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Euromines Newsletter

January 2018



**Boosting Cooperation
EU – Latin America**

Editorial

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Cooperation between Latin America and Europe is clearly justified

The use of mineral resources is of major importance for almost all Latin American and European countries with strong mining traditions, and for which the industry was, and is, directly or indirectly, the main source of wealth-generation and development of some municipalities, regions and even nations.

This is an issue that is almost as old as man himself. Mineral resources have conditioned the evolution of humanity in such a way, that the origins of the first pre-history period names are related to such materials: Paleolithic, Neolithic, Iron Age, Bronze Age. It has always been like that throughout history, even in civilizations whose pillars were based in a philosophy of respect and communion with nature.

The need to establish mechanisms of cooperation in this area between Latin America and Europe is then clearly justified and should focus on the needs of society, just like the recently approved Sustainable Development Goals, devoted primarily to:

- research for the discovery of new mineral deposits and development of technological innovation in the mining processes and products;
- land use planning supported by geological knowledge in order to safeguard the main areas of occurrence of mineral resources;

- the use of the best available technology in order to minimize the negative environmental impacts arising from the extractive industry.
- the involvement of local communities of the main mining areas so that they are the major beneficiaries of this activity and thus facilitating the obtaining of a social license to operate.

To this end, it should be noted that a recent initiative of the European Commission was launched in the beginning of 2017: the EU-Latin America Mineral Development Network Platform. The overall objective of this project is the establishment of a network platform for continuous and structured cooperation on a mutual benefit basis between EU and Latin American authorities, industry, business (including SMEs), academia, geological surveys and other relevant entities for the non-energy extractive industries, in the fields of technology, consulting services, infrastructure, investment, trade, training and skills, health and safety, good governance and other relevant areas of the mining value chain (from exploration to mining, rehabilitation and post-closure).

In this edition of our newsletter, we explore the relationship between the EU and Latin American more deeply as well as some of the projects taking place in partnering countries.

**Luís Martins
Assimagra**

MDNP PROJECT

The aim of the MDNP project is to bring together, building on existing multilateral cooperation, all relevant stakeholders from entities and disciplines linked to the non-energy extractive industries in the EU and the participating LatAm countries. It will thereby support a continuous and structured cooperation between the EU and Latin America, reinforcing dialogue, promoting cutting-edge technologies, strengthening business, institutional and academic ties and opening new business prospects, thus leading to win-win situations between the two strategic partners.

METS 2018

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Forming Global Partnership Across the Atlantic

Corina Hebestreit
Euromines

Today we experience the world as an interconnected community, both personally and professionally. The digital era has opened doors for communication, transport and data that we couldn't imagine even 20 years ago. With constantly improving technology, we're now able to video chat with friends and family across the globe, and we can do business across time zones and cultures like never before.

It's no surprise that in industries dealing with natural resources that are unevenly distributed around the planet, this new level of connectedness is changing the landscape of business and policy. The mining sector in particular is seeing a number of partnerships that cross land and sea to enhance industries, economies and the lives of citizens.

One such partnership is the Mineral Development Network Platform (MDNP) project. In this EU funded endeavour, the EU, together with seven Latin American partner countries (Argentina, Brazil, Chile, Colombia, Mexico, Peru and Uruguay) are looking to intensify cooperation within non-energy extractive industries. Both regions have different strengths in these industries, and they also face a number of challenges in today's economy.

In these partnering countries, mining provides substantial revenue and jobs while supplying essential raw materials for fast-growing, cutting-edge sectors such as renewable energy, fuel-efficient transportation and smart technologies.

But the challenges of coping with dropping commodity prices, the need for improving environmental standards and meeting the desires of customers can be a struggle to manage. As major economic and resource contributors, it's the duty of these countries to move forward in socially, environmentally and economically sustainable ways, in full alignment with the UN Sustainable Developments Goals.

The MDNP project can help both Latin American countries and those in the EU to achieve these goals

by forming global partnership across the Atlantic. Latin America is a major source of raw materials, including critical minerals and metals that are needed in the EU. And the EU is a global leader in innovation and new technology, especially in the areas of machinery and sustainability that are so important in extractive industries. By working together, both regions can enjoy the benefits of the other, while boosting their own economies and providing for their citizens.

A major part of the MDNP project is building a digital platform that will help foster such cooperation. This resource will offer extensive resources relevant to all industries related to non-energy extractive activities in English, Spanish and Portuguese so that people from all participating countries can participate in their native tongues. The platform will also provide a means for people across the Atlantic to connect directly and discover ways they can work together.

To provide potential partners with an opportunity to make personal connections and jump start such progress, the Mining Exploration and Trade Show Conference (METS) will be held for the first time in Madrid in April 2018 as part of the MDNP project. EU and Latin American stakeholders will have the chance to meet in person and discuss possible ways to open doors for progress and help overcome challenges within the mining sector.

The event will feature expert speakers and workshops covering a range of key industry topics such as trade potential, geological surveys, training and skills, health and safety, and good governance. There will also be a trade show running alongside the conference where attendees can learn about and see demonstrations of the latest technological developments and investment opportunities.

