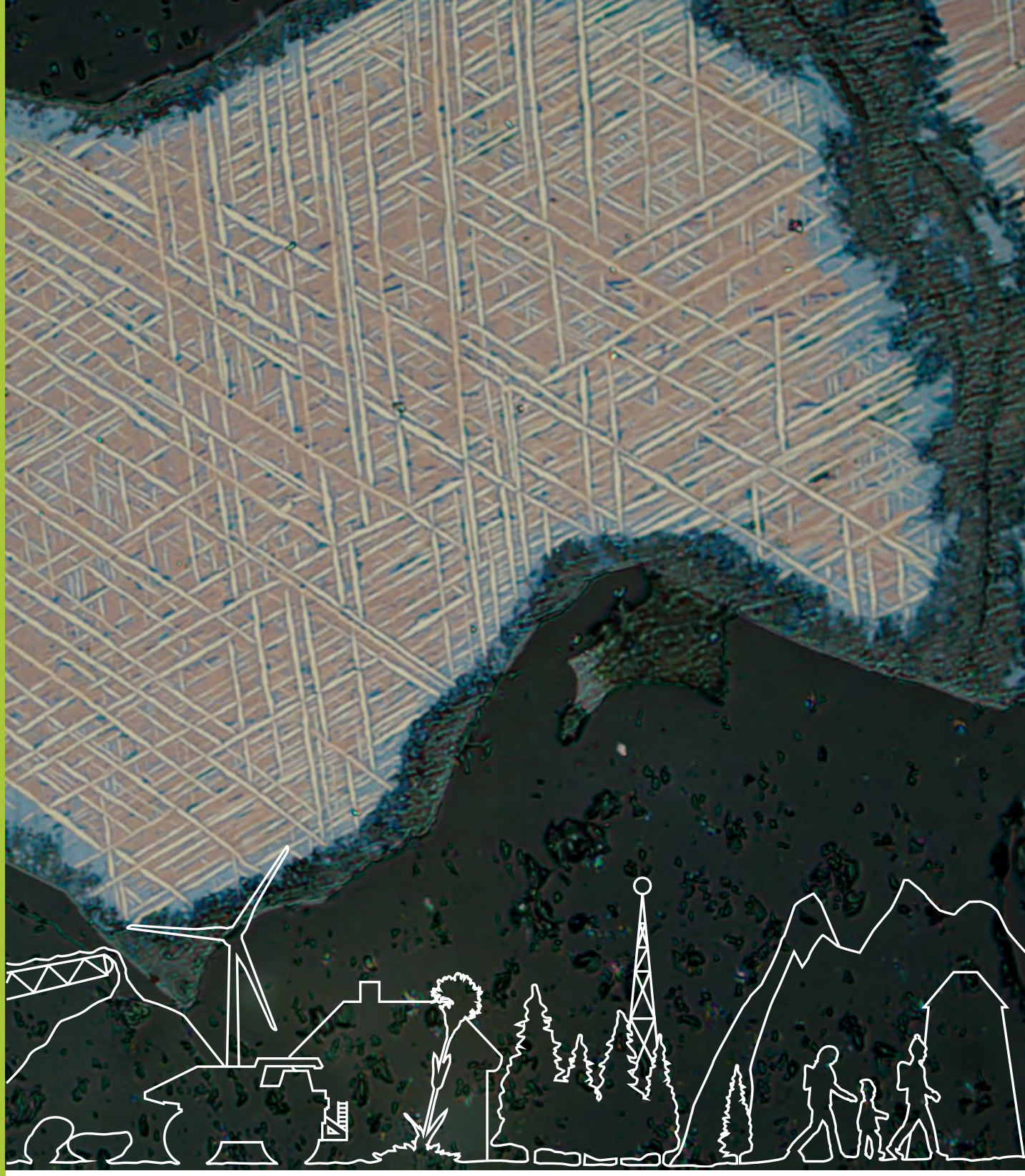


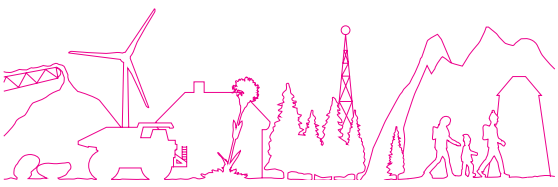
Sweden's Minerals Strategy

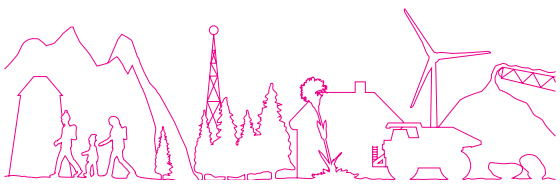
For sustainable use of Sweden's mineral resources that creates growth throughout the country

REGERINGSKANSLIET

Government Offices of Sweden

Production Swedish Ministry of Enterprise, Energy and Communications
Cover Photo Erik Jonsson/SGU
The picture shows complex amalgamations of copper sulfides, primarily copper pyrites, yellow lamellae, in brownish purple bornite from a mineralisation in Norrbotten.
Illustration Blomquist
Print Elanders
Article no N2013.06





Preface

Photo: Kristian Pohl.

A new bridge, a windpower turbine or your mobile telephone contains metals extracted from the ground somewhere in the world. As more and more people extricate themselves from poverty, build cities and develop their industry, the demand for metals and minerals is rising. This has in turn led to a greater interest in Swedish mineral resources.

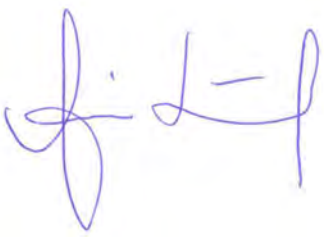
Sweden is currently the EU's leading mining and mineral nation and one of the goals of Sweden's minerals strategy is to strengthen that position. By using our mineral resources sustainably, in harmony with environmental, natural and cultural values, we can create jobs and growth throughout Sweden.

Not only do we have the resources in the form of ore and minerals, but we also have the framework in the form of robust and unequivocal environmental legislation, a strong climate for innovation, openness as regards our geological resources, high-level research and a well-educated workforce.

An expanding mining and mineral industry involves huge investments in parts of the country where such investments have been conspicuous in their absence for a long time. This is a welcome development, but it also brings with it substantial demands.

The communities that are growing alongside the mining industry must also be built up sustainably. Attractive living environments must be created so as to avoid situations where the workforce is flown in and out. The expansion must take place in harmony with the environment and surrounding industries.

My hope is that Sweden's Minerals Strategy will act as a tool for dialogue, cooperation and growth in all parts of the country.



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Sweden's Minerals Strategy

This minerals strategy will increase the competitiveness of the Swedish mining and minerals industry so that Sweden maintains and strengthens its position as the EU's leading mining nation. Sweden's mineral assets are to be exploited in a long-term sustainable way, with consideration shown for ecological, social and cultural dimensions, so that natural and cultural environments are preserved and developed.

*In the minerals strategy, the Government identifies **five strategic objectives** that are considered to be of particular importance in order to reach the strategy's vision. These objectives are:*

*Within these five strategic objectives, there are **eleven action areas** to which a number of **goals** and **measures** are connected. These action areas are:*

The minerals strategy deals with non-energy minerals for industrial purposes.

The term "mining and minerals industry" refers to enterprises that produce ore for metal extraction, aggregate, industrial minerals and natural stone.

1 *A mining and minerals industry in harmony with the environment, cultural values and other business activities.*

1. Greater resource efficiency

Measures:

1. Survey and analysis of the extraction and recycling potential of Swedish metal and mineral assets (SGU, EPA).

2. System for reporting shot rock production data (SGU, EPA, Transport Agency, Boverket).

2. Better dialogue and synergy with other industries

Measures:

3. Manual for consultation between the reindeer and mining industries during permitting processes (Norrbotten CAB).

3. Mining communities with attractive natural and cultural environments

Measures:

4. Develop, compile and disseminate examples of how the cultural environment in Bergslagen can be utilised by the mining and tourist industries (Heritage Board)

2 *Dialogue and cooperation to promote innovation and growth.*

4. Promotion of societal development and regional growth

Measures:

5. Programme for exchange of knowledge and experience and coordination when new large-scale mines are being established (TVV).

6. Manual for municipalities where mines are to be established (TVV, EPA).

7. Review of obstacles preventing an increase in housing production to meet the expansion of the mining industry (Boverket).

8. Methodology for regional material supply planning (SGU).

5. Clearer distribution of responsibility and better flow of information among actors in the industry

Measures:

9. National minerals forum to promote dialogue, knowledge exchange and coordination.

Abbreviations:SGU (Geological Survey of Sweden), EPA (Swedish Environmental Protection Agency), Boverket (Board of Housing, Building and Planning), CAB (County Administrative Board), TVV (Agency for Economic and Regional Growth), TA (Agency for Growth Policy Analysis), FFI (Programme for Vehicle Strategic Research and Innovation), VR (Swedish Research Council).

The primary target group for the mineral strategy is the Swedish mining, industrial minerals and aggregate industry and the actors who contribute to or are affected by the industry's activities. Sweden has several strong enterprises that supply technically advanced equipment to industrial mining and minerals enterprises. Some of these businesses are world leaders in their respective sectors and have significant market shares. Creating the prerequisites for growth in the mining and minerals industry also strengthens the conditions for its suppliers, which is beneficial to Sweden. Some of the measures presented in the strategy also have a direct bearing on the suppliers.

3 *Framework conditions and infrastructure for competitiveness and growth.*

6. A clearer and more effective regulatory framework

Measures:

10. Follow-up and evaluation of performed initiatives to shorten environmental permitting lead-times (TA).

11. Pilot for comprehensive plan to support municipalities in their detailed planning work (Norrbotten CAB).

7. Infrastructure investments for growth in the mining industry

Measures:

12. Use experience from FFI to develop electric propulsion systems for trucks on the road (Transport Agency).

4 *An innovative mining and minerals industry with an excellent knowledge base.*

8. Research and innovation that create growth and competitiveness

Measures:

13. Biometric subject review of the mining and minerals research area. Propose improved forms of cooperation between business sector and academia (Vinnova, VR).

9. Skills supply that meets the needs of the industry and the regions

Measures:

14. Increase knowledge about the role of geology in society and highlight the industry as a workplace (SGU, business sector).

15. Regional skills platforms are to draw up plans for how to meet the long-term skills supply needs. mpetensförsörjningsbehovet.

5 *An internationally renowned, active and attractive mining and minerals industry.*

10. A good supply of capital and promotion of investment

Measures:

16. Analysis of Sweden's attractiveness as a mining country, from an international perspective (TA).

11. Greater participation in the international arena

Measures:

17. Investigate the conditions for establishing a communication and marketing platform to present activities for greater internationalisation (Business Sweden).

18. Propose how Sweden and Swedish enterprises can contribute to a sustainable mining industry in developing countries (SGU).

19. Sound out countries for more in-depth contacts at government level.

Contents

Why Sweden needs a minerals strategy

The Swedish minerals strategy takes an integrated approach in order to create beneficial conditions, and identify opportunities and challenges so that the mining and minerals industry can grow sustainably and keep pace with the opportunities provided by today's strong international demand for metals and minerals.

Natural resources are vital to the global economy and a good quality of life. Minerals and metals are crucial to the building of modern society. Access to metals such as iron, copper, silver and high-tech metals is a pre-condition for the production of modern energy and environmental technology such as windpower, solar cells, low-energy light-bulbs and catalytic converters in cars. Green growth without access to raw materials for green technology is unfeasible.

There is currently considerable international focus on how the access to metals is to be safeguarded. The issue has come to the fore as a result of rapid economic development in countries such as China, India and Brazil, where constantly improving welfare is leading to a need for metals in society in order to build infrastructure and create material values. Most metals are scarce in the EU with a substantial lack of nickel, iron, zinc, lead and copper and the region is completely dependent on imports of metals such as tin, cobalt and molybdenum. The demand for metals is expected to continue to be high over the next ten years as well as in a longer-term perspective.

Alloying material, ferromaganese (FeMn), SSAB Tunnplåt AB, Luleå. Photo: Stig-Göran Nilsson.

Sweden is one of the EU's leading ore- and metal-producing countries and the Swedish mining industry is in a period of strong growth. The mining industry is of substantial importance to the country's growth and economy. It creates jobs in the surrounding community, contributes to making the mining areas of Sweden more attractive and creates growth in parts of the country that have had a downward population trend for a considerable period of time. The expansion of the mining industry is proof of the strong connection between urban and rural areas.

