or organization, which should document scientifically the performance and potential environmental impacts throughout the lifecycle, i.e. including for example, the impact of energy consumed (based on supplier-specific data, or if it is not available, country-specific consumption-mix data) along the life cycle. Research ideas which recommends differentiated VAT rates according to the environmental footprint performance of products, i.e. a system of "green value added tax" (VAT) based on [life cycle assessment \(LCA\)](#) results, are one of the ideas.

However, one of the recently most discussed aspects for mining development is the social contribution and acceptance of mining investments and potential conflicts related to acquisition and use of land. In some countries social protests against mining have intensified and have required extended consultations. Therefore, more information is needed about the role of minerals in the economy, as well the activities which create good relationships between governments, large-scale mining companies and local communities at the earliest stages of mining projects. New innovative and environmental friendly technologies (including reuse, recovery, recycling and substitution) with an adequate mining policy or other policies, and good CSR programs create a better chance for reducing raw material dependency in EU.



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Pushing boundaries beyond - Circular by 2020?

1/2015

Pushing boundaries beyond – Circular by 2020?

On 9th March 2015, the International Conference on New Technologies and Policies for Mining and Mining Products “Pushing boundaries beyond - Circular by 2020?” was held at Trinity College Dublin.

The conference focused on the role of new technologies and policy approaches for a future mining industry in Europe. With Ireland having been a major supplier of raw materials to the EU and its downstream industries in the past, particularly in lead and zinc, the country scored highly on the latest Fraser Institutes assessment of investable countries for exploration and mining investments in Europe.

Hosted by the country's leading university, the conference brought together high level representation from the Ministry of Communications, Energy and Natural Resources, the European Commission, academia and geological surveys as well as European mineral suppliers and technology providers and sector organisations such as Euromines, European Technology Platform on Sustainable Mineral Resources and IBEC.

Some 100 participants from all over Europe attended this conference which explored:

- The development of alternative energy sources and their future material demands including these so-called critical raw materials;
- New technologies for the production and use of raw materials;
- New approaches to address public awareness and social validation of the mining industry;
- Strategies and technical and political requirements for achieving a more circular economy with increased reuse and recycling of materials currently in use;
- Strategies and policies around providing raw materials for Europe's innovation and reindustrialisation strategy;
- The European Innovation Partnership on Raw Materials and the funding programmes and topics available in the future.

Innovation is a powerful vehicle in meeting Europe's challenges in raw materials. For example,

new technologies help to reduce losses, safely extract minerals deeper underground, source the raw materials in more remote areas and under a wider range of conditions. This is also why a European Innovation Partnership on raw materials has been set up by the Commission towards increasing Europe's own production. “Europe is rich in natural resources. Our future is one where technological advances lead our industry, where regulation compliments growth and is born from a hard-won consensus for a better future.” highlighted Euromines President Mr. Rachovides in his speech.

The articles in this Newsletter are written by some of the conference key speakers. We truly appreciate the time that they took out of their busy schedule to prepare these articles for this issue of the Newsletter.



Ocean Energy – future opportunities for Europe’s mining industries?

1/2015

Ocean Energy – future opportunities for Europe’s mining industries?

Speaking at the International Conference on New Technologies and Policies for Mining and Mining Products on 9 March in Dublin, Nicolas Wallet, Manager of The Technology & Innovation Platform for Ocean Energy, drew a picture of the direction in which this next generation renewable energy sector is heading, which included a sizable opportunity for innovative thinking on materials.

European technologies have been the driving force by the global movement which has brought the ocean renewable energy sector¹ to the brink of commercialisation. To date, several European technologies have generated over large numbers of megawatt hours of electricity into national grids, proving that the concept is sound.

When this global advantage can be turned into reality will depend on how quickly the sector reduce costs and drive down the price of its product: electricity. TP Ocean – the European Technology & Innovation Platform for Ocean Energy – was created in 2013 to ensure that this happens in the most cost efficient and timely manner, by generating consensus around research priorities for the sector.