The MDNP partnership is a celebrated example of mutually beneficial exchange that helps not only the businesses and organizations involved, but also the citizens living in the countries impacted. METS 2018 will be a major part of solidifying partnerships and discovering new possibilities for organizations within the mining sector.

The EU-LAC Dialogue on raw materials

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Enhancing the Role of European SME's in Latin American Markets

Eduardo Chaparro A.

Project leader of EU-Latin America Mineral Development Network Platform

Between the countries of Europe and America, the commercial and scientific relations around mining began a short time after news of the Columbus trips spread. Men like Nikolas Federmann, legal representative of the Houses of Fuger and Welser, lent money to Carlos I of Spain for the exploration of new territories. Many of those expeditions, started in 1530, were dedicated to gold mining.

Numerous Spaniards, French, Germans and English arrived in America seeking knowledge and fortune in mining¹. The most important was Alexander von Humboldt, who from 1799 to 1805, devoted himself to exploring South America and Central America and Mexico in the company of the Frenchman Aimé Bonpland.

The Yaoundé Convention in the 1960s moved Latin America (LAC) to seek the market of the European Economic Community (EEC) and led to the Latin American Memorandum of 1966, which proposes the creation of a joint permanent commission for dialogue.

In the '70s, the Declaration of Buenos Aires of the CECLA (Special Commission for Latin American Coordination) reached the first non-preferential trade agreements and the UNCTAD recommendations received by the EEC in 1971 generated a first scheme of the Generalized System of Trade Preferences (SGP).

Today, the EU-LAC relationship is between important economic partners in mutually beneficial relationships, working toward the exchange of goods and services and henceforth of support for democracy and equity through the fight against poverty, for human rights and for the protection of the environment. These will be the articulating elements of the future between the two sides of the Atlantic.

¹ La Colonia en Colombia; <http://lacoloniaeci2006.blogspot.com.co> / retrieved on 2017.11.30

Engage in the MDNP Project

It is in the mutual interest of LatAm countries and the EU to exploit the full potential of the extractive industries, both as contributors to the local economies and as suppliers to the sectors of the future, and to do so in a socially, environmentally and economically sustainable way, in full alignment with the UN Sustainable Developments Goals. Sign up for the Mineral Development Network Platform and register for the mining exploration convention and trade show.

You will be able to:

- Connect easily with EU and LatAm stakeholders
- Strengthen your ties across the Atlantic, and forge new ones
- Promote your Institution or Company
- Participate in the scientific, regulatory and social dialogue

www.mineralplatform.eu

The EU-LAC Dialogue on raw materials

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The EU demand for imports from Latin America grew 13% in the first two months of 2017, however, the United States and China control trade: 35% and 27%, respectively, leaving only 6% of the total volume at trade with the Union. All this under a significant fact: the trend was reversed and for the first time in four years, in the first quarter of 2017 the value of merchandise exports in Latin America and the Caribbean recorded an interannual expansion, which reached 17%. The policy of industrial development of China, voraciously absorbed products from Latin America. The USA has been the most important trading partner by tradition, and this is not surprising due to geography and affinities. But 6% of the total trade of Latin America seems very little for one of the most important economic and political blocs of the world, such as the European Union. There is the possibility of improving this percentage through an integrative effort.

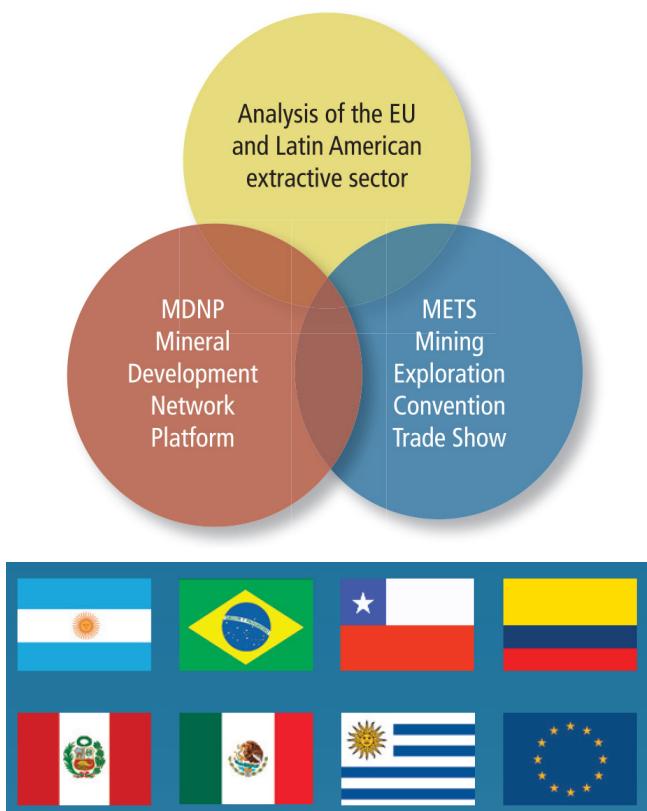
Specifically, there is a favorable field to strengthen the EU & LA exchange: that of small and medium enterprises, understanding that for this to happen, the facts mentioned by ECLAC should be remembered:²

- In Latin America and the Caribbean as well as in the European Union, SMEs represent 99% of the number of companies and generate between 40% and 80% of employment.
- In the countries of Latin America and the Caribbean, SMEs tend to be in sectors with little added value, lower wages, low quality jobs and high informality.
- In Latin American and Caribbean countries, the wage differences between workers of different strata of company size are much wider than in European countries.
- Latin American SMEs have a low incidence in the export structure, which contrasts sharply with the performance of European SMEs.