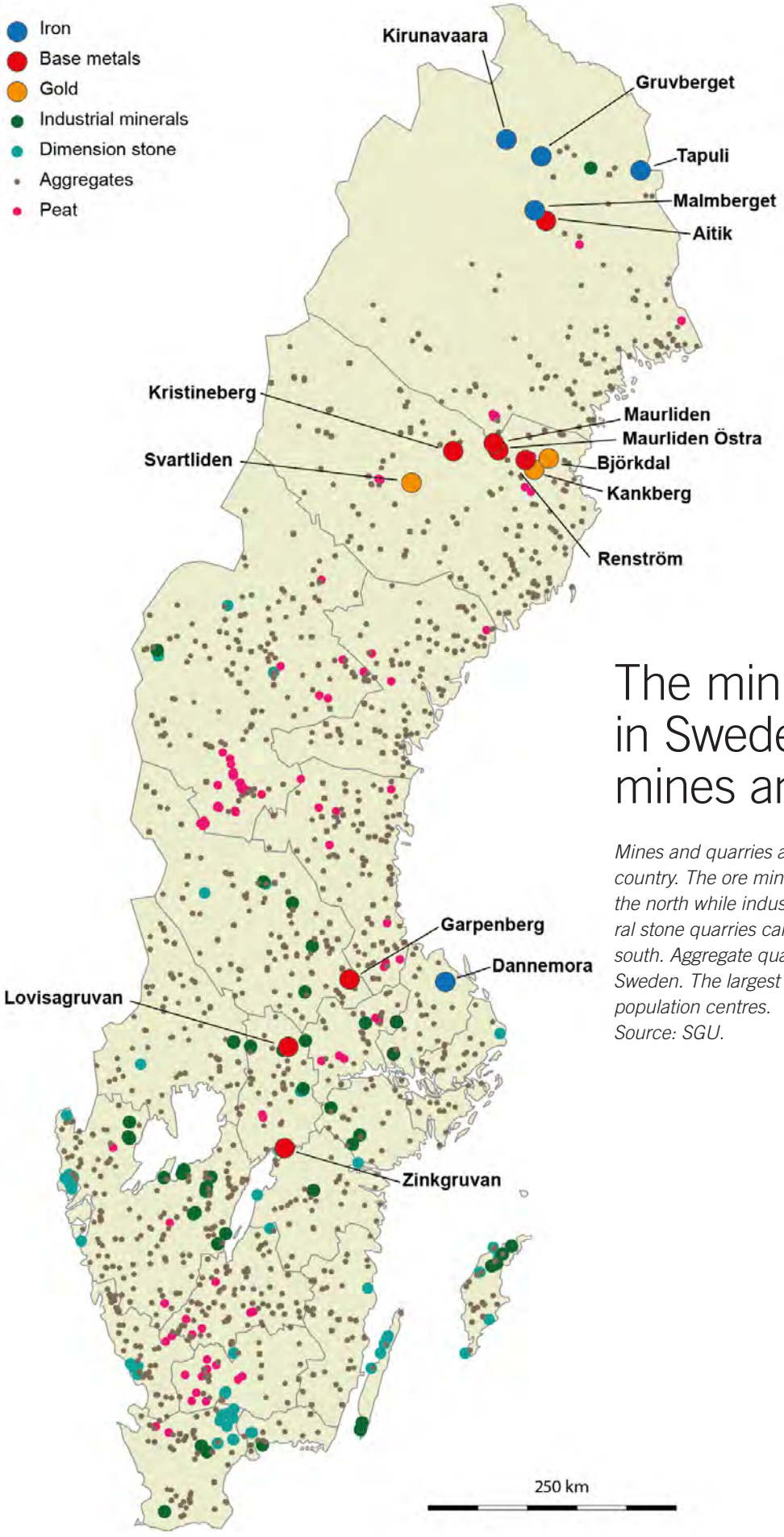
In addition to the production of ore for the extraction of metals, Sweden's bedrock provides good-quality natural stone that has a good international reputation and is exported all over the world. Material is also taken from the bedrock and used for various construction purposes that are necessary for society. Minerals with special physical or chemical properties are used in industrial processes and products.

The production of ore for metal manufacture, mineral products for industrial processes and rock and stone material for building purposes all presuppose the extraction of valuable material from the bedrock. The conditions for ore, industrial mineral and aggregate production are quite similar and they all face very much the same challenges. They are therefore dealt with together in this minerals strategy.

The right conditions for a strong Swedish mining and minerals industry

Most of Sweden is part of a primary rock formation which in turn is part of the Fennoscandian Shield. The Fennoscandian Shield stretches over Sweden, Finland and northwest Russia as well as over parts of Norway. It contains plentiful ore deposits. The primary rock is also of high quality from a building and material point of view. Globally there are few primary rock formations, a fact that makes the Fennoscandian Shield interesting for mineral extraction both in a European and an international perspective. The mining of ore and minerals has characterised Swedish history and metal has been extracted in the country for 4000 years. The oldest stone churches date back to the 11th century and during the same period, mining began in earnest in the central Swedish region of Bergslagen in the form of extracting iron from ore and the establishment of mining districts. Historically, the copper mine at Falun, the silver mine at Sala and iron ore mining in central Sweden have all been of considerable significance for the Swedish economy. During the 18th century, Bergslagen was made up of one large industrial landscape consisting of mines and smelting

The Fennoscandian Shield is a unique primary rock formation with rich ore deposits, in contrast to the bedrock that dominates the geology of the rest of Europe. Source: SGU.



The mining industry in Sweden 2012, mines and quarries

Mines and quarries are spread over the entire country. The ore mines are concentrated in the north while industrial minerals and natural stone quarries can be mostly found in the south. Aggregate quarries are found all over Sweden. The largest quarries are close to major population centres.
Source: SGU.

works. From the beginning of the 20th century and onwards, the mines of Västerbotten and Norrbotten in the very north of Sweden, not least the iron ore mines in Kiruna and Malmberget, have formed the backbone of the Swedish mining and metals industry At the end of 2012, Sweden had 16 active ore mines. Iron ore is mined in Kiirunavaara, Malmberget, Dannemora and Pajala while sulphide ore and gold are mined on other sites. The Kiruna mine is the largest underground iron ore mine in the world. Aitik, located twenty kilometres east of Gällivare, is Europe's largest copper mine and is also Sweden's largest gold producer. Minerals that are important for the process industry and unique types of stone that are internationally renowned for their high quality are mined in southern Sweden. Several rock-types in the Swedish bedrock are suitable for the production of durable aggregate. Crushed products are used in the construction of e.g. roads, railways and concrete. Aggregate quarries can be found all over Sweden.

According to data from the SGU, there could be as many as 30 metal mines in Sweden in 2020 compared to the current number of 16. By 2030, there may be as many as 50 mines in operation in Sweden. This forecast is based on assessments of the mining capacity in projects that have been given or have applied for a processing permit and where active efforts to implement the projects are being made. The forecast assumes that all these projects will become operational mines.

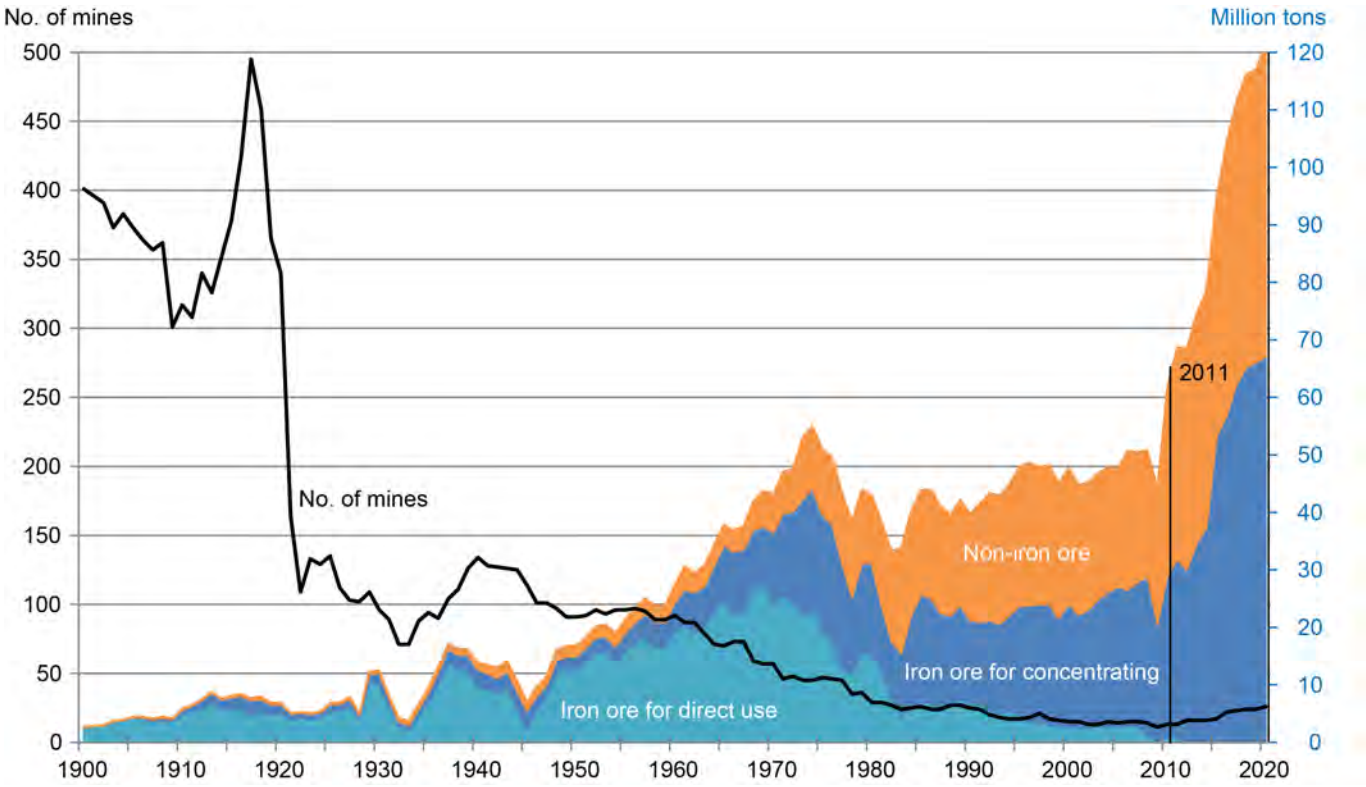


Figure 3. At the end of the 1910s, there were nearly 500 mines in Sweden producing almost eight million tonnes of ore. A mere 50 years ago, there were still around 100 mines in Sweden producing about twenty million tonnes of ore. Today, Sweden mines nearly 70 million tonnes of ore per year. According to the sector's own forecasts, compiled by the Swedish Geological Survey of Sweden (SGU), ore production may amount to nearly 120 million tonnes in 2020. There were 16 mines in operation at the end of 2012. The total volume of ore extracted in Swedish mines is estimated to be about 2 900 million tonnes. The known volume of ore in Swedish mines is currently estimated at 3 494 million tonnes, although this volume is increasing as new exploration is being carried out.

In 2020, ore production is expected to amount to 120 million tonnes, which is 75 percent more than in 2011, when production was 68 million tonnes[1]. SGU estimates that production in 2030 will amount to 150 million tonnes. The percentage of iron ore is expected to rise from 46 percent in 2011 to 50 percent in 2020 but then fall back to 44 percent in 2030.

