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NordMin

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A Nordic Network of Expertise for a Sustainable Mining
and Mineral Industry

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Nordic co-operation

Nordic co-operation is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, and the Faroe Islands, Greenland, and Åland.

Nordic co-operation has firm traditions in politics, the economy, and culture. It plays an important role in European and international collaboration, and aims at creating a strong Nordic community in a strong Europe.

Nordic co-operation seeks to safeguard Nordic and regional interests and principles in the global community. Common Nordic values help the region solidify its position as one of the world's most innovative and competitive.

About NordMin

NordMin is a Nordic network of expertise and research focusing on sustainable non-energy raw materials. The network is managed by Luleå University of Technology in Sweden. NordMin will support research, development, innovation and education initiatives in the raw materials sector in all Nordic countries and Greenland. The strength and synergy deriving from the complementary capacities of the Nordic countries will give NordMin a competitive edge.

The network will serve as a platform for existing and future Nordic co-operation in the mining and mineral sector, and has been designed through dialogue with stakeholders

in the Nordic countries. The aim is to increase sustainability in the Nordic mining and mineral sector in terms of resource efficiency, impact on the environment, and impact on society. The issues of attracting a skilled workforce to the sector, involving both genders and at all levels, will also be addressed.

The network is funded by the Nordic Council of Ministers for four years (2013–2016). From 2017 onwards, the network should be financially self-sufficient through financing from other sources. The aim is to create long-term Nordic co-operation in the mining and mineral sector.

www.nordmin-network.org

“The mining industry must improve in all parts of the value chain.”

“NordMin can bring together various experts in the Nordic region, so that mature mining countries like Finland and Sweden can share their experiences with Greenland and Iceland.” These are the words of Pär Weihed, project manager of NordMin and Professor in Ore Geology at Luleå University of Technology in Sweden.

PÄR WEIHED

*Professor in Ore Geology,
Luleå University of Technology,
Sweden*

The mining industry is facing many challenges, not least societal – for instance, how to generate acceptance for mining operations, and how mining companies can work more closely with the surrounding community. There are technical challenges too – new deposits are becoming harder to find, mines are becoming deeper, and the ores more complex.

“All this means that we must improve in all parts of the value chain,” says Pär Weihed. “At the same time, mature mining countries need an influx of new ideas, and there is a need to think outside the box. This is another aspect where NordMin can hopefully make a contribution.”

What is the objective of NordMin?

“The objective is to gather Nordic expertise on a broad front, and promote collaboration between various organisations. Not least, the aim is to build networks that together can make a strong contribution to, for example, Horizon 2020, where the mining and natural resource issues are important.”

Pär Weihed identifies a need to cluster Nordic mining research.

“We believe that collaboration over the national boundaries will make us stronger. The Nordic countries each have so much expertise regarding a number of relevant issues, and we want to utilise this.”

What are the challenges facing NordMin?

“Our biggest challenge will be to generate team spirit in a relatively short time and with limited resources. In the four years, we want to set up a number of networks that can administer the Nordic Council of Ministers’ initiative and stimulate others at national and European level.”

NordMin can help with financing the setting up of networks, and Pär Weihed’s hope is that the projects will take root and become firmly established.

“We offer a very great opportunity for researchers in the Nordic region to build networks for the future, not least within the EU programme.”

What is the current status of NordMin? And what will collaboration be like in the future?

“NordMin has just taken shape. We’re working with national coordinators, as well as leading the everyday work from Luleå University of Technology in Sweden.”

“We’re very optimistic about the working meetings we’ll be holding around the Nordic region in the coming years. We hope that NordMin will inspire other initiatives, not least in the EU context, and that we can generate meetings between people and organisations that would otherwise not come into contact with each other,” says Pär Weihed.

“In the Nordic region the question about security of supply and the development of a more sustainable mining and mineral industry is high on the agenda.”

Open mines and major mineral deposits in Fennoscandia and

The maps on mineral occurrences are modified from Weihed et al. SGA News 33. Background data from the Geological Surveys of Denmark and Greenland, Finland and Sweden and State company Mineral Russia.