The EU-LAC Dialogue on raw materials (with Argentina, Brazil, Chile, Colombia, Mexico, Peru, Uruguay) is the most recent and current political and operational event between the EU and Latin America. It is known that information and good relations are needed between countries of the European bloc and those of Latin America. In this dialogue, the MDNP project (Mineral

Development Network Platform) will provide verifiable information and offer a free digital platform, so that its users can access its content; generating information exchange in the different fields of the mining industry, which: supports the continuity in the supply of minerals and metals for the future and that this provision is stable, safe and traceable, with high quality information.

MDNP will allow the small and medium enterprises of EU & LAC to be a new side of the intercontinental relationship. In Europe, this industrial segment is the largest provider of employment, possesses experience and a solid technological base, has a high capacity for operation and is more agile and dynamic than larger companies. Its Latin American counterparts require partners with experience, dynamism and financing capacity to receive technology in mining operations and activities related to this industry.



² CEPAL, ONU La Unión Europea y América Latina y el Caribe ante la nueva coyuntura económica y social; http://repositorio.cepal.org/bitstream/handle/11362/38217/S1500331_es.pdf retrieved on 2017.12.03.

Complementary Strengths: Continuing the Partnership Between Peru and the EU

María Chappuis

Advisory Board member of INGEMMET – Geological, Mining and Metallurgical Institute, Peru

The European Union (EU) and Peru signed a Free Trade Agreement nearly five years ago. Trade between the South American country and the European bloc currently amounts to 6 billion euros a year, with mining products accounting for more than 36%. The EU is Peru's third-largest market and its leading provider of services and technology.

During the past five years, the EU became the main source of foreign investment, contributing 8.5 billion euros to the Peruvian economy. European officials have said that they are always seeking to improve the investment climate and address shortcomings in the labor market. Matthias Jorgensen, head of the EU Trade Unit, has stated that the relationship with Peru goes beyond trade and is ambitious on environmental issues.

In the area of raw materials, the EU and Peru's Ministry of Energy and Mines (MINEM) signed a letter of intent in January 2013, in which they agreed to engage in ongoing dialogue to promote mutual understanding, increase bilateral cooperation and share information about policies related to raw materials and mining. Framework conditions for this agreement seek to promote development, innovation, respect for the environment, growth and social inclusion.

Peru is an important producer of precious metals and base metals. Table 1 shows the Andean country's contribution to global mining production of various metals.

Table 1

Metal	Peru's Contribution to Global Mining Production (%)	European Countries that Import from Peru
Silver	16.6	Switzerland
Copper	12.1	Germany, Italy, Spain
Zinc	11.2	Spain, Belgium
Molybdenum	11.1	Germany
Tin	6.8	Holland
Lead	6.5	Belgium, Italy, Germany
Gold	5.1	Switzerland, United Kingdom, Bulgaria

Innovation in mining is an essential task and is a focus of the Ministry of Energy and Mines (MINEM). Future scenarios are likely to include the need to sustain larger productive processes; these must take an integral approach because of their environmental repercussions, which affect nearby populations.

This makes it necessary to examine processes, seeking methods that are different and creative, and which contribute to cost reduction and, therefore, to an increase in productivity and efficiency.

The EU can establish areas of cooperation with Peru, with benefits for both parties, such as analysis of mine tailings for reprocessing and extracting strategic industrial elements. The economic treatment of complex polymetallic deposits that contain critical metals that are listed as critical raw materials in the EU can be done on Peruvian deposits. In the EU, processes are being developed that combine hydrometallurgy with novel metallurgical extraction techniques.

Partnership Peru - EU

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These technical studies must be supplemented with reports on regulations, global reserves, market potential and growth, to stimulate investment in these innovative business solutions.

The treatment of highly acidic water discharged from mining deposits is a key concern throughout the industry. The search for passive treatments, such as wetlands, which are used extensively in Europe, could offer opportunities for collaboration and associativity between Peruvian and European researchers.

Land-use planning is another area of concern in geologically rich countries, such as Peru. By definition, exploration is a never-ending process; for the country's mining future, it is therefore important to safeguard areas where resources have been discovered. Knowledge of the country's geology, along with economic factors and social

acceptance, should be part of a multi-dimensional evaluation model for medium- and long-range planning, recognizing the need to designate specific areas for future mining operations. Europe can offer interesting experiences in this area, having developed the concept of "Mineral Deposit of Public Importance".

Finally, Europe has much experience in the closure of mining operations, such as coal mines, which has involved establishing measures for compensating neighboring communities, experiences that could be shared with Peruvian authorities.

Although Peru ranks 70th out of 127 countries in innovation, according to a study of competitiveness prepared by the World Economic Forum, its mining industry is fairly well developed and has researchers who could form part of innovation teams in order to obtain outcomes that benefit both Peru and the EU.