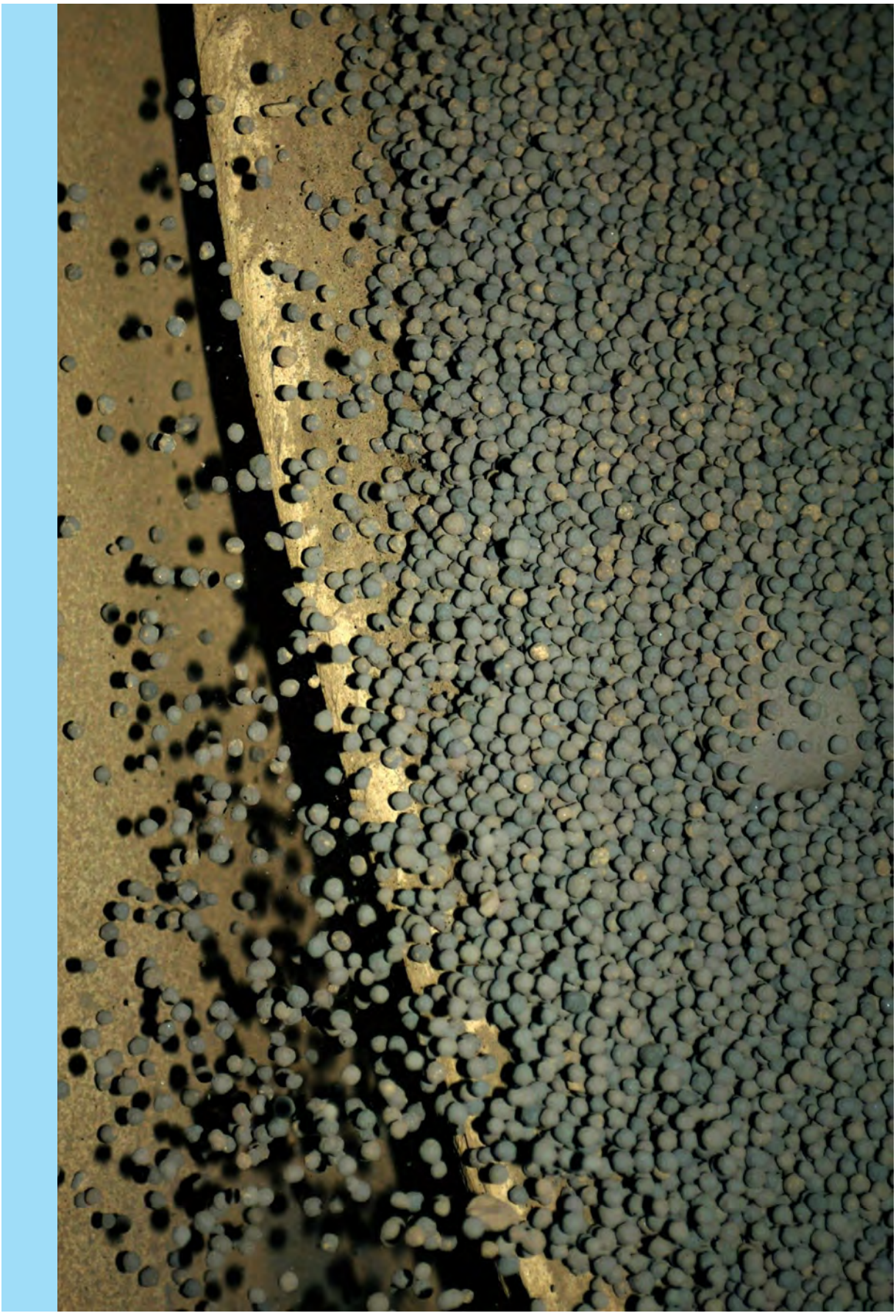
In 2010, the Swedish mining and minerals industry employed 8 400 people and it is a very important sector for Swedish exports. Its share of Swedish commodity exports has risen consistently since 1998 and in 2011 amounted to 12 percent. In absolute terms, the mining and minerals industry supplies export products with a value of just over SEK 145 billion (EUR 17.5 billion). The industry's share of Swedish GDP has increased during the 2000s and in 2010 amounted to 0.85 percent. In fixed prices, this share corresponds to just over SEK 30 billion (EUR 3.6 billion)[2].

In a 2012 survey ranking the investment climate for establishing exploration and mining activities in 93 regions and countries, Sweden was in the top ten[3]. The survey took several factors into consideration, such as the potential for mineral deposits in the regions and countries, political stability, security in the country or region, level of corruption, permitting systems, environmental assessment system and land use, infrastructure, tax burden, access to geological data and skilled labour, etc. Apart from Sweden, the ten highest ranked regions or countries in terms of investment climate included Finland, Ireland and various territories and states in Canada and the United States.

[1]SGU, Metals and Minerals newsletter, December 2011.

[2]Statistics Sweden, National Accounts 2012.

[3]The Fraser Institute, Survey of Mining Companies 2011/2012, 2012.



Manufacture of pellets from collected flue dust, Fundia Special Bar AB, Smedjebacken
Photo: Stig-Göran Nilsson, Jernkontoret

Sweden's mining and minerals industry in an international perspective

The global population is continuing to rise and is expected to reach nine billion by 2050. In 2060, it is assumed that two-thirds of the world's population will live in urban areas. The number of "mega-cities" is therefore expected to rise. This will put huge demands on the availability of metals and minerals to keep up with societal development. Such major urbanisation also throws up issues linked to land and resource use as well as environmental impact.

The EU needs to import considerable volumes of metals to meet the demands of societal development. EU Member States use 25-30 percent of the global production of metals while producing only about three percent themselves. Sweden is the EU's leading iron ore producer, producing as much as 93 percent of the total. Sweden is also among the leading producers in the EU of the base metals copper, zinc and lead and the precious metals gold and silver. Certain other important metals are not produced at all in Europe and the EU. EU Member States have therefore taken a number of steps in order to safeguard the supply of raw materials. Particular interest has been directed at rare earth metals, due to the fact that global production is concentrated to so few countries. China is thought to be responsible for about 95 percent of the global production of rare earth metals. Concern over the dominance of individual countries as regards raw materials and minerals along with restrictive trade measures have sparked an interest at international organisations like the OECD in discussing and analysing the current situation and likely trends. In 2012, for example, the OECD published reports on measures restricting the export of raw materials[4] and measures controlling exports of specific commodities[5].

In November 2008, the European Commission presented a strategy for meeting Europe's critical needs for non-energy raw materials to

The Europe 2020 strategy described five targets to be achieved by 2020, namely:

1. Employment: Increasing the employment rate of the population aged 20-64 to 75 percent.
2. R&D: Investing three percent of GDP in research and development (R&D).
3. Climate and energy: Reducing carbon emissions by 20 percent (and by 30 percent if conditions permit), increasing the share of renewable energies by 20 percent and increasing energy efficiency by 20 percent.
4. Education: Reducing the school drop-out rate to less than 10 percent and increasing the proportion of tertiary degrees to at least 40 percent among 30-34 year-olds.
5. Poverty and social exclusion: Reducing the number people threatened by poverty and social exclusion by 20 million.

[4]OECD, Taking stock of measures restrictions the export of raw material, OECD trade policy papers No 140.

[5]OECD, Regulatory transparency in multilateral agreements controlling exports of tropical timber, e-waste and conflict diamonds.

Limestone, 20-40 mm, SSAB Tunnplåt AB, Luleå Photo: Stig-Göran Nilsson, Jernkontoret.

promote growth and jobs, known as "The raw materials initiative"[6]. This initiative was built on three pillars:

- Safeguarding access to raw materials on the global market.
- Fostering a sustainable supply of raw materials from European sources.
- Promoting resource efficiency and recycling.

The Commission has since delivered its communication "Tackling the challenges in commodity markets and on raw materials"[7] which is a follow-up to the raw materials initiative.

According to "Europe 2020 – A strategy for smart, sustainable and inclusive growth"[8] a greener, more resource-efficient and more competitive economy built on skills is to be developed.

The growth strategy 2020 comprises the areas:

- Smart growth.
- Sustainable growth.
- Inclusive growth.
- Financial governance.

Under these areas, there are seven flagship initiatives. In the area of sustainable growth, *A resource-efficient Europe* is presented, and in smart growth we can find the *Innovation Union* initiative including the *European Innovation Partnership (EIP)* instrument. The partnerships shall act throughout the entire research and innovation chain to increase research and demonstration, coordinate investments in demonstration and pilot schemes, predict rapid and necessary amendments to ordinances and standards, and mobilise demand. There are EIPs in areas such as active and healthy ageing, water, agriculture and raw materials.

Another target is the creation of EIT (European Institute of Innovation and Technology), which is to stimulate European sustainable growth and competitiveness by strengthening innovation capacity and innovative impact. Special KICs (Knowledge Innovation Communities) have been established to achieve this. There will soon be a KIC for raw materials.

The EU has called on the Member States to develop national mineral strategies. Finland[9] and Germany[10] presented their mineral strategies in 2010. Finland is looking to safeguard

[6]European Commission, The raw materials initiative - meeting our critical needs for growth and jobs in Europe, COM(2008) 699, 2008.

[7]European Commission, Tackling the challenges in commodity markets and on raw materials, COM(2011) 25, 2011

[8]European Commission, Europe 2020 – A strategy for smart, sustainable and inclusive growth, COM (2010) 2020, 2011

[9]Geological Survey of Finland, Finland's Minerals Strategy, ISBN: 978-952-217-133-7, 2010.

[10]Federal Ministry of Economics and Technology, The German Government's raw materials strategy, www.bmwi.de, 2010.

access to raw materials, reduce environmental impact, increase productivity during extraction and strengthen R&D activities whereas Germany is focusing on strengthening the participation of German enterprises in mining operations and metal extraction worldwide. There are also examples outside the EU. Norway, for example, is currently working on a minerals strategy and another has been presented for the province of Quebec in Canada[11]. Background data and documentation that form the basis of a Swedish minerals strategy was submitted to the Government by SGU in March 2011[12].

Photo: Boliden.

International work on mining and mineral policy issues is ongoing in a number of configurations in which Sweden participates. The European Commission is working on raw materials issues, for example, via the Raw Materials Supply Group, an advisory body convened by DG Enterprise. Regarding metals, there are a few international commodity bodies (ICB), such as the International Copper Study Group (ICSG), the International Lead and Zinc Study Group (LZSG) and the International Nickel Study Group (INSG). These organisations are primarily forums where governments, central agencies and other stakeholders can meet to discuss mining and minerals issues. They focus mostly on compiling statistics and analyses of the market and disseminating information. They also participate and support their member countries in various forms of development and foreign aid projects within their respective specialist areas. Some of these projects are financed by the Common Fund for Commodities (CFC), of which Sweden is a member and which is devoted to using the voluntary contributions it receives to support, both financially and from a knowledge perspective, projects that involve several member countries. Such international projects should preferably be of a pilot project nature. International metal and mineral issues can also be dealt within the UN, the Barents Euro-Arctic Council, the Arctic Council and as part of the EU Strategy for the Baltic Sea Region.

In order to maintain an overview of international initiatives and strategies in the area, Sweden needs to participate continuously in the relevant configurations, not least when it comes to EU work both on the council level and in special projects.

[11]Gouvernement du Quebec, Preparing the Future of Quebec's Mineral Sector, ISBN: 978-550-52918-7, 2009.

[12]SGU, En kraftfull svensk mineralstrategi – inriktning, innehåll, uppläggning av arbeten, Dnr 04-2095/2011, 2011.

The Swedish framework

Swedish bedrock can be said to consist of two types of minerals; concession minerals and landowner minerals. The Chief Mining Inspector grants permits for the extraction of concession minerals and the terms and conditions governing such a license are set down in the Swedish Minerals Act (1991:45). Landowner minerals are extracted according to agreements between the landowner, who makes the land available, and the enterprise that will mine the minerals.

The mining of both types of minerals must fulfil the same environmental requirements as other industrial activities. Prior to the extraction of ore and minerals, the planned activities must be tested against the provisions laid down in the Swedish Environmental Code and the Swedish Planning and Building Act (2010:900).

The Swedish Minerals Act

The Mining Inspectorate of Sweden is an organisational unit at the Geological Survey of Sweden (SGU). The Inspectorate is headed by the Chief Mining Inspector, who decides on issues in accordance with the Swedish Minerals Act, e.g. issues relating to exploration permits and permits to mine concession minerals.

Exploration permits

An exploration permits gives the holder exclusive rights to exploration (prospecting) and priority rights to a mining permit (exploitation concession). Before exploration work starts, the permit-holder must draw up a work plan. This work plan must be communicated to the owner/s of the land where the exploration will take place. Landowners then have the right to submit comments on the content of the work plan. If the landowner/s and prospector cannot agree on how the work is to be performed, the Chief Mining Inspector will adjudicate and establish the work plan. When performing exploration work, other regulations governing the area must also be followed. These may be e.g. local nature conservation regulations, provisions under the Cultural Heritage Act (1988:950) or the Off-Road Driving Act (1975:1313)

Exploitation concession

The Chief Mining Inspector decides on

Brief facts

- Concession minerals are certain mineral substances and industrial minerals. The term also covers oil, gaseous hydrocarbons and diamonds.
- Landowner minerals are minerals that belong to the landowner. Examples of landowner minerals include limestone and quartz.
- More than 99 percent of the Swedish bedrock is made up of landowner minerals.
- The provisions governing concession minerals are based on a common national interest in mine working and the minerals industry.
- The public interest in mining and utilising minerals has been deemed to be strong enough to fulfil the conditions laid down in the Swedish Constitution governing the encroachment of landowners' rights.

exploitation concessions pursuant to provisions in the Swedish Minerals Act. If the exploration work done indicates there are deposits of such quality that they would be economically profitable to extract and that their geographical location is suitable with regard to the principles of natural resource management, the Chief Mining Inspector may grant an exploitation concession. An exploitation concession is normally granted for 25 years. The Chief Mining Inspector also establishes the level of compensation that the mining enterprise must pay to the landowner and to the state, the "minerals fee". The minerals fee was introduced in 2005 and means that the landowner is entitled to 0.15 percent of the value of the minerals and the state is entitled to 0.05 percent.