More info on the mineral deposits can be found in the FODD database (<http://en.gtk.fi/information-services/databases/fodd/index.html>).

in Greenland

NORDIC GEOLOGICAL SURVEYS

Geological Survey of Sweden SGU

The Geological Survey of Sweden is the expert agency for issues relating to bed-rock, soil and groundwater in Sweden.
www.sgu.se

Geological Survey of Norway – NGU

The Geological Survey of Norway is the national institution for knowledge on bedrock, mineral resources, surficial deposits and groundwater in Norway.
www.ngu.no

Geological Survey of Denmark and Greenland – GEUS

The work field of Geological Survey of Denmark and Greenland is geoscientific studies, research, consultancy and geological mapping and primarily covers Denmark and Greenland.
www.geus.dk

Geological Survey of Finland – GTK

The Geological Survey of Finland is a European centre of excellence in assessment, research and sustainable use of earth resources.
www.gtk.fi

Iceland GeoSurvey – ÍSOR

The expertise of Iceland GeoSurvey includes geothermal and groundwater exploration, utilization and monitoring, marine geology, mineral resources and environmental sciences.
www.isor.is

NordMin Steering Committee

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FLEMMING GETREUER CHRISTIANSEN

Deputy Director, Geological Survey of Denmark and Greenland (GEUS)

What are your expectations of working with NordMin?

“I find this sort of networking very important. One particularly crucial aspect is the need to transfer knowledge from countries with a long history of mining to countries with a much lower level of activity. I hope that this initiative will help to improve educational programmes and branding of the minerals industry, as there will be a strong need to recruit qualified personnel in the coming years.”

What challenges and opportunities do you see in Denmark regarding minerals in the coming years?

“It’s still a great challenge to get issues about minerals – and resources generally – on the political agenda.

However, I’m very optimistic that matters of resource efficiency and the need for specific materials in green growth and green technological solutions will change this in the coming years.”

BENTE VIBEKE HANSEN

*Head of Section
Bureau of Minerals and Petroleum,
Greenland*

What are your expectations of working with NordMin?

“Greenland’s expectations of NordMin are that it will develop networks, strengthen co-operation in education and research, and allow exchange of experiences and solutions on issues relating to the developing mining industry.”

What challenges and opportunities do you see in Greenland regarding minerals in the coming years?

“Greenland is in a phase where the mining sector is developing into one of the main drivers in the national economy. Some of our challenges involve developing mining projects, because mining takes place in remote areas, with high construction costs, poor infrastructure, and adverse climate. Another problem is that the prices of many of the minerals are low on the global market.”
“Mining projects will provide new opportunities in the form of new jobs for the local workforce, and will also generate revenue through royalties and taxes, thereby contributing to the national economy.”

MIKAEL GRÖNING

Head of Section at the Ministry of Enterprise, Energy and Communications, Division for Research, Innovation and Industry Development, Sweden

What are your expectations of working with NordMin?

What are your expectations of working with NordMin?

“The obvious one is to create a common platform for players in the mining sector where they can meet, build networks and conduct research and innovation projects together. This will boost the industry’s competitiveness.”

“In the EU, there is currently a major focus on mining issues and, by having the networks in place, we will have a competitive advantage when Horizon 2020 starts inviting research proposals.”

What challenges and opportunities do you see in Sweden regarding minerals in the coming years?

“We’ve seen a surge in demand for metals in recent years, and I’m confident that demand will remain strong for many years to come. However, setting up a mining plant is a huge and complex operation. It’s difficult in terms of attracting the large financial resources that are needed, but environmental impact and acquiring a social licence to operate are also delicate issues that need to be adequately addressed.”

BRYNDÍS G. RÓBERTSDÓTTIR

*Manager – Mineral Resources
National Energy Authority, Iceland*

What are your expectations of working with NordMin?

“Since Iceland is a newcomer on this stage we have very high expectations of NordMin. It’s important for Iceland to be part of the NordMin research and innovation projects, and to participate together with other Nordic countries in international research projects.”

What challenges or opportunities do you see in Iceland regarding minerals in the coming years?

“Iceland is very young and by the same token we are taking the first steps on exploration and investigation of ores, which we hope will lead us to sustainable mining. Collectively Iceland needs to improve on our knowledge and expertise in the raw materials sector, therefore it is very important to develop higher education in the field at the University of Iceland.”

“The opportunities offered by NordMin offers are linked to the existing diversity of this field in the Nordic countries. However, for NordMin to work effectively it will have to tackle well number of managerial challenges, and all five Nordic countries and Greenland must actively participate in the co-operation.”