Between now and 2020, as the first arrays (or farms) of ocean energy devices are deployed, the journey down the cost curve will begin through a mixture of innovation, learning by doing and the economies of scale which go with volume production. Materials are central to this issue of cost. Ocean energy devices need to be robust enough to survive and operate in a high-energy and often volatile environment (the sea).



¹The renewable ocean energy sector is made up of five technologies: wave energy, tidal stream, tidal range, salinity gradient energy conversion, and ocean thermal energy conversion (OTEC)

Ocean Energy – future opportunities for Europe's mining industries?

1/2015

The larger they are the more economically viable they become, as we have seen with offshore wind turbines reaching 160m in diameter. The devices must also be 'marinised', meaning resistant to corrosion, bio-fouling and waterproof to the extent that they can survive and function at optimal levels.

Reducing the cost of production, while maintaining each of these characteristics, is a key goal for the sector. Today, the predominant structure of these devices is made from steel, which is well understood and durable, but expensive.

Solutions are being explored: cheaper materials are used in some instances, such as concrete. High quality materials such as fibre reinforced polymer can be used for parts under extreme stress. The scale issue can be tackled by using a minimized structure for mounting multiple turbines to.

Knowledge transfer from other sectors has been identified by TP Ocean as a high effective innovation pathway to be explored. Composite materials and antifouling coatings used in the shipping industry represent low hanging fruits for cost reduction. Already today, several innovations from within the shipping industry, such as sea-water lubricated bearings are being explored. Similarly, there is a great dealing of existing knowledge to build on in the area of moorings of foundations, which is of fundamental importance to the sector.

Radical new concepts are needed, however: Removing the need for large foundation structures, and making greater use of buoyant, tensioned cables, for example. The substitution of steel with a less costly and equally performing alternative would represent a breakthrough innovation for the sector.

Given its current technological dominance, and the abundance of global resources, there are few sectors which represent as much employment and export potential for Europe as ocean energy. All this while removing imported fossil fuels from the grid and replacing them with clean, secure energy. The combination of these elements has driven ocean energy considerably high on the EU agenda in the past two years, leading to the creation of the European Commission's 'Ocean Energy Forum'. This Forum has been tasked with creating a roadmap for the development of the sector and uniting relevant EU countries under a common, strategic plan. On implementation, this plan will be of great benefit to those who are well positioned to support its development with innovative, cost effective solutions.

More information available on [Ocean Energy Europe](#).

Mr. Nicolas Wallet
[Ocean Energy Europe](#)



Automation increases efficiency and safety

1/2015

Automation increases efficiency and safety

Boliden Mines is currently implementing a number of major initiatives in order to increase automation levels. Increased automation in our mines is a vital part of the Boliden strategy, and it may have major effects on the following areas:

ENHANCED SAFETY

Safer access control procedures using positioning makes life easier in many ways, and if an accident does happen it'll be possible to communicate with staff and guide them to the nearest rescue chamber. It'll be possible to control machines remotely, which means in the longer term that it could conceivably be possible to move staff away from the stopes to safer work environments. Another safety enhancing option would be to use constant machine monitoring to control maintenance, ensuring it takes place at the mines workshops instead of out at the face, so resulting in a safe work environment.

BETTER WORK ENVIRONMENT

Air quality in the mine is constantly monitored. With the technical solutions we're starting to put in place in the majority of our mines, we have the option of developing requirement controlled ventilation even more than is the case at present. This will save money and be good for the environment as this will reduce energy consumption while also improving the work environment down in the mine. In the event of a fire, it will also be possible to control the ventilation in order to shorten the duration of the fire and reduce the risk of it spreading. Above all, we can improve the work environment by quite simply allowing operators to do their jobs in locations other than just at the face, where we'll have other opportunities to create a good work environment.

INCREASED PRODUCTIVITY

The technical solutions that have provided us with tools such as better communication channels, automated reporting from machines and real-time position updates provide us with good opportunities for even more efficient planning. Increased use of remote control and autonomous machines will allow us to utilise our time more effectively as

well. When shifts overlap at shift changeovers, we can utilise the entire shift time as overlapping staff won't need to wait underground. Furthermore, machines which are autonomous or controlled remotely from above ground won't need to remain stationary during the purging time following firing.