The Environmental Code

The overall purpose of the Environmental Code is to promote sustainable development that will assure a healthy and sound environment for present and future generations. All those who pursue an activity, or intend to do so, must take the precautionary measures that are necessary to prevent, hinder or combat damage or detriment to human health or the environment. An establishment or expansion of a quarry or mine will not be possible without the project being tested against the provisions of the Environmental Code. The Environmental Code contains general rules of consideration, for example a basic principle that measures are to be taken as soon as there is a suspicion that there might be a risk to human health or the environment and a principle that it is the polluter who pays for the remediation of any damage or detriment caused.

The Environmental Code also contains basic provisions concerning the management of land and water areas. The basic rule is that land and water areas are to be used for the purpose or purposes for which they are best suited. Priority shall be given to use that promotes good management from a public interest point of view. Some areas are pinpointed in the legislation as areas of national interest and within these areas, no measures may be taken that do obvious harm to such an area's identified value, with certain specified exceptions.

Apart from the areas of national interest that are identified in the Code, certain agencies, pursuant to the provisions in the Ordinance (1998:896) on Land and Water Management, are to supply information on areas they deem to be of national interest for various purposes. Such agencies include the Sameting (Sami parliament), which is responsible for supplying information on areas of national interest for reindeer husbandry, the Swedish Environmental Protection Agency (Swedish EPA) for similar information on natural values and recreation, the Swedish National Heritage Board, for the preservation of the cultural environment and the SGU for deposits of valuable substances or minerals. The claims made by agencies regarding areas of national interest are not legally binding, however, until they become relevant within the framework of a permit assessment. If, in such an assessment, an area is deemed to be of national interest, measures must not be taken within it if they cause obvious damage to the interest. If an area is of national interest for several incompatible purposes, priority is to be given to

Brief facts

	Granted exploration permits	Granted exploitation concessions	New mines in operation
2009	195	4	1
2010	174	4	4
2011	202	2	1
2012	182	6	3

A total of SEK 783 million (EUR 93.8 million) was invested in exploration in 2011, the highest amount ever. Source: SGU/Bergsstaten

the purpose or purposes that promote good long-term management in the most appropriate way.

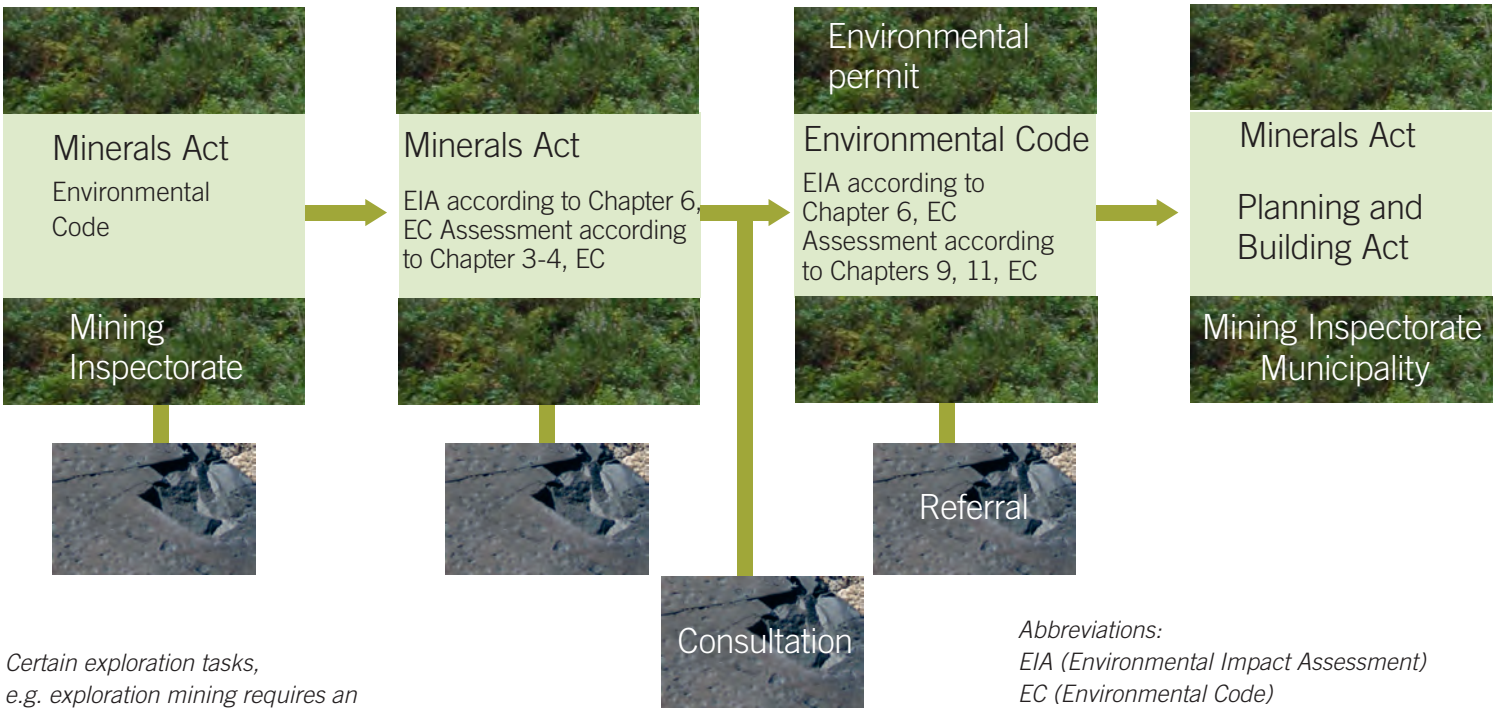
Environmental assessment of mining activities

Environmental permits for mining activities are issued by the Land and Environment Court as the first instance. An application must include an environmental impact assessment, a waste management plan and a plan for how remediation is to be carried out after the activities have ceased. An environmental permit specifies the conditions that apply both to the operation of the mine and to site remediation. The environmental permit also includes states that financial security must be submitted to ensure that sufficient resources are available for remediation in case the enterprise lacks the financial capacity to remediate the site as planned. While the mine is operating, a supervisory authority checks to see that the conditions specified in the permit are being adhered to by the operator. In the initial stages of the assessment process, consultation is sought from all potential stakeholders, who will be given information and the opportunity to submit comments. Both agencies and the general public are included in the consultation.

The Swedish Planning and Building Act

A new Planning and Building Act (2010:900) came into force in Sweden in 2011. The aim of the provisions in the act are, with due regard for the freedom of the individual, to promote social development that provides equal and good social living conditions and a healthy and long-term sustainable living environment for people in today's society and for future generations. The act contains provisions on the planning of land and water resources and on building. The term planning here relates to the work done to develop a regional plan, a comprehensive plan, a detailed plan or site-specific provisions. Under the act, the planning of land and water use is a matter for the municipality. Every municipality is to have a comprehensive plan covering its entire surface area and is to specify the long-term development of the physical environment. The plan is to provide guidance when making decisions on how land and water areas are to be utilised and how the built environment is to be used, developed and preserved. In the new Planning and Building Act, the strategic focus of the municipalities' comprehensive plans has been strengthened in comparison to the previous act (1987:10): The comprehensive plan must specify how the municipality intends to consider national and regional objectives, plans and programmes that are important for sustainable development.

Permitting process from exploration to mine



Certain exploration tasks, e.g. exploration mining requires an environmental permit

Abbreviations:
EIA (Environmental Impact Assessment)
EC (Environmental Code)

The vision of the Swedish minerals strategy

Photo: Benno Kathol/SGU

To create growth throughout Sweden by means of sustainable use of the country's mineral resources, in harmony with environmental, natural and cultural values. Sweden is strengthening its position as the EU's leading mining and minerals nation.

The Swedish minerals strategy serves as a basis for the Government's minerals policy. Establishment of the strategy provides the foundation for further work and it will be realised in the relevant policy areas in order to achieve the set objectives. The strategy is to highlight opportunities and challenges, create prerequisites, clarify roles and identify synergies that can be achieved through cooperation. The vision is permanent but the strategy may be updated to meet changing circumstances.

The Swedish minerals strategy has been developed by the Government with assistance from SGU and in broad dialogue and cooperation with actors and stakeholders on the local, regional and national level who contribute to and are affected by the activities of the mining and minerals industry. The approaches highlighted in the minerals strategy have been identified based on actor input and on the Government's overall assessments of which measures are important in order to achieve the strategy's objectives and vision.

The fundamental prerequisite is a continued strong demand for metals and minerals. Up until 2030, the economic cycle will fluctuate and prolonged periods of recession may well prove challenging for the mining industry. Mining is a long-term activity. Predictions of future growth and demand are deemed to be sufficient to allow planned mining projects to be realised.

Strengths, opportunities and challenges in meeting the vision

For Sweden to be able to utilise the opportunities provided and to develop the mining and minerals industry in a long-term sustainable fashion, with attractive environments for enterprises and individuals, a number of challenges must be addressed.

The future demand for metals can be difficult to predict but there are statistics that can be used as a basis. The figure below illustrates the demand for steel and per capita GDP. At a certain per capita GDP, the curve levels out and the demand for steel peters out. China and India have a long way to go before they reach the per capita GDP of the old economies, which means they will continue to

Brief facts

- The OECD's long-term growth scenarios predict that global growth will be 3.4 percent up until 2017, 3.3 percent up until 2020 and 2.4 percent up until 2050.
- Growth in Sweden is forecasted to be 2.5 percent up until 2020, 2.3 percent up until 2030 and 1.8 percent up until 2050.
- This growth is sufficient to allow new mining projects to get underway within the set time-frame.

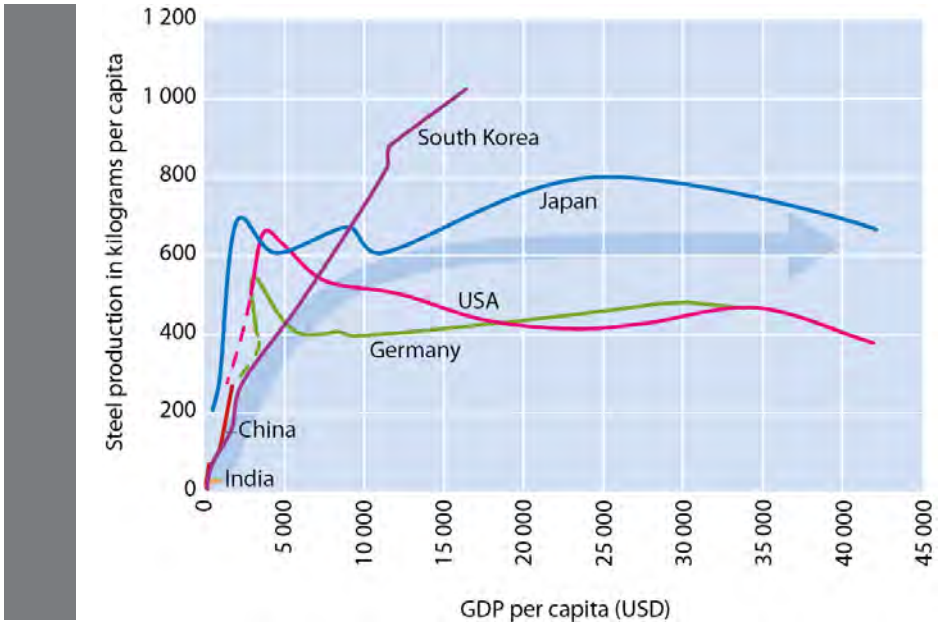


Figure 4. Demand for steel in different countries as a function of GDP per capita (USD). Source: SGU.

experience a high demand for metals. In addition, continued industrialisation in many regions of the world, including parts of Asia, South America and Africa will also lead to very high growth and demand for metals.