Tintaya Open Pit Copper Mine – Peru



Cerro Verde Open Pit Copper Mine – Peru

Lithium in Brazil

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Actions and Perspectives of the Geological Service of Brazil in the Promotion of the Lithium Business in the Country

Vinícius José de Castro Paes, Eduardo Duarte Marques, Fernando Antônio Rodrigues de Oliveira, Mônica Mazzini Perrotta, Luana Duarte Santos (Serviço Geológico do Brasil - CPRM)

The Geological Survey of Brazil (CPRM) has been carrying out a prospective project called Assessment of the Lithium Potential in Brazil since 2012. The main goal is to improve the knowledge about the pegmatite-related lithium deposits in Brazil and their geological context. The first stage of the project (Paes et al., 2016) was carried out in the Jequitinhonha valley region located in northeastern Minas Gerais State (southeastern Brazil). This area belongs to the Eastern Brazilian Pegmatite Province and comprises 100% of the official lithium reserves of Brazil.

Since it is a prospective project, actions were taken to establish the critical conditions of the lithium mineralizations and also their prospecting guides. The main actions carried out included: (i) the creation of an adequate geologic map (1:100,000 scale) of the study area (17,750 km²); (ii) the petrographic and geochemical (whole-rock) study of Cambrian peraluminous granites of the S-type Ey4S Granitic Suite (lithium pegmatites are genetically related to Ey4S Granitic Suite); (iii) the study of contact and regional metamorphic mineralogy of the metasediments (Neoproterozoic) that host the pegmatites; (iv) field study of 45 lithium occurrences/deposits (20 unpublished until that time); (v) sampling of pegmatites, the soils derived from them and their host rocks for spectral study (ASTER images); (vi) processing and interpretation of Gamma ray spectrometry and magnetometric airborne surveys data; (vii)

compiling of geological information on the mineral chemistry of pegmatites and geochemistry of the host rocks from the studied region, as well as on the use of geochemical prospecting of stream sediments to locate lithium deposits.

The applied methodology led to an improvement of geological models for the lithium deposits in the study area. This allowed to propose an exploratory model for the deposits that is based on the identification and mapping of the metallotects and prospecting guides for the mineralizations. Other relevant results include the identification of new areas with potential for discoveries of lithium deposits.

The second stage of the project started in 2017 and comprises the Borborema Pegmatite Province in Rio Grande do Norte and Paraíba States (northeastern Brazil). Other areas with lithium occurrences in Brazil are: (1) Solonópole region (Ceará State); (2) eastern Minas Gerais State; (3) São João Del Rei region (southern Minas Gerais State); (4) Itambé region (southern Bahia State); (5) southern Tocantins State and northeastern Goiás State; (6) northwestern Rio de Janeiro State and southeastern Minas Gerais State. The geological knowledge of these areas is heterogeneous, and all of them need additional studies focusing on the metallogenetic aspects of the lithium pegmatites in order to evaluate their real potential for discovery of new deposits.



Figure 1: spodumene (greenish)-rich pegmatite in a new area with potential for discovery of lithium deposits. Fazenda Bananal Artisanal Mining - Itinga Pegmatitic Field. Jequitinhonha valley region.

Lithium in Brazil

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CPRM has great interest in creating scientific cooperation programs with international institutions concerning the prospecting and exploration of pegmatite-related lithium deposits. The exchange of technology and knowledge could approach many scientific subjects such as: (i) the use of different exploration tools for assessing the lithium potential of a region such as: whole-rock chemistry of granites; chemistry of minerals from granites; geochemistry of host rocks of pegmatites; chemistry of minerals from pegmatites; study of fluid inclusions in minerals from pegmatites; (ii) geochemical mapping and exploration geochemistry for lithium, concerning exploration data analysis (uni, bi and multivariate statistical analysis techniques), analytical and sampling methods, and the results of different geological matrixes (rock, soil, sediments and surface water/groundwater); (iii) the application of multivariate statistical analysis techniques by aggregating data from all airborne gammascipectrometric, magnetometric, electromagnetic and multispectral or remote sensing hyperspectral data channels in pilot areas, in order to extract the

maximum information contained in these data in large sampling populations for lithostructural cartography, detection of zones of hydrothermal alteration and favorability to the emplacement of pegmatitic bodies.

In recent years CPRM has developed a lithium ore spectral library that comprises up to 1000 spectral signatures of Li-pegmatite deposits (including mineralized veins, wall rock alteration and host rocks). This library can allow the spectral, mineralogical and compositional characterization of lithium deposits and also help the identification of mineralized bodies in remote sensing images.

Paes, V.J.C.; Santos, L.D.; Tedeschi, M.F.; Betollo, L.M., 2016. Avaliação do potencial do lítio no Brasil: área do Médio Rio Jequitinhonha, Nordeste de Minas Gerais. Belo Horizonte: CPRM - Companhia de Pesquisa de Recursos Minerais. Disponível em <http://www.cprm.gov.br>.



Figure 2:
spodumene
(white)-rich
pegmatite in a
new area with
potential for
discovery of
lithium deposits.
Severino
Artisanal
Mining - Itinga
Pegmatitic Field.
Jequitinhonha
valley region.



**Figures 3 and
4:** spodumene
(white)-rich
pegmatite in
a new area
with potential
for discovery
of lithium
deposits. Zué/
Dim Artisanal
Mining -
Curralinho
Pegmatitic
Field.
Jequitinhonha
valley region.