MORE EFFICIENT MAINTENANCE

Efficient maintenance work is required with higher machine utilisation levels. This can also be improved using modern technology. One option involves automatically collecting operating information from the machines. Working on the basis of this information, it's possible to implement more well-planned preventive maintenance on the basis of actual wear and precise operating times. Coordinating maintenance with the production plan allows servicing to be carried out when the machines are least needed. The aim of this is to reduce disruptions and unplanned stoppages in production.

Boliden Mines



Garpenberg mine
© Boliden

Sustainable Treatment of Acid Mine Drainage

1/2015

Sustainable Treatment of Acid Mine Drainage

Omya Group is a leading global producer of industrial minerals. Sustainability is the key to future success on our journey to achieving our objectives. In the course of the "Total Product Life Cycle" thinking we strive to optimize resource efficiency.

Omya strives to extract high purity reserves with a minimum of impurities to optimize resource use. The right choice of raw materials is essential for efficient energy optimized production. The prevention and reduction of waste throughout the entire production process is the primary focus. Due to the nature of the extracted stone the lower brightness parts of our quarries may not work for applications in paints or paper. We are constantly seeking for applications for these materials. We believe that the success of our products will increasingly depend upon minimizing our footprint in the future.

We identified the Acid Mine Drainage (AMD) in the metal and coal mining industry as an area of potential synergies. AMD is a well-known phenomenon which refers to the outflow of acidic water from (usually abandoned) metal or coal mines. If the rock contains sulphides a natural oxidation process can acidify the water.

Gold mine in South Africa – case study

Gold occurs in association with pyrite which produces sulphuric acid when exposed to water and oxygen. The acid dissolves the surrounding or in flooded parts of the mine, slime dumps and tailings releasing the heavy metals within. The ferric hydroxide formed in this reaction is also called "yellow boy", a yellowish orange precipitate that covers streams or river beds with a slimy sludge. By adding calcium carbonate to AMD heavy elements can be precipitated and acid can be neutralized.

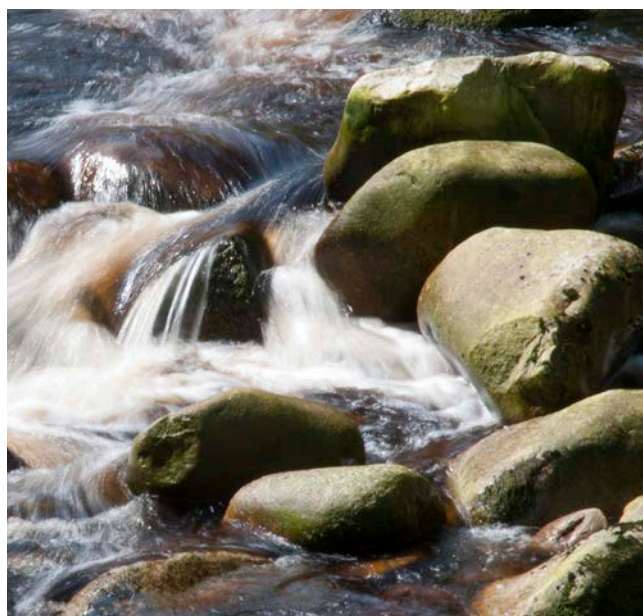
The process flow is basically very simple and results in clear cleaner water and a sludge which could be sent to or put in a disposal site. The calcium carbonate could be either regular products (for instance based on limestone) or the lower brightness material which could contribute to the "circular economy" concept.

Acid effluents from the surface treatment industry

An even more advanced technology could so far be demonstrated using the case study of Printed Circuit Board (PCB) which releases a volume of waste effluent of about 2.3 million m³ per year in Europe. The current treatment of the PCB acid waste is neutralization of the acids and precipitation of the heavy metals by using a lot of chemicals (precipitation agents, complexing agents and flocculants). The solids removal has to happen within one single sludge which has to be dewatered and disposed according to local regulatory rules. The chemicals contribute to 25% and the sludge disposal to up to 75% of the OPEX costs!