Given the continued strong demand for metals and minerals, Sweden is well placed to supply the raw materials and develop the processing chain needed to meet future needs. In addition to Sweden's unique geological potential, there are several other prerequisites that put the country's mining and minerals industry in a good position.

Sweden is a world-leader in mining and minerals research and Swedish enterprises are operating in very efficient clusters in partnership with universities and research institutes. The country is also very much in the vanguard of recycling technology.

Sweden has a capacity for innovation that is among the best in the world. The national innovation strategy adopted by the Government in the autumn of 2012 is a common agenda for a world-class innovation climate in 2020 . It spans a number of action areas that affect all the country's important sectors including the mining and minerals industry. The national innovation strategy underpins a Swedish minerals strategy. An innovation climate that holds its own in the face of tough global competition is crucial if Sweden, together with other countries, is to contribute innovative and sustainable solutions to global social challenges that can provide better quality of life for human beings, more sustainable development and green growth.

Today's strong international focus on raw materials means that it is important for Sweden to be more prominent as a mining nation and to actively and successfully participate in international discussions and activities that deal with the future sale of raw materials and their use. Particular focus should be put on monitoring and influencing the work of the EU in the area of minerals and raw materials and on the internal market for these commodities.

Sweden is seen internationally as an attractive country to invest in as regards mining exploration and operation. In addition to Sweden's good geological prerequisites, its attractiveness is also influenced by the quality of the country's infrastructure in the form of roads, railways, harbours, energy and water supply. Sweden's institutional preconditions, in the form of its legislation, efficient public sector, taxes and fees, transparency and predictability in assessment processes, low level of corruption, etc., make it an attractive country to invest in. It is important to maintain this attractiveness in the face of the competi-

[13]Government Offices, National Innovation Strategy, N2011/547/FIN, 2012

tion as other countries are also carrying out similar initiatives to strengthen their mining and minerals industries.

Mining and quarrying have an unavoidable impact on the environment that must be minimised before, during and after operation. The current rising production of minerals and metals must be balanced against greater protection of and care for the natural environment. Production should increase without jeopardising fulfilment of Sweden's environmental quality objectives, including the Good-Quality Groundwater (extraction of natural gravel in particular), A Non-Toxic Environment, Limited Climate Impact and A Good Built Environment objectives.

Dala sandstone with desiccation cracks. Photo: J-O Svedlund/SGU.

Establishment of the majority of new mines is planned in northern Sweden where there are environments of high natural and cultural value, an active outdoor life and where the Sami have a long tradition of reindeer husbandry. It is important that the mining expansion takes place in consensus with and with respect for other industries and values so as not to weaken the region's overall attractiveness.

The initial phase of establishing a mine places considerable demands on the municipality in which the mine is being located. Actors with a variety of remits and responsibilities take part in the establishment processes and there must be good dialogue between them to avoid conflicts of interest. In addition to the purely legal processes that must be dealt with by the municipalities, it is important that they promote business and a well-functioning labour market. It is equally important that the municipalities can offer attractive living environments with good access to services, attractive housing environments and recreational opportunities. The regional level has an important supportive role to play in this work. Strategic efforts which take a holistic approach to the needs of mining enterprise employees and their families increase the likelihood that they also take up residence in the area thereby avoiding what are known as "fly in/fly out" scenarios. Establishing mines can thereby contribute to more sustainable and diversified growth locally and regionally, which can promote development in other sectors and industries.

Improving the industry's attractiveness and image is a key component in attracting qualified staff of both sexes to the industry and to increase the intake of students to relevant educational programmes. Joint initiatives by the industry, agencies, regional and local representatives are necessary in order to identify labour and skills requirements based on local and regional conditions.

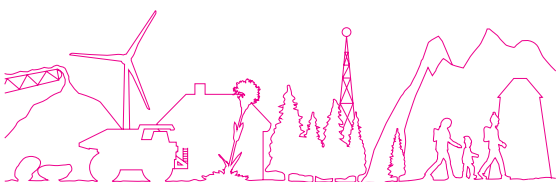
The aim of the Swedish minerals strategy is for Sweden, by using its strengths, to able to tackle challenges and utilise the opportunities presented so that we continue to develop as the EU's leading mining nation.

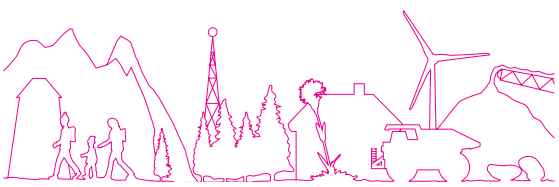
- To create attractive environments for businesses and individuals.
- To maintain and develop enterprises' capacity for innovation.
- To recruit skilled labour to meet the needs of the industry and the regions.
- To expand the mining and minerals industry with respect for and in harmony with reindeer herding rights, other industries and natural and cultural values while fulfilling Sweden's environmental quality objectives.
- To expand the mining and minerals industry so that it provides regional as well as national growth.

- More value added on products.
- Increased international profile and activity.
- Increased exports of Swedish mining technology.

- Good geological prerequisites.
- A strong innovation climate and strong research and innovation environments.
- Good investment climate with good institutional conditions.

- Receding demand for metals and minerals.
- Lack of consensus and dialogue among actors leads to opportunities not being utilised to their full potential.





Five strategic areas for long-term sustainable minerals use

A mining and minerals industry in harmony with the environment, culture and other industries

Growth in the mining and minerals industry must take place with respect for and in harmony with environmental values, cultural environments and other industries. A long-term sustainable mining and minerals industry tackles the negative environmental effects it causes in a lifecycle perspective. This means that sustainable technologies are used for exploration and exploitation. Mining operations are efficient in terms of materials, energy and water use. This is achieved as a result of waste prevention, recycling, use of new and substitute materials and using chemical and biological enrichment methods that do not have a negative environmental impact. Emissions are generally low and environmental impact is measured and managed. Mining areas are restored or remediated so that new natural or cultural values emerge after operations have ceased. Sustainable development is to be business-driven but the Government calls on businesses to follow the OECD Guidelines for Multinational Enterprises, the UN Guiding Principles on Business and Human Rights and the UN Global Compact.

A broader focus than simply on geological extraction creates value added and contributes to growth throughout society. Resource efficiency makes it possible for the economy to create more with less, deliver greater value with less effort, use resources in a sustainable way and minimise environmental impact. Resource efficiency can therefore lead to both environmental benefits and new business opportunities.

A significant resource base for metal production is stored in society in the form of end-of-life products and this should be utilised to a greater extent. Recycling and the opportunity to use substitute materials reduces the EU's dependence on imports of primary mineral raw materials and improves the environmental balance. By using end-of-life materials as raw materials, new metal and mineral products can be manufactured efficiently from both a materials and energy point of view. Metals can be infinitely recycled without their unique properties deteriorating. Recycling on its own is not sufficient however to meet the growing societal need for metals and minerals, making the extraction and processing of virgin raw materials still necessary.

Greater resource efficiency

Objective: To extract ore and minerals from Swedish bedrock with greater resource efficiency. The recycling rate of end-of-life metallic and

Conglomerate rock in Hykjeberg. Photo: J-O Svedlund/SGU.

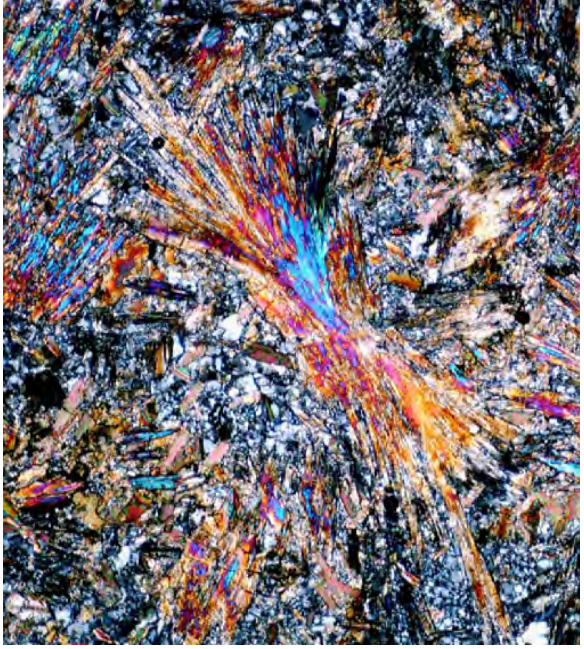
mineral products and of process waste is to increase and waste volumes are to be reduced.

The objective of EU work on resource efficiency is economic growth without a simultaneous increase in resource consumption. The extraction of minerals and metals is responsible for a considerable share of total energy consumption both nationally and globally. This share is increasing as demand increases and deposits become increasingly difficult to access. Processes for the production of metals and minerals need to be even more resource-efficient and the mining industry needs to further reduce its emissions of greenhouse gases.

Recycling and reuse are one of the most energy-efficient measures that can be taken to reduce the environmental impact of the mining and minerals industry. The recycling of minerals and metals can, and needs to be increased. This is true for traditional materials of considerable economic significance such as iron, aluminium and copper, where recycling rates are already relatively high. It is even more applicable to new, rarer metals that are expected to be of crucial importance to the development of future energy solutions and for which global recycling rates are low. Examples of such metals are lithium in batteries, gallium, germanium, indium and tellurium in solar cells, and rare earth metals such as neodymium and dysprosium in catalytic converters and permanent magnets.

Sweden has a long and successful tradition of recycling to build on. Recycling should be developed further. Rare metals can already be found today in end-of-life products which are often collected for the recycling of steel, copper and precious metals. As the use of these rare metals increases, the volumes of end-of-life products that become available for recycling are becoming increasingly commercially viable. This recycling may demand technologies and approaches that are different to traditional scrap metal management. Recycling of new metals may need to be promoted so that Swedish enterprises can also benefit from imminent developments in Europe.

There is also potential for improving resource efficiency and increasing the use of mined material for use as aggregate. Greater use of crushed rock as ballast should be promoted



Picture shows amphibole aggregate in a transformed volcanic rock-type close to the iron ore in Persberg, western Bergslagen. Microscope image in cross-polarised light. Photo: Erik Jonsson/SGU.

and the use of natural gravel, which is a finite resource, should be reduced. The blasted rock waste, or "shot rock", produced during major infrastructure and construction projects, is currently seen as a by-product. This rock can be used instead of natural gravel as ballast material in various applications as long as it is processed appropriately. Residual stone from rock breaking can be used as a substitute material. There is currently no complete documentation or any compiled data on how much this might be. To increase resource efficiency and be able to satisfy society's requirement for ballast, a system needs to be developed to receive data on produced volumes of shot rock. This production data can then be used together with the data that is available on production from gravel pits and stone quarries to increase total resource efficiency and reduce the use of natural gravel. This would be in line with one of the targets within the environmental quality objective of Good-Quality Groundwater, which stipulates reduced use of natural gravel.

The European raw materials initiative proposes ten measures. The first of these measures is to define critical raw materials. Finland's minerals strategy defines this by means of a table of 14 "critical", 11 "economically very important" and 15 " economically important" metals and minerals that relate to the EU's definition. For each metal or mineral the strategy states whether there is mining activity or potential deposits in Finland. There is as

yet no similarly fundamental and integrated knowledge on these critical raw materials and even less on the recycling status per metal and mineral.

To increase the resource efficiency of the mining and minerals industry, it is proposed within the framework of the minerals strategy that:

- SGU be given the task of performing an analysis of the extraction and recycling potential for various metal and mineral assets in Sweden in partnership with the Swedish EPA and with the support of the mining and recycling industries. The analysis is to be linked to the total supply requirement in the whole of Europe. The findings of such an analysis could form one of several bases to stimulate more efficient use of Swedish metal and mineral resources, show how Sweden can contribute to the European supply situation and identify potential business opportunities.

- SGU be given the task of working together with the Swedish EPA, with the support of the Swedish Transport Administration and the National Board for Housing, Building and Planning, to submit proposals for how a system for reporting shot rock production data can be designed and used together with data that has already been compiled on the production of crushed rock and natural gravel. Improved statistics on ballast production including shot rock will help provide a better planning basis and better monitoring of the target to reduce natural gravel use.