ERLEND OPSTAD

*Senior Advisor
Ministry of Trade, Industry
and Fisheries, Norway*

What are your expectations of working with NordMin?

“The aim of NordMin is, first and foremost, to increase R&D co-operation between companies and research institutes across the Nordic boundaries. I also believe that the way NordMin facilitates contacts with other ministries in the Nordic countries is useful. This co-operation will lead to an exchange of experiences that we will be useful for us in our work in the ministry.”

What challenges and opportunities do you see in Norway regarding minerals in the coming years?

“The prices of many raw materials are still relatively high compared with six-seven years ago, but there is still some uncertainty in the markets and this affects the supply of capital available to mining companies. The mineral industry is facing challenges in many countries – such as the environment, access to a skilled work force, social responsibility/CSR, and consideration for indigenous peoples – and solutions must be found.”

What are your expectations of working with NordMin?

RIIKKA AALTONEN

*Senior Advisor
Ministry of Employment and
the Economy, Finland*

What are your expectations of working with NordMin?

“NordMin promotes greater co-operation between the players, and offers a platform for discussing issues that concern the sector. NordMin also strengthens current co-operation in research, and enables more frequent dialogue between Nordic researchers, industry and students. NordMin will also boost Nordic research within the EU context.”

What challenges or opportunities do you see in Finland regarding minerals in the coming years?

“Conflicts of interest and environmental issues are areas where the NordMin co-operation can hopefully help us develop new methods and solutions. These can then be applied globally to ease conflicts and concerns.”

“Within the EU, the importance of having our own raw material supply will probably increase, so the Nordic countries hold a key position. It’s vital that we can resolve these challenges in a sustainable way.”

KENNETH EKBERG

*Senior Advisor/Business,
Energy & Regional Development
at Nordic Council of Ministers*

What are your expectations of working with NordMin?

“That NordMin will help to increase the global competitiveness and sustainability of the mining and mineral industry in the Nordic region, through cooperation in research, education and regional development.”

What challenges or opportunities do you see in the Nordic region regarding minerals in the coming years?

“For many regions in the Nordic area, minerals and mining is the only option for economic development. At the same time, the Nordic countries form the largest mining region, with the most dynamic exploration and development activities within the EU. The Nordic region has a large and vibrant mining industry with strong clusters, and the industry is high on the political agenda. Maintaining this strong position is one of the greatest challenges for the future.”

PÄR WEIHED

*Professor in Ore Geology,
Luleå University of Technology,
Sweden*

What are your expectations of working with NordMin?

“I hope that the work with NordMin will result in closer Nordic co-operation in the mining and minerals sector. I also hope we can succeed in bringing together various players from academia, industry, research institutes, agencies and NGOs.”

What challenges or opportunities do you see in Sweden regarding minerals in the coming years?

“There are many challenges, not least societal – for instance, how to increase acceptance for mining operations and how mining companies can interact with the surrounding community. There are technical challenges too – new deposits are becoming harder to find, mines are becoming deeper, and the ores more complex. All this means we must improve in all parts of the value chain.”

RDI challenges and possibilities

Organizing R&D in mining sciences in Finland

DR. KARI KNUUTILA

Research Professor and Director of Oulu Mining School at the University of Oulu in Finland. He is also Chief Technology Officer at Outotec Oyj. His work does not involve his own R&D projects; instead, his task is to organise R&D in mining sciences at the University of Oulu.

“The mining industry needs new knowledge to develop its technologies and improve its competitive edge. International co-operation with other universities is crucial if we are to be at the cutting-edge with the latest mining research results and innovations.”

“Right now my task is to develop Oulu Mining School into a new faculty at the University of Oulu. The University Board decided in mid-December 2013 to establish a new faculty, and the new faculty of Oulu Mining School will open in August 2014,” he explains.

This new faculty will significantly strengthen research and education in the fields of geosciences, mining engineering and minerals processing. The solid integration of the sciences in mining enables versatile optimisation throughout the value chain, from exploration to operative mine and its closure.

The new faculty will work closely with other faculties at the University of Oulu, other universities in Finland, and institutions in other countries. The plan is to collaborate in areas such as environmental techniques, process chemistry, process control and monitoring, and social responsibility.

“The new faculty is also a solution for taking R&D in mining to the next level and improving collaboration with mining and technology companies. Current and future mining operations will need skilled mining experts,” says Kari Knuutila.