Land Planning in Colombia

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Land Planning in Sabana of Bogotá, Colombia

Carlos Fernando Forero, General Director of Asogravas

The Sabana of Bogotá is an area located in the center of Colombia, on the Eastern Cordillera, in the southern part of the Cundiboyacence Plateau, with an average height of 2,600 metres above sea level. This abundant ecosystem of water sources, tourism, productive activities such as agriculture, mining, livestock, among others, have attracted the world's eyes in this area of special protection. This situation has not been alien to Colombians since from 1993, the Ministry of the Environment declared the Sabana of Bogotá, its páramos, waters, surrounding valleys, surrounding hills and mountain systems of national ecological interest, with priority given to the agricultural and forestry activities, without excluding the activities of mining.

According to the most recent economic study on the region, the dynamism that has developed in the central part of the department of Cundinamarca, better known as the province Sabana Centro, is amazing. The eleven municipalities that make it up - Chía, Cota, Cajicá, Sopó, Tocancipá, Zipaquirá, Tenjo, Nemocón, Tabio, Cogua and Gachancipá - have seen their building activity shine and the settlement of countless industries. This has generated better revenues to the municipal coffers, invigorated their economies and turned the region into the most competitive department (generates 30.6 percent of PIB).

This conjuncture also generates difficulties. Initially, the government began a process of inter-institutional coordination, in which several ministerial portfolios and agencies of the Colombian state had as their goal to delimit the zone of special protection. Initially, this process generated the issuance of several regulatory decrees that sought the protection of the ecosystem. Therefore, Resolution 222 of 1994 was published. The Ministry of Environment and Sustainable Development regulated article 61 of Law 99 of 1993 and established five polygons compatible with mining of construction materials in the Sabana of Bogotá in a corresponding area to 11,304 ha that constitutes 2% of the total area of

the Sabana. To make this long story short, there is currently Resolution 2001 of 2016, that determines the areas compatible with mining operations in the Sabana of Bogotá, which is under review by the Administrative Court of the department of Cundinamarca.

This compatibility and incompatibility of construction materials has had an extensive process and been full of different regulatory actions by the National Government (see intertitle). It has been more than 23 years since the standards have changed, which has hindered optimum protection of the environment and, in the same way, the development of the activity of building materials.

In parallel, the demand for these materials is added to the economic and social variables. According to the most recent report of the area of Economic Studies of Asogravas, the areas near the area in question, such as Bogotá, demanded in 2016 about 6.9 million tons. For its part, the department of Cundinamarca required 6.4 million tons to complete its projects; even though we are in the low cycle of constructions at this time, we are expecting to reach at least 30 million tons per year by 2026. These important figures represent a challenge since the sources of construction materials should not be more than 50 kilometers away from the consumption center, as their transport costs and other logistical aspects increase.

In this sense, to avoid the increase in the cost of the aggregates, the most important challenge is to coordinate the mining activities and the protection of the ecosystems that are in the Sabana of Bogotá under clear parameters that include citizen participation, guaranteed respect for the communities, the environment and other productive activities, and seeking sustainable development hand in hand with the development and impulse in infrastructure, housing and building that the region demands.

Land Planning in Colombia

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LEGAL CONTEXT

10 years after the Resolution issued in 194, through Resolution 813 of 2004 the Ministry of Environment and Sustainable Development redefined areas compatible with mining for construction materials and replaced Resolution 222 of 1994.

Subsequently, Resolution 1197 of 2004 was published, repealing Resolution 813 of 2004 and delimiting 14 polygons compatible with mining of construction materials and clays, which corresponded to 1.63% of the total area of the Sabana, reducing the area established in Resolution 222 of 1994 by 17%.

Here it is important to note that the Council of State, by decision of June 23, 2010, declared null and void Article 1 and its third paragraph of

Resolution 1197 of 2004, welcoming again zones compatible with mining in the Sabana of Bogotá, those established in Article 4 of Resolution 222 of 1994.

Subsequently, in 2014, the State Council issued a ruling, within the popular action of the Bogotá River, in which it ordered the Ministry of Environment and Sustainable Development in coordination with the Ministry of Mines and Energy, to geographically delimit the areas excluded from mining of the Sabana of Bogotá.

In compliance with the above, the Ministry of Environment and Sustainable Development issued Resolution No. 2001 of 2016, which determined areas compatible with mining operations in the Sabana of Bogotá, the previous year and in force until now, but in review by the Administrative Court of Cundinamarca.

The following part of the Newsletter is dedicated to the METS 2018 event and its contributors.

EU-Latin America Mining & Exploration Convention and Trade Show

10 – 12 April 2018 | Madrid, Spain



Funded by
the European Union



METS 2018 is part of
the MDNP project

EuropeAid/137958/DH/SER/MULTI

Find out more at:
WWW.METS2018.EU



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Contributing to METS 2018

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How Mining Could Benefit from Solar Power

Thorsten Preugschas, Soventix GmbH; Christian Kropf, DMT GmbH & Co. KG

Mining is an energy intensive industry, but a large number of mining facilities are located in regions without proper access to the local energy grid. For this reason, the industry is using independent diesel or gas generators to secure the power supply. But availability of these fossil fuels is not always guaranteed and will become more expensive in the future.