Better dialogue and synergy with other activities

> *Objective: To extract minerals with respect for and in harmony with other industries. If there is competitive land use, dialogue is to start at an early stage and consensus solutions are to be investigated. Synergies with other industries are to be sought.*

Ore and minerals can only be mined where there are viable deposits in the bedrock. The location of a mine is determined exclusively by the position of the mineral deposit. Metalliferous ores are mostly found in northern Sweden, where there are also considerable natural and cultural values that are a resource both for the business sector and to create attractiveness for individuals, for example in the form of recreational areas, reindeer husbandry and tourism. The mining of aggregate is restricted to a slightly less extent to a specific location since rock types of suitable quality can often be found on several sites. For economic and practical reasons, however, the mining needs to be done close to where the aggregate is to be used. The long-distance transportation of heavy aggregate should be avoided from the point of view of both the environment and profitability.

Potential for growth can be found in identifying and realising synergies between the mining and minerals industry and other industries. The mining industry, like forestry and windpower projects, is dependent on infrastructure for transport, which provides scope for cooperation. The tourism sector is also a transport-intensive industry.

Coordination and dialogue among the industries and activities that lay claim to the same land must be promoted. A situation that often arises when planning mineral extraction and that requires careful consideration is when the planned mine is located within a reindeer herding area. The Sami right to land and water, the reindeer husbandry right, is founded on traditional/ancient customs and is a prerequisite for reindeer husbandry. Reindeer husbandry is protected in the Swedish constitution and regulated by the Reindeer Husbandry Act (1971:437). Reindeer husbandry is a basic prerequisite of Sami culture, which is also protected in Sweden's Instrument of Government. The Government takes measures aimed at promoting a vibrant Sami culture, based on ecologically sustainable reindeer husbandry and other Sami industries, and at strengthening the Sami's capacity to influence. The Sami are also recognised as Sweden's only indigenous people.

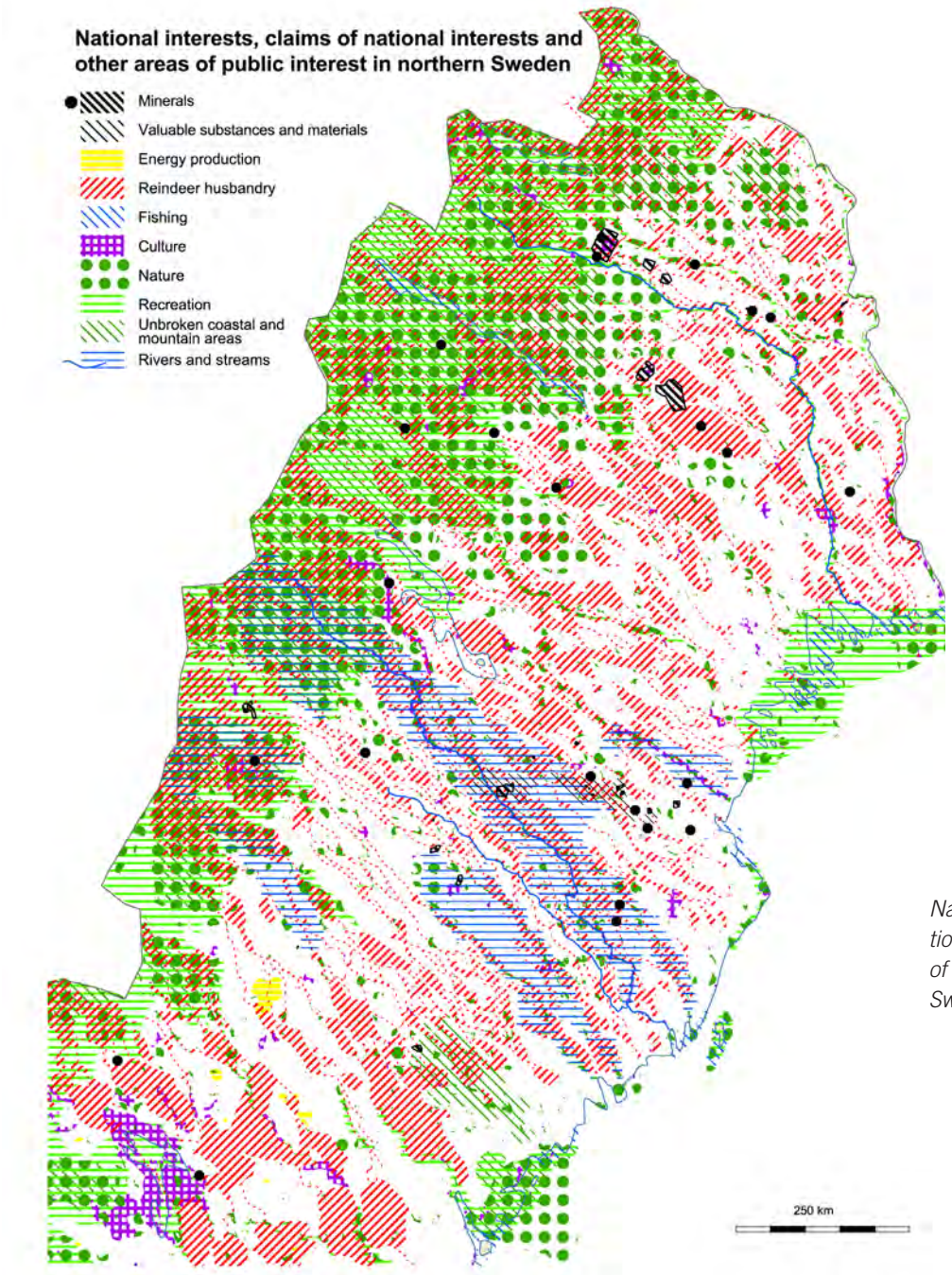
Key reindeer herding areas are also exposed to a number of other activities in addition to mining operations, including wind and water power and infrastructure such as roads and railways, which can make reindeer husbandry more difficult in these areas. The cumulative consequences of other interests in the local environment can also make it difficult for reindeer herders to use alternative grazing areas.

The figure below shows a picture of northern Sweden, on which areas deemed to be of national interest under the Environmental Code, or deemed by the competent authorities to be of national interest, as well as other areas of public interest (e.g. national parks and Natura 2000 sites) are marked. The figure clearly illustrates how the land-based distribution of different interests varies and how several interests overlap in major areas.

To promote greater cooperation and synergy between the mining and minerals industry and other industries, it is proposed within the framework of the minerals strategy that:

- The Norrbotten County Administrative Board be given the task to head a project to develop a manual for consultation and communication between reindeer husbandry and the mining industry during the permitting process for exploration and exploitation. Both the industries' sector organisations, the Sameting (Sami Parliament) and the Mining Inspectorate of Sweden, are to be given the opportunity

project



National interests, claims of national interests and other areas of public interest in northern Sweden. Source: SGU.

Mining communities with attractive natural and cultural environments

Objective: To ensure that new mining communities in Sweden are established and developed based on a holistic perspective that promotes sustainable community planning. Considerable concern is to be shown for both cultural and ecological dimensions. Natural and cultural values should be utilised to promote attractive living environments.

By planning proactively to ensure a rich range of cultural activities when establishing and developing mining communities and to preserve and utilise valuable natural and cultural environments, the mining and minerals industry can be strengthened as a sustainable industry with a long-term future.

Falu Mine, which was closed in 1992 after more than a thousand years of mining, is today a popular tourist destination and world heritage monument. Photo: Falu Mine.

For some considerable time, the mining and minerals industry has shaped both communities and landscapes. In many cases, the industry has created cultural environments of considerable value. In Kiruna and Malmberget, many actors have been involved in recent years in discussions on how these historical prerequisites can best be utilised. The central Swedish district of Bergslagen has a thousand-year history of mining that has left its imprint on the landscape. It is here that one can find the Falu Mine World Heritage Site. The historical traces of the mining industry are today valuable parts of the cultural landscape and are of fundamental significance for the living environments of many people. The environments are also very important for the tourist industry. The presence of both active and historical mines in the same area leads to greater interest from both local residents and visitors.

The fact that there is a deeply rooted history also has a very positive effect on the scope for developing today's mining industry. It is a question on the one hand of cultural heritage being an important part of the Swedish mining industry's brand and on the other of the existence of considerable knowledge and a deep understanding of how a mine operates within traditional mining communities. The mining and minerals industry has a great deal to gain from utilising centuries-old cultural heritage. Mining tourism should have plenty of development potential and be able to contribute substantially to creating growth and jobs.

To promote attractive natural and cultural environments in new and existing mining communities, it is proposed within the framework of the minerals strategy that:

- The Swedish National Heritage Board be given the task of developing, collecting and disseminating best practice as regards how the cultural environment can be utilised and become an important resource in areas where mines are reopened. This task should also include striving to ensure that cultural heritage is utilised by both the mining industry and tourism and promoting collaboration between them. The task should focus primarily on Bergslagen and be performed in cooperation with the

relevant county administrative boards, actors who are responsible for coordinating regional growth initiatives, and in consultation with other stakeholders.

Dialogue and cooperation to promote innovation and growth

Cooperation between central government, municipalities, regions, the business sector and interest groups creates the conditions needed to improve local and regional attractiveness and national growth. Good dialogue and clear distribution of responsibility among stakeholders provide an important basis for stimulating greater competitiveness, more jobs and growth in the mining and minerals industry as well as in the business sector as a whole in areas affected by large-scale initiatives. The latter is not least important in order to create an efficient overall labour market, which also benefits the mining and minerals industry. Timely and clear information when establishing new mines and quarries also creates common objectives and enables proactive planning work to be implemented.

Promotion of societal development and regional growth

Objective: To ensure that each mining area has the opportunity to grow based on its own specific prerequisites. Mining regions and mining municipalities are to attract, retain and develop activities, skills, businesses and capital so that they contribute competitively and in the long term to national growth.

Many of the raw materials needed to build homes and infrastructure can be found in regions dominated by rural communities. The expansion of the mining industry is proof of the strong connection between urban and rural areas. Rural areas contribute to development and sustainable development in cities and towns just as cities and towns are important for rural areas. Even though these natural resources, along with attractive cultural and natural environments and large open spaces for business operations, are a source of strength, rural areas face a number of major challenges. The population base is small and is still diminishing in many, although not all, rural areas. Things are further apart. This leads to poorer matching on the labour market, higher costs for the individuals and businesses and poorer public services. These are examples of the challenges that have to be faced by the various actors if the potential of the mining and minerals industry is to be fully utilised.

The expansion of the mining industry is of strategic importance for growth and employment on both the regional and the national level. The objective of regional growth policy is to create momentum for development in all parts of the country with strengthened local and regional competitiveness.

The National Strategy for Regional Competitiveness, Entrepreneurship and Employment 2007-2013 constitutes the political platform for strategic priorities and provides guidelines for collaboration among stakeholders on the local, regional and national level. The Government also contributes by implementing various measures to strengthen the attractiveness of the country's regions. In 2012-2014, the Government is implementing Attractiveness Sweden, an arena for dialogue and cooperation to promote attractive living and housing environments. The initiative focuses on local and regional driving forces and the responsibility for utilising and developing a region's unique opportunities for greater attractiveness. Municipalities, county councils, regional cooperation councils, agencies, businesses, interest groups and the civil society are all invited to Attractiveness Sweden to discuss prerequisites and tools.

The responsibility for coordinating regional growth work in each county lies with the following actors:

- The cooperative body in 13 counties.
- County councils in Skåne, Västra Götaland and Halland as well as the Municipality of Gotland.
- The county administrative boards in Stockholm, Västmanland, Västernorrland and Norrbotten.

The task involves, for example, coordinating the regional plethora of actors and adapting sectorial interests to a regional context. To help them in their task, these actors have a variety of different tools and methods.

"Creutz hoist room at Falu Mine was built in 1855 and is Sweden's only preserved hoist room for the hoisting of ore from several different mine shafts." Photo: Falu Mine.

In the work on the National Innovation Strategy, actors from all parts of society on the local, regional and national level, in broad dialogue with the Government, have been mobilised to create a common agenda for a stronger innovation climate in 2020. The innovation strategy highlights the importance of Sweden's regional innovation environments being globally attractive and of Sweden's regions developing their innovativeness based on their unique prerequisites.

Municipalities where there has been no previous mining activities or where disused mines are being reopened face new issues that can be perceived difficult to deal with. The establishment of an activity that is as substantial as a mining operation can often lay claim to a significant share of the municipality's resources for a long period of time in order to deal with the necessary decisions and measures. Furthermore, the municipalities must also meet requirements for new homes and more municipal services and infrastructure.