The alternative treatment process is a selective precipitation of valuable heavy metals or substances present in the acid waste (e.g. copper sludge, white gypsum). The precipitation is a continuous process with stepwise neutralization of the acids by adding especially developed calcium carbonate product and initiates a selective precipitation of added value substances.

Mr. Ekhard Beuleke
Omya International AG



Raw materials between euphoria and ignorance

1/2015

Raw materials between euphoria and ignorance – the need for raw material strategies

More than any other goods, raw materials underlie economic and societal challenges imposed by global and regional developments, such as individual growing demand of national markets, technological progress, customer behaviour and acceptance, speculation, change of attitudes and policies in securing raw material supply. The raw material hype of the first decade of the 21st century and the subsequent price drop led to euphoria and ignorance.

The need for action on “raw material security” varied strongly due to the very heterogeneous demand side of EU member states’ economies. Effectively, raw material shortages have a rather different impact on the EU economy considering the unbalanced share of industrial production as well as structural differences of industry and market economies within EU. This makes for heightened pressure on the applicability and performance of European raw material strategy and innovation partnership (EIP RM) and necessities interaction with national and even regional strategies (including their lobbying) that reflect more specific requirements.

Just comparing the main objectives of the German raw material strategy (2010) with those given by the Free State of Saxony’s raw materials strategy (2012) reveals differences and synergies. At a national level, removal of the barriers to international trade and distortion of competitive positions and support of transparency and good governance in mining industry is allied to a somewhat ambiguous commitment to the domestic mining industry.

In contrast to this, the incorporation of raw materials as a future subject in the Free States Innovation Strategy has resulted in the reassessment of Saxon raw material deposits and data as a continuous project since 2008 and a growing share of national R&D programmes. Saxon raw material policy focusses on domestic primary raw materials and is committed to strengthening mining administration and raw material awareness. Today, Saxony holds pole position in raw materials entrepreneurship especially from a group of enterprises the EC targets most: SMEs. Despite the fact that their lobbying in the EU is rather limited they are an important key group in generating growth by especially encouraging entrepreneurs in mining. The “Mittelstand” has shown much resistance during the financial crisis.



More than tradition: the renaissance of European mining in the Saxon Erzgebirge follows a comprehensive cadastre work of the past mining activities. “Glück Auf” as a call for new public and private engagement.

Raw materials between euphoria and ignorance

1/2015

The Saxon Free State, rich in raw materials, now holds 18 exploration licenses with most of them linked to local industry and shareholders. Entrepreneurs, like Nickelhütte Aue GmbH or SolarWorld Solicium, actively consider backward integration or expanding the value chain through their own mining investments. SMEs are the focus group in linking and merging EU expertise in stimulating mining from EU resources, and Saxon industrial partners have much to offer here: The HORIZON 2020 project FAME (Flexible And Mobile Economic processing technologies) was initiated by a group of Saxon mining entrepreneurs supported by the Freiberg based Geokompetenzzentrum with the aim of achieving synergies and support from European networks.

After successfully reopening fluorspar mines (in Germany and the UK) Portuguese, German, and UK tungsten-tin deposits are now closer to becoming competitive through enhancing their minerals processing technologies (www.fame-project.eu). The participation of EU based industry in investments into international raw material markets (> 500 billion €/year) requires an intensive support from EU but also from national governments. Projects like FAME and regional activities at a comparatively small scale and almost entirely based on private entrepreneurship gain more and more importance in the performance of the EIP RM. This requires reliable conditions for the key players by policy makers and administration. Keeping this in mind, the structurally and operationally diverse European industry, with its regional divergence (in industrial history, economic development strategies, acceptance by the public) can truly support European regeneration.