Even if the integration of photovoltaic installations into an energy supply system does not directly lead to a cost reduction today, it is guaranteed in any case that fossil fuel reserves will be saved and the energy supply sustainably ensured. Ultimately, costs and environmental impact are always significantly reduced.

If the solar system is supplied under a "power purchase agreement" regime, the OPEX cash flow of the mine would not even be affected, and the

energy supply would become cheaper from day one as investors in solar projects know the benefit of the long term use and already have trust in the technology.

In the lifetime of a mining operation, which is several decades, it is certainly to be expected that the PV system must be placed elsewhere on the site. This presents not a serious problem because the installation is highly customizable and mobile due to the modular design. On a lot of mining locations, the surface has been used for different purposes, and parts of the soil have been left for future recycling. Solar greenfield sites can be used especially on former industrial areas, so named brown fields. The advantage is that these areas are still accessible, have a better optical look and the environmental impact of mines will have a strong positive argument.



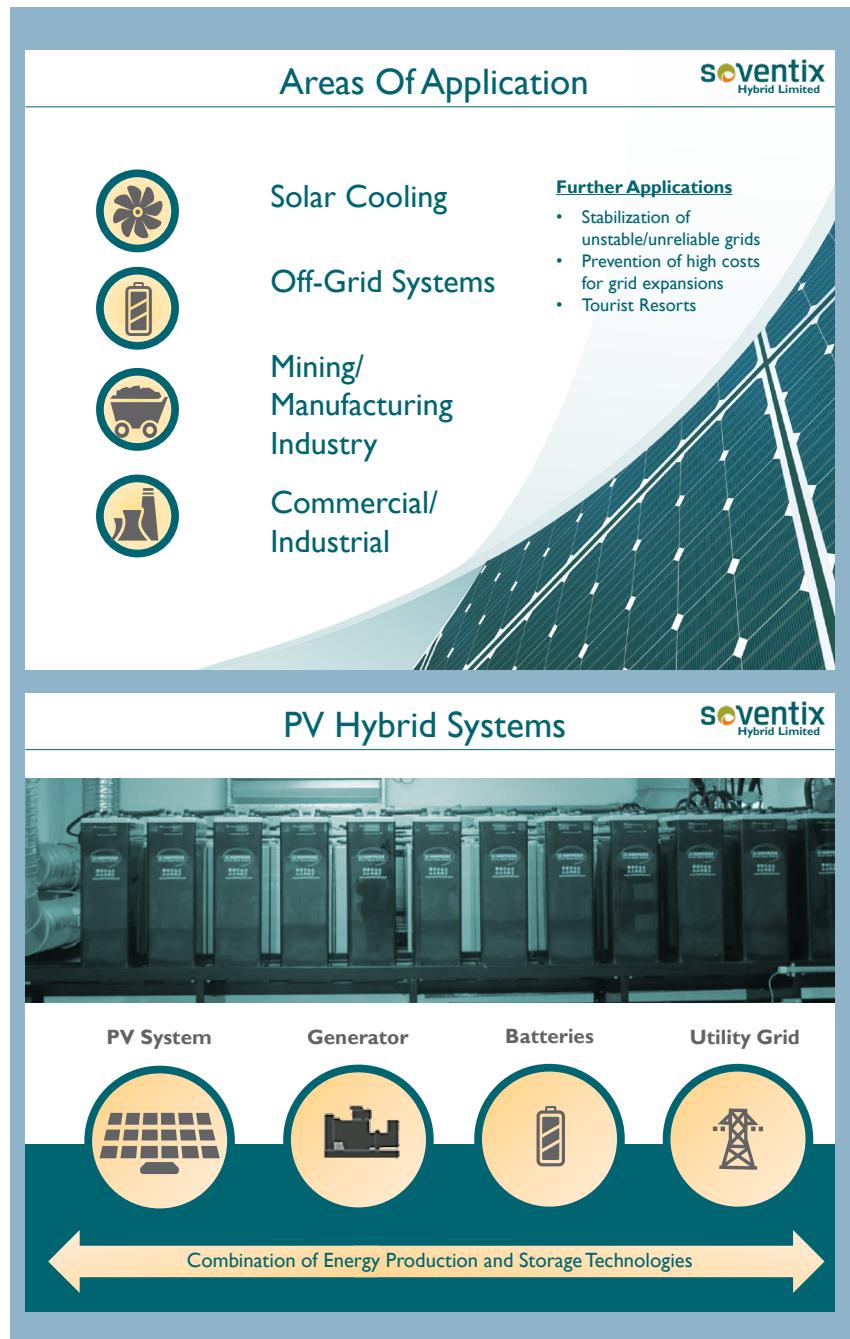
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It doesn't matter if the mines are investing in the solar projects on their own balance sheet or if they are signing a power purchase agreement; the carbon dioxide reduction will be a big benefit, especially when you compare each kWh produced with a diesel generator against solar power projects. Each kWh produced with fossil fuels or coal will generate an average of 0,65 kg of carbon dioxide. A typical solar power greenfield for mines would start at a minimum 2 MWp installation. In Latin America that leads to 3 GWh of energy production per year. This 3 GWh replacement would decrease the carbon dioxide emission of the mine for 1,95 Mio metric tons of carbon dioxide a year!