In order to promote the building of new homes on subdued housing markets, the Government has recently adopted amended terms and conditions for state credit guarantees for new housing projects. The ceiling has been raised to SEK 16 000 (EUR 1 900) per square metre and the upper limit of SEK 2 million (EUR 240 000) per housing unit has been removed. As a result of this decision, the state can contribute towards home-building loans in parts of the country where the market value is lower than the construction costs. State credit guarantees for loans for building new homes are administrated by the Swedish Board of Housing, Building and Planning. The Board also offers help with financial calculations and project risk assessment. The difficulties of building homes on weak housing markets in mining municipalities combined with a housing shortage and many people wishing to move into the area are problems that indicate the need for additional measures to strengthen the capacity of mining municipalities to build new homes.

The municipalities have the responsibility for planning the allocation of land areas for aggregate quarries used during the construction of e.g. roads, railways and housing. In order to enable well-founded decisions to be taken on where stone and gravel quarries are to be located, sound background documentation and decision support systems are necessary. Within the framework of SGU's work on the environmental quality objective Good-Quality Groundwater including the target for reduced consumption of natural gravel, a methodology is being developed that

county administrative boards will be able to use when producing regional material supply plans. A regional plan can support the municipalities in their comprehensive and detailed planning work.

To help promote societal development and regional growth, it is proposed within the framework of the strategy that:

- The Swedish Agency for Economic and Regional Growth be given the task of establishing and implementing a national programme for major investment project planning support from the business sector. The programme shall aim to promote knowledge building, stimulate dialogue, cooperation, the exchange of experiences and coordination between municipalities and public actors on the regional and national level. The programme shall also aim to identify and manage the needs associated with major business sector investment projects so that existing resources are used more efficiently to meet them.
- The Swedish Agency for Economic and Regional Growth be given the task of, in cooperation with the Swedish EPA, to produce a manual for municipalities in which new mines are about to be set up or in which existing mining and quarrying activities are to be expanded. This manual shall list the measures that need to be implemented by the municipality and will act as an aid to the municipality in the dialogue with the developer. The manual shall also show how the process can be managed and hence how a set of common objectives can be created in partnership with the developer.
- The National Board of Housing, Building and Planning be given the task of reviewing the obstacles that are preventing an increase in housing production and what experience there is of how municipalities have managed housing construction, coupled to the expansion of the mining industry.
- SGU be given the task, within the framework of its responsibility for the environmental quality objectives, of further developing and finalising the work that is under way at the agency to develop a methodology for how regional material supply plans can be implemented. SGU shall also support the county administrative boards in their use of this methodology and in their use of the mapping service currently being developed for this purpose.

Clearer distribution of responsibility and better flow of information among industry actors

Objective: To promote dialogue between actors who are affected by and who contribute to mining and minerals industry's operations in order to improve information exchange, enable proactive planning work and reduce potential conflict situations.

The decentralisation of the political responsibility for the regional growth policy has led to stronger regional autonomy in growth issues. At the same time, a shift from hierarchical governance to multi-level governance has taken place. Multi-level governance involves building relations and participating in various network configurations while cutting across territorial and administrative borders. This has, among other things, led to a greater need for coordination in policy implementation. In this context, the national level has an important task to perform in offering meeting-places and channels for good dialogue and the exchange of information and experience in order to create a clear division of responsibility between the business sector, municipalities, regional cooperation councils, county councils, agencies and interest groups in the mining and minerals industry. An example of how the national level can act as facilitator for the mining industry is the Ore-Field Group (Malmfältsgruppen) whose task is to promote dialogue among actors affected by mining activities in Sweden's ore-mining districts. The Ore-Field Group has been in operation since 2005 and is headed by the Swedish Minister for Enterprise.

Another example of efforts on the national level is the recent appointment by the Government of a coordinator of issues arising as a result of the mining industry's expansion. This coordinator has brought together

and facilitated dialogue between actors in the regions affected by the mining industry's expansion. The task includes: identifying possible obstacles and needs that arise as a result of the substantial expansion of the mining industry; and proposing measures to overcome and meet these obstacles and needs.

The process from business idea to the extraction of ore and minerals involves considerations and assessments in accordance with a number of legal provisions. These relate to issues such as physical planning, exploitation concessions and environmental assessment. Even if the regulatory system itself is predictable, a number of complicated considerations are required in each individual case. Differences of opinion between the business operator and the authorities as to what background documentation is required risk lengthening the decision-making process as a result of the need to submit extensive additional documentation. This problem is difficult to solve through legislation. Experience instead suggests that the major potential for creating faster and less conflict-ridden assessments lies in improved communication between business operators and authorities. Cooperation must take place both proactively during community planning and in each individual case.

Establishing a forum for dialogue between the business sector, municipalities, actors with a responsibility for regional growth efforts, and authorities can create the long-term prerequisites for increased competitiveness and growth. The objective of this dialogue is to create the conditions for proactive planning work and reduce conflict situations by supplying early information. The parties in the dialogue forum should also coordinate their business intelligence and analysis activities to create a comprehensive picture of developments and hence avoid surprises.

To help stimulate dialogue and clarify the division of responsibility, it is proposed within the framework of the strategy that:

- A national minerals forum be established to follow the implementation of the Swedish minerals strategy and with the task of identifying supplementary measures to achieve the strategy's objectives and vision. The forum is to promote dialogue among actors, provide opportunity for exchanging information and experience and coordinate business intelligence and analysis activities. The forum is to be led by the Minister for Enterprise and gather together companies in the mining and minerals industry, municipalities, actors who are responsible for coordinating regional growth promotion, authorities and sector organisations/interest groups who are affected by and contribute to activities in the mining and minerals industry.

Framework conditions and infrastructure for competitiveness and growth

A thorough and efficient environmental assessment process is crucial for the protection of the environment and health and is one of the cornerstones of Swedish environmental policy. An important starting-point for environmental assessment is that the procedure must not be more complicated than required with regard to the protection of the environment and human health. Shortening lead times is a high-priority issue for the Government.

A clearer and more effective regulatory framework

> *Objective: To ensure that permit assessments for newly established or modified operations are implemented in transparent, efficient and legally secure processes without jeopardising the fulfilment of environmental requirements.*

Better information when applying for exploration permits

Extensive exploration activities are currently underway in Sweden due to the substantial interest in minerals extraction. Large-scale and active exploration requires many work plans to be established and a large number of landowners have to be informed that work will be carried out on their land. Although it is common that many properties covered in an exploration permit are not affected at all by any exploration work, it is understandable that the growing amount of exploration can lead to questions and concern about what might happen to the land. One way of increasing knowledge and reducing the level of concern over what an exploration permit involves is to provide landowners, including

Evidence of spheroidal weathering at Åsby diabase, Rämma. Photo: J-O Svedlund/SGU.

any Sami villages that are affected, with more and better information. This information is to be provided as early as possible in the process and contain relevant details of what will happen on their land.

To tackle this issue, the Government appointed a one-man commission in 2011 to review how the system of work plans has functioned since it was introduced in the Minerals Act 2005 and to submit proposals for how to improve the information given to landowners and other relevant stakeholders. The commission presented the report Exploration permits and work plans (SOU 2012:73) at the end of 2012. The report was sent out for consultation during the spring of 2013.

More efficient environmental assessment with shorter lead times

The Government has implemented several measures to simplify and coordinate environmental assessment and shorten lead times. One of these measures is the formation of five land and environment courts and a land and environment court of appeal to replace the previous environmental courts, land tribunals and environmental court of appeal. As a result of the reform, the processing of environmental cases, cases linked to the Planning and Building Act and property cases has been concentrated to the new courts. The land and environment courts have received additional funding of SEK 35 million (EUR 4.2 million) in 2013 and will receive another SEK 25 million (EUR 3 million) per year as from 2014. This increased funding will hopefully lead to more efficient handling of mining and quarrying cases.

Another measure is the concentration of assessment procedures for operations that require a permit to just 12 county administrative boards instead of the previous 21. This is an important reform measure that has been called for by the business sector. The county administrative boards will receive an extra SEK 40 million (EUR 4.8 million) for 2013, SEK 30 million (EUR 3.6 million) for 2014 and SEK 15

The picture shows white, radial scapolite aggregate on a crack through the iron ore in Sahavaara, Pajala. Photo: Erik Jonsson/SGU.

million (EUR 1.8 million) as from 2015. These extra resources may result in more administrators at the county administrative boards.

The boards have also been tasked to report lead times based on when an application is submitted and when it is deemed to be complete. The goal is to ensure that an application submitted to an environmental assessment delegation is dealt with within six months from the date a complete application is received. A report on this task is to be submitted in March 2013.

A further measure is the survey and analysis of the permitting process for quarrying operations, classed as "B operations". The survey/analysis has been performed by the National Council for Innovation and Quality in Public Administration, appointed by the Government in May 2011. The Council's work has involved the land and environment courts, municipalities and various agencies and resulted in a model for identifying and clearing bottlenecks in the environmental assessment procedure based on a systematic approach. Following on from the Council's work, the Västerbotten County Administrative Board has been tasked to continue developing the model so that it also covers the permitting of "A operations", which include mining activities, and to submit proposals for how environmental assessment can be improved. This task may be expanded to include counties other than Västerbotten. It is to be implemented over a two-year period and be reported to the Government at regular intervals. Västerbotten County Administrative Board has been allocated SEK 2 million (EUR 240 000) for this purpose.

The current provisions on environmental impact assessments (EIAs) under Chapter 6 of the Environmental Code have been criticised by both the business sector and municipalities for being complicated and difficult to apply. In addition, the requirements laid down are too rigid and do not give the environment more protection. The business sector has on several occasions also pointed out that it is the initial phase of the assessment process for environmentally hazardous operations, the phase which includes consultation and the drafting of EIAs, that takes the longest time and is most resource-demanding for the enterprise. Work to simplify and improve the provisions in Chapter 6 of the Environmental

[14]Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (EUT L 26, 28.1.2012, p. 1, Celex 32011L0092).

Code is currently ongoing within the Swedish Ministry of the Environment. The aim of this work is to develop a more efficient system for identifying, describing and assessing environmental impact, which includes the drafting of EIAs. In the autumn of 2012, a proposal has been circulated to a large number of agencies and organisations for comments. The Ministry of the Environment intends to have a dialogue on the proposal in parallel with the negotiations in the European Council of Ministers' working group on the Commission's proposal for amendments to the Environmental Impact Assessment Directive .

Guidance when applying for a permit

An application for an environmental permit to perform mining activities is subject to extensive assessment in accordance with the regulations laid down in the Environmental Code. The background documentation submitted by the business operator to the assessment authority is to include detailed descriptions of how the planned activities will be pursued and can be assumed to impact on the surrounding natural environment.

The business sector has called for clearer guidance as to what background documentation will be required as a basis for assessment. With clearer guidance and guidelines, more complete background documentation can be submitted to the assessment authority, which in turn will shorten lead times since there will be less need to submit supplementary information.

The Government has therefore tasked SGU to produce an industry-specific manual on mining activity assessment in close cooperation with the Swedish EPA. This manual will be an aid for both the business operator and the relevant authorities. SGU is to submit a report on this task to the Ministry of Enterprise, Energy and Communications at the end of May 2013.

Land use and considering different interests

In order to promote long-term sustainable development, it is important to have good cooperation when planning, both among municipalities and between municipalities and counties, as well as between planning authorities and other activities. The emphasis of the Regional Growth Ordinance (2007:713) and the new focus of the Planning and Building Act are strengthening the link and the synergies between regional objectives, plans and programmes and the municipal comprehensive plan. Cooperation is particularly important when it comes to major establishments and activities that don't just affect the conditions in a single municipality, e.g. new mines. On the regional level, it may be a question of adding a spatial dimension, where geographical relationships and conditions in the physical, economic and social environment are highlighted in the background documentation that forms the basis of the counties' development strategies. This would help to facilitate and increase the scope for coordinated actions and cooperation between the local and regional level. It may also increase the scope of the municipalities to take a cross-border strategic approach to activities that promote sustainable growth. Since the establishment of new mines often affects and is dependent on good interaction both within and between the different sectors and remits of municipalities, there is a need for planning that goes beyond municipal borders. A comprehensive plan that covers several municipalities can facilitate each municipality's detailed planning work and constitute a basis for discussions on cross-border issues.

In cases where SGU assesses the short-term and long-term public interest in extracting minerals in certain areas that are very large, the agency earmarks such areas as areas of national interest for mineral extraction. The Government is keen to ensure that the national interest system is fit for purpose and simple to apply in municipal planning work and when assessing permits. The regulations governing national interests were introduced many years ago and since then, as society has developed, opinions on what is a national interest have changed somewhat. In light of this, the Government has ascertained in its 2013 Budget Bill (Govt Bill 2012/13:1, expenditure area 20) that these regulations and their application are in need of an overhaul. As a result, the Government intends to appoint an inquiry to clarify and improve the system.