Relying on Europe's own middle-class private sources, raw material strategies

- have to follow global developments and challenges and not theoretical issues and ideology;

- need to be specified and budgeted according to the requirements at regional, national, and EU level;
- require reliable measures in timing and budgeting and dedication of responsibilities to be bundled and to be of high priority;
- need to be steadily controlled regarding the realised tasks and measures and updated;
- need to be communicated at all levels.

Because of its fundamental importance in demonstrating the value of industry, its nature as location bound with a substantial long-term risk capital commitment, and its specific requirements in sustainability, raw materials investment cannot tolerate either euphoria nor ignorance.

Only if we adopt the challenges, independent of price developments, legislation periods in policy, and fears, without any ideological background and lobbyism, we will have the chance to maintain and to further develop the industrial value chain in Europe and to secure and to strengthen an internationally competitive raw materials industry.

Dr Wolfgang Reimer & Dr Manfred Goedecke
Geokompetenzzentrum Freiberg e.V., Germany



New process technology for more efficiency in mining developed by SME entrepreneurs in mineral processing: a model of a bio-reactor shown on the FAME Kick-Off Meeting in Meißen, Saxony.

EIT Raw Materials

1/2015

EIT Raw Materials

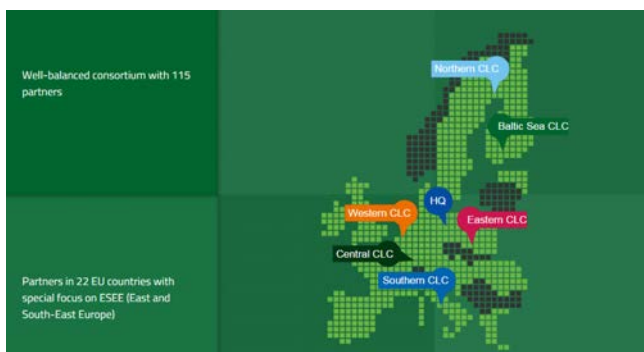
The European Institute of Innovation and Technology (EIT) Raw Materials was designated as an EIT Knowledge and Innovation Community (KIC) by the EIT Governing Board on 09 December 2014.

EIT Raw Materials has the ambitious vision of turning the challenge of raw materials dependence into a strategic strength for Europe. Its mission is to boost the competitiveness, growth and attractiveness of the European raw materials sector via radical innovation and entrepreneurship. This KIC will integrate multiple disciplines, diversity and complementarity along the three sides of the knowledge triangle (business, education and research) and across the whole raw materials value chain.

EIT Raw Materials will be the strongest consortium ever created in the world in the raw materials field. The approach will pay particular attention to systemic thinking and de-siloing across the value chain. Novel service offerings will be implemented to empower the EIT Raw Materials community and other stakeholders, including four customised tracks focusing on growth and job creation by boosting start-ups, SMEs, radical innovation and education.

EIT Raw Materials will generate significant impact on European competitiveness and employment. This will be realised through the introduction of innovative and sustainable products, processes and services and well-educated people that will deliver increased economic, environmental and social sustainability to European society.

More information available on [EIT Raw Materials website](#).



KIC Activity Lines	Start-Up Track	SME Track	Radical Innovation Track	Perfect Job Track
Business Creation & Support	Start-up Booster	SME Growth Booster	Funding Instruments	Kick-start Funding
Learning & Education	Wider Society Learning	Lifelong Education	Lifelong Education	PhD Education
Validation & Acceleration	Network of Infrastructure	Network of Infrastructure	Upscaling Project	Upscaling Project
Matchmaking & Networking	Idea Camp	Intrapreneurship Facilitator	Info Center	Matches

1/2015

Euromines

Euromines is the recognized representative of the European metals and minerals mining industry. The members' main objective is to promote the industry and maintain their relations with European institutions at all levels. Euromines provides services to its members with regard to EU policy and forms a network for cooperation and the exchange of information throughout the sector within Europe. The association also supports contacts with the mining community throughout the world.

Euromines members are large and small companies who with their subsidiaries in Europe and in other parts of the world provide jobs to more than 350,000 people. Their activities and operations produce more than 42 different metals and minerals.

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