Taking into consideration that the lifetime of a properly installed solar system is more than 40 years and that the expected pay-back-times in Latin America are less than 10 years, every solar system would generate the energy only for the maintenance costs.

Mining operators and investors already understand very well that energy costs have a decisive influence on the profitability of a mining project. Taking into account that, besides saving on operational costs, initial investment is becoming even smaller, it is difficult to understand that the use of PV in regions of high solar irradiance is not yet being considered by default. One of the reasons may be that mining is characterized by conservative investment strategies. But this is just a possible explanation and not an apology.



Contributing to METS 2018

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STINGS An Integrated Novel Approach for Tailing Supervision

Karsten Zimmermann, DMT GmbH & Co. KG

STINGS is an innovation project funded by EIT Raw Materials to establish a ground- and space-borne remote sensing and analysis system to effectively and cost-efficiently monitor critical ground infrastructure stability and content, primarily focusing on mining tailing dams. It is dedicated to increasing the safety standards related to tailing operations and to delivering the related mining sector, government, citizens and all stakeholders affected by previous and current activities with an extended monitoring and early warning system for identification of operational impact and environmental risk.

Global data on failures of both operated and closed tailing dams are extremely scarce and incomplete, much of this due to differences in legislative reporting requirements and to some degree as a reflection of willingness of failure reporting. Nevertheless, available data shows that there has been a significant amount of tailing dam failures during the last decades. Data shows that the number of very serious and serious (both including loss of life) failures are increasing. This is mainly driven by larger tailings becoming necessary to allow economic extraction of lower grades of ore. This tendency is predicted to continue at a rate of at least 1 - 2 major failures every year from 2017 - 2020. Increasing global mining operations need the availability of new technologies to monitor tailings safety effectively and cost-efficiently. Here, a key value STINGS will provide is the intersection between the increasing risks of tailing management and the improved technologies of monitoring.

By integrating and analyzing a broad range of complementary ground- and space-borne sensor data, STINGS offers a unique information service to identify risks, prevent disasters and to capture previously undetected secondary values. The monitoring system will focus on different information types and different sensors and combine them in order to generate the most reliable information related to tailings stability, chemical and

mineralogical content. It will implement satellite radar information as well as ground-based sensor data to detect mechanical movements. An additional integration of optical remote sensing information enables to detect observable exits of substances from tailings. By using these different kinds of sensor information, data analysis and modelling the system will create safety information relevant for early warning. STINGS will offer cost efficient performance improving automation for monitoring of both active and closed tailings sites while providing a holistic risk management tool helping monitoring operations to ensure both measuring as well as analyses and reporting.

The technical feasibility of STINGS developments strongly depends on the underlying technical components. Satellite radar interferometry is a cornerstone of remote sensing. The European Union (ERS 1, ERS 2, ENVISAT, and now Sentinel 1A and B) and Germany (SRTM, TerraSAR-X, TanDEM-X mission) are leading players in this field of technology. In this project in particular, differential interferometry (dInSAR) is of interest in order to detect and monitor surface deformation occurring at tailings. For this application, the capabilities of the current operational European and German radar satellites are complementing quite well. Furthermore, radar absorption methods are investigated by STINGS to identify soil moisture changes by multi-temporal analysis of SAR-Data from Sentinel 1 as an indicator for the potential dry out of tailings. The results can be used as an early warning signal for particle emissions by wind from the tailing pond. In addition, the same methodology is foreseen to be applied for the detection of ground moisture changes due to leakages of liquids from the tailings pond. Optical Remote Sensing with data namely from the Copernicus Sentinel 2 mission and hyperspectral missions (e.g. Hyperion, EnMap) represents a keystone of the planned system.