Mining knowledge for remote areas

“Mining in a remote Arctic environment such as Greenland gives the industry an opportunity to test methods for use in already developed mining areas – both from a technological and a geological perspective,”

“The industry is very interested in learning whether exploration models developed in known areas (brownfields) also work in unknown areas (greenfields).”

“Everything is more expensive in Greenland. There’s no infrastructure to talk about, but lots of potential. That’s why we’re trying to find new ways and techniques to improve mining in the future,” says Jochen Kolb.

DR. JOCHEN KOLB

Research Professor in Economic Geology at the Geological Survey of Denmark and Greenland. Two projects relevant to NordMin involve regional assessments of mineral potential and investigation of known deposits in order to understand how they were formed. The main application of his research is new data for mineral exploration. By combining, for example, geological and geophysical data and building mineral deposit models, his research facilitates exploration and inventory of new deposits.

A sustainable approach to mining

“One particular focus area for us lately has been how to dispose mine tailings to sea in a sustainable way.”

“But our efforts also include what to do with other surplus materials, how to work in arctic environments, deep mining and mining on the ocean floor. SINTEF is actively co-operating with several private operators in the mining industry as well as the Luleå University of Technology in Sweden and VTT in Finland.”

Per Helge Høgaas work is primarily on sustainable development within the mining industry and in this work he looks at alternative mining tech-

niques, new process and refining technologies, and how to handle and utilise excess materials in an efficient way.

PER HELGE HØGAAS

Senior Business Developer with SINTEF Materials and Chemistry, a contract research institute which offers a high level of expertise in materials technology, advanced materials and nanotechnology, applied chemistry and biotechnology.

Investigating young gold and silver deposits

DR. VIGDÍS HARÐARDÓTTIR

Geochemist at Iceland Geo-Survey (ÍSOR). She is currently investigating metal deposition from geothermal wells onshore in the Reykjanes area, just southwest of the Icelandic capital Reykjavik.

“My research is on base metal sulphides, gold and silver, formed in geothermal areas. As you know, Iceland is geologically young. We don’t have many mines extracting ancient ore deposits.”

“My research is examining ore formation in real time as minerals precipitate from metal-rich geothermal waters. You could say it’s like creating an inventory for future metal recovery in Iceland,” she explains.

“Today we’re trying to understand how valuable metals are formed in active geothermal systems. This research could also help us to locate new resources in already developed areas.”

Dr. Vigdís Harðardóttir’s research focuses particularly on areas where

sea water reacts with the surrounding basaltic rocks at elevated temperatures, and extracts gold and silver from the crust.

Although significant accumulation of metals by this process may take between 50 000 and one million years, new technology may soon enable metal extraction directly from the active geothermal systems.

“It’s impossible to say when minerals might be harvested from this source, but research is exploring the geological conditions that are best suited to metal accumulation.”

Gender equality particularly beneficial in mining companies

DR. EIRA ANDERSSON

Researching into gender and technology at the Division of Human Work Science at Luleå University of Technology in Sweden. In recent years, she has noticed a growing interest for gender issues in the raw materials industry.

“The male dominated mining industry is particularly interesting. It’s very significant for the local labour market where it operates, and it influences community development. Mines can’t be moved, and there is lot of money involved,” explains Eira Andersson.

At the same time, the sector must regenerate in order to develop.

“The industry wants young creative people ... and more women. But for this to happen, the industry must address the gender issues to be more attractive. Lack of gender equality is problematic within mining companies. Conservative gender patterns make it more difficult to adopt modern management methods or new technology.”

“There is also a direct contradiction between masculine attributes and safety. In all male workplaces, physical

debilitation is more likely and unnecessary risks may be taken,” says Eira Andersson.

“By challenging gender patterns, you’re also changing the image of the mining industry – from a conservative male-dominated sector to a modern business enterprise with greater acceptance from the community. In northern Sweden, this is a prioritised issue. The aim is to create sustainable job opportunities, which make it attractive for both women and men, to remain in the region,” says Eira Andersson.

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NordMin is the Nordic Council of Ministers research and education initiative in the mining and mineral field. NordMin is funded by the Nordic Council of Ministers with a total of 30 million DKK for a period of four years, from 2013 to 2016. The initiative is co-ordinated by Luleå University of Technology.

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