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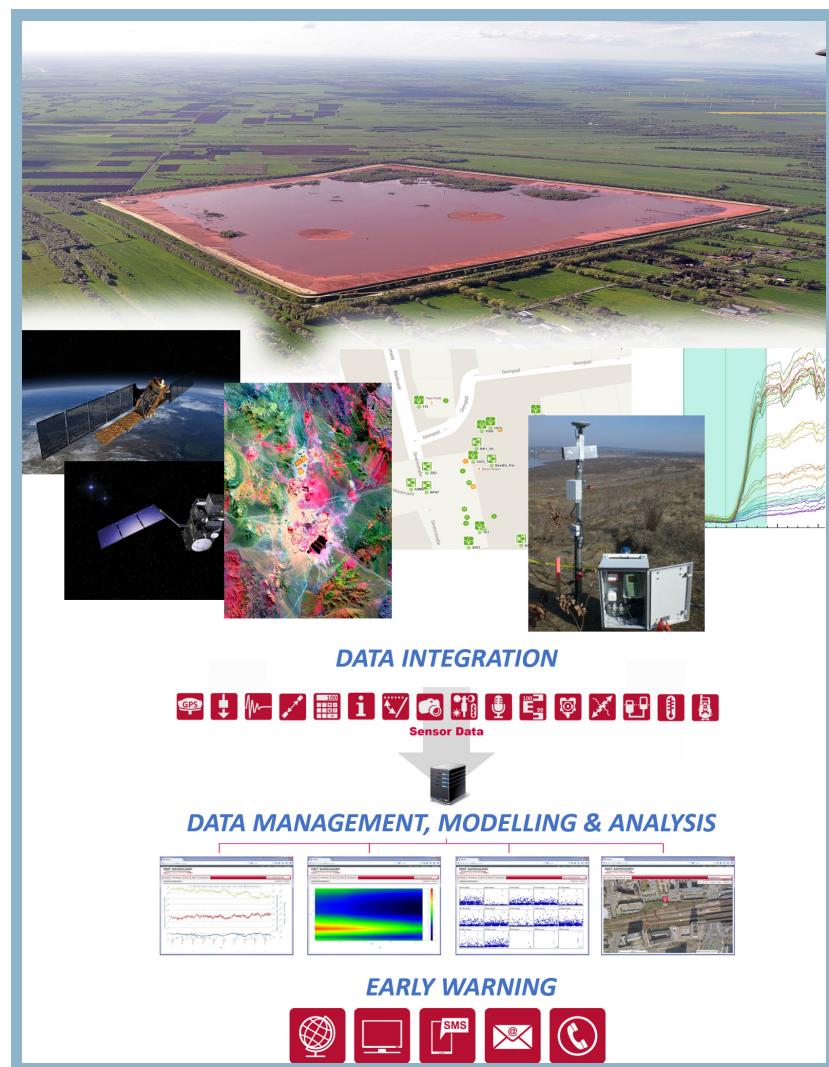
Optical remote sensing is already applied for exploration and monitoring tasks in the mining sector. Recent results from R&D-projects clearly demonstrated the potential of new optical space-borne data from missions like Hyperion and Sentinel 2 e.g. for change detection of water bodies and soil moisture due to mining-related ground movement.

In-Situ sensor development and sensor application to detect movements and instabilities at tailing sites is another major task in STINGS. While various sensors (GNSS) and data logging technology are available on the market, within the project we focus on the development of low cost equipment with automated communication technology (ICT) for automated sensor data transfer.

System and data integration is a main challenge of the digital edge and specifically for what is called "Industry 4.0" – a collective term embracing a number of contemporary automation, automatic and intelligent data exchange and fully digitized manufacturing technologies. STINGS will provide an important part corresponding to the integration of the various systems for the proposed interdisciplinary monitoring of tailings. The data management and early warning system developed during the project will accumulate all information and create safety information about the supervised tailings. The system is based on DMT's monitoring system SAFEGUARD that provides a technical foundation and proofs the technical feasibility.

The partner composition of STINGS combines user partners to determine market requirements, industrial partners for commercialization and the thematic expertise of scientific

institutions. DMT takes the role as consortium lead due to the company's long-term widespread international experience in the development of monitoring technologies for the mining industry. To improve tailing monitoring specifically in Latin America, one of the core project partners is PUCV (Pontificia Universidad Católica de Valparaíso) from Chile. PUCV has already conducted intense research focusing on improving operational controls and generating technologies for recovering areas occupied by tailings deposits. Within STINGS, the university will give valuable technological input, enable to select a suitable site for the system developments at large local tailing operations and will evaluate the results of the system for use in Chile.



Contributing to METS 2018

1/2018

XIV International Congress on Energy and Mineral Resources

Jesús Portillo, Mining Engineers Association of the South of Spain

The Spanish National Association of Mining Engineers, the High Council of Professional Associations of Mining Engineers of Spain and the Official Professional Association of Mining Engineers of the South of Spain are pleased to announce the holding of the 14th International Congress on Energy and Mineral Resources in Seville in April 2018 (from the 10th to the 13th).



With the broad and exciting theme "Sustaining the future", this Congress intends to become a forum for discussion where all the individuals and entities related to the different fields of action in which mining engineers are present can search for sustainable solutions to the present technological challenges.

Experts, researchers and professionals of companies and administrations will have the chance to enjoy a meeting point to exchange knowledge and, why not, find business opportunities. To this end, technical sessions will be completed with an exhibition area to showcase products and services in front of an international specialized audience. The term international gains a special significance in this edition with the simultaneous holding of the "Slope Stability in Open Pit Mining and Civil Engineering" Symposium. In addition to the working sessions, there will be technical visits and an attractive cultural programme for participants and guests, with Seville and its surroundings offering especially attractive opportunities in this field.

His Majesty the King Felipe VI will hold the Presidency of the Honor Committee of the Congress, to which the President of the Spanish Government and the President of the Autonomous Community of Andalusia, among other authorities, have confirmed their membership.

The congress will be structured on the basis of five thematic areas which include: exploration and extraction of mineral resources; raw materials and their processing; energy; water; and management systems and regulatory framework.

The Congress also offers the possibility of participating as an exhibitor. This is a good chance to present new products and innovate by sharing experiences with professionals, researchers, experts and scientists of recognized prestige.

You can find further information of all the issues (scientific information, venue, accommodation, registering, commercial exhibition dossier, etc.) in the website of the Congress:

<http://www.congresomineriasevilla2018.org/internacional-ingles/index.html>

A historic review of previous Congresses lets us expect a very successful event in this edition, but this requires the collaboration of all of us and therefore, we call upon your participation.

1/2018

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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