To help improve and clarify the regulations on mineral extraction, it is proposed within the framework of the minerals strategy that:

- The Swedish Agency for Growth Policy Analysis be given the task to, first of all,

follow up the actions that have been initiated and implemented. When doing this task, the Agency shall take the experiences of business operators into consideration. Secondly, the Agency shall, where it is possible, evaluate the effects of the actions, which includes assessing whether government funding has been used efficiently. Thirdly, the work is to include an international comparison between the environmental assessment processes and regulations of relevant countries when it comes to mining and quarrying operations. The work shall include a comparison of lead times in the permitting processes.

- The Norrbotten County Administrative Board be given the task of running a pilot project in 2013 to investigate how a comprehensive plan covering several municipalities can be developed aimed at providing support to the municipalities in their detailed planning work. This task is to be performed in consultation with the county's municipalities. The benefit of such an approach is to be evaluated within the framework of the task.

Infrastructure investments for growth in the mining industry

Objective: To create robust and reliable infrastructure that meets the needs of the mining industry.

The expanding mining industry is exposing the shortcomings in Sweden's transport system as regards its carrying capacity, operation and maintenance, etc. It is the Government's opinion that the needs of the mining industry must be satisfied quickly in order to make full use of the opportunities provided by the current boom in the industry. The Government has therefore proposed an investment in mining-related infrastructure of SEK 3.5 billion (EUR 420 million). This doesn't just include investment in the Iron Ore Line (Malmbanan) and in the road between Pajala and Svappavaara, but also other investments in the mining industry in, for example, Bergslagen, on which a final decision is due in the spring of 2014 once the Government has established the National Transport Plan 2014-2025.

The Iron Ore Line between Boden and Riksgränsen and on to Narvik in Norway is currently Sweden's busiest railway line mainly running iron ore trains that are up to 750 metres long. Ore transport on the Luleå-Riksgränsen line is expected to rise by over 80 percent between 2010 and 2020, the majority of this increase occurring before 2015. The planned expansion in passenger transport between Luleå and Kiruna is also to be added to this. To rectify this expected lack of capacity, the Government has proposed more resources to enable investment in greater capacity on the Iron Ore Line. Some sections of the busiest line between Kiruna and Riksgränsen may need to be double-track. These measures will hopefully satisfy the capacity requirements for freight transport and reduce travelling times between Kiruna and Luleå. At the same time, robustness and punctuality are also expected to improve.

A brand new iron ore mine opened in Pajala in the autumn of 2012; an investment of several hundred million euros. The ore will be transported by road to Svappavaara and then by rail on the Iron Ore Line to Narvik. As mining is already underway, improvements to the local infrastructure are now a matter of urgency. Among the measures to be taken is the modernisation of the Pajala to Svappavaara road so that it can take heavy goods transport. Within the framework of the action planning, the Swedish Transport Administration has looked at the possibility of building a rail link between the mining area of Kaunisvaara and the existing railway line in Svappavaara. The Administration will also consider electrification which in the long term can lead to more efficient transport with less environmental impact by meeting future transport needs with minimum expansion of the infrastructure.

The Administration will also consider various alternative transport routes to satisfy the needs of the mining industry in cooperation with relevant stakeholders as part of the action planning. The various alternatives will be highlighted based on a holistic perspective, where the total benefit for all travel and transport needs, including those of the mining industry, will be taken into consideration. These alternatives shall present cost-benefit

assessments as well as consider and describe other aspects and consequences, not least environmental impact, but also reloading requirements, effects on traffic safety, effects on the possibility of labour commuting and interregional accessibility, etc.

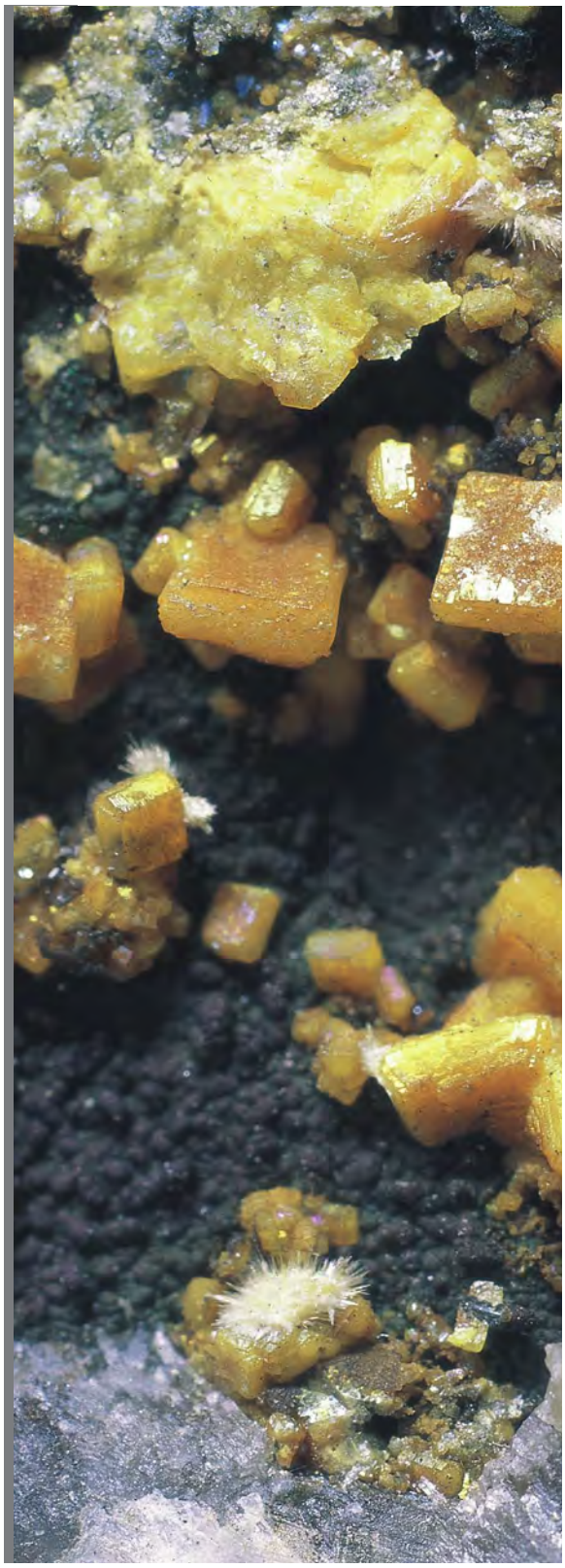
In connection with the production of background documentation and decisions on the implementation of infrastructure projects, the Transport Administration will look into the scope for cofinancing from different stakeholders. The Government's opinion is that the ongoing infrastructure projects shall contribute to the achievement of transport policy objectives and as a rule of thumb be socioeconomically profitable regardless of how they are financed. The same arguments shall apply when prioritising projects irrespective of whether they are cofinanced through contributions or not. Regarding any cofinanced project, its benefit to financial contributors should be an important starting-point. Cofinancing of government transport infrastructure via contributions from municipalities, county councils and businesses can be a good way of achieving effective solutions in the transport system.

To help create a robust infrastructure that meets the needs of the mining industry, it is proposed within the framework of the minerals strategy that:

- The Swedish Transport Administration, as part its task to investigate new electric propulsion systems for trucks on the road, makes use of the lessons learned from previous and ongoing projects within the Programme for Strategic Vehicle Research and Innovation (FFI). Field tests and pilot facilities are important development steps to ensure the technology is ready for full-scale use.

An innovative mining and minerals industry with an excellent knowledge base

The Swedish mining and minerals industry currently faces a number of challenges, to which the solutions can be found in research and innovation. The mining industry is very energy-demanding. Ore is mined at ever-greater depths and the process must be efficient to be profitable at the same time as new demands are being placed on safety measures and on



The picture shows brownish yellow crystals, up to about 1.5 mm, of the lead-antimony-oxychloride mineral nadorite, a character mineral for the complex and extremely mineral-diversified iron and manganese ore deposits in western Bergslagen, similar to those found in Långban in Värmland. Photo: Erik Jonsson/SGU.

knowledge of the bedrock's geology at greater depths. The minerals, ballast and stone industry are facing challenges in terms of energy-efficiency in mining and crushing, product development, the environment and safety.

Investments in research and innovation in the mining and minerals field provide new knowledge that can be converted into new products and services as well as increase the industry's growth and competitiveness. With excellent research and a well-functioning innovation system, Sweden can retain its position as the EU's leading mining and minerals country in the face of tough international competition.

Major international research and innovation strategies have been announced or are in their infancy. It is important to have good Swedish representation and active participation in these. Synergies should be sought between national and international programmes. An efficient information flow needs to be safeguarded among relevant actors to promote successful participation.

To enable the mining and mineral industry to expand at the pace made possible by today's strong demand for metal and minerals, businesses must have access to a skilled workforce. The signs are that there will be a need for skilled labour in a wide variety of professions. The industry needs to work together with the relevant actors on the local and regional level to clarify this need based on local conditions. The attractiveness of the industry to the labour force of the future should be improved in order to increase the interest in and the intake to relevant educational programmes.

Brief facts: Investments outlined in the 2012 Research Bill:

- SEK 205 million (EUR 24.6 million) between 2013 and 2016 on a mining, minerals and steel research programme to be headed by Vinnova.
- Strategic areas of innovation based on societal challenges.
- Increase in the strategic skills funding for the Research Institutes of Sweden (RISE).
- Improved scope for recruiting world-class international researchers to Sweden.
- Support to Swedish participation in Horizon 2020.
- Funding to facilitate participation in partnership programmes.

Research and innovation that create growth and competitiveness

Objective: To ensure that Swedish research in mining- and mineral-related areas is world-class and characterised by good cooperation between the business sector and the academic world. Research findings are to be applied by the industry and strengthen its competitiveness.

Research in the mining and minerals field takes place to a great extent in close cooperation between businesses, universities and research institutes. Today's mining enterprises are very demanding as regards the efficiency and safety of mining equipment. This tests the boundaries of technological development. Swedish mining technology research is at the cutting edge and Swedish researchers are taking part in several major international research projects.

In its 2013 Budget Bill (Govt Bill 2012/13:1, expenditure area 24) and presented in more detail in its Research and Innovation Bill (Govt Bill 2012/13:30) from October 2012, the Government proposes a number of measures to strengthen mining, minerals and steel research from 2013. Between 2013 and 2016, the National Innovation Systems Agency (Vinnova) will receive SEK 205 million (EUR 24.6 million) to finance outstanding research in the mining, minerals and steel field. Other investments are being made that can strengthen mining and minerals research.

The vast majority of Swedish mining and minerals research is international and takes place in close cooperation with research groups and enterprises operating in other countries. International cooperation provides new ideas and new knowledge at the same time as internationally prominent researchers can be recruited to Swedish universities, research institutes and enterprises. Within the framework of its presidency of the Nordic Council of Ministers in 2013, Sweden has therefore launched the NordMin project - A Nordic Network of Excellence. This project will run for three years and be coordinated by

the Luleå University of Technology. Universities, enterprises and research institutes in the Nordic countries meet within NordMin with the aim of implementing joint research and innovation projects to stimulate green growth within the Nordic mining and minerals industry. The Nordic Council of Ministers is funding the project to the tune of DKK 10 million (EUR 1.34 million) per year for three years.

In the forthcoming Horizon 2020 European research programme, access to raw materials is expressed as a societal challenge. Specific raw materials research projects are likely to be announced within Horizon 2020. All in all, there will be plenty of opportunities for Swedish research players in the area of mining, minerals and steel to apply for research funding from both national and international sources. The funding comes from a number of different financiers with a variety of aims, regulations and tasks, to which research players will have to keep to.

As part of the development of new programmes at the EU level, open consultations are being carried out to analyse the needs of the business sector and the academic community for targeted research initiatives within specific areas. Strategic research agendas are being written and will later be turned into research projects. To increase the Swedish share of funding from EU programmes, it is important for Swedish representatives to work to ensure Swedish interests are considered in the strategic research agendas.

To further stimulate research and innovation in the mining and minerals industry, it is proposed within the framework of the minerals strategy that:

- Vinnova be given the task of performing a subject review of the mining and minerals research area in cooperation with the Swedish Research Council. This review should contain a biometric evaluation and a survey of historical and future research initiatives in the mining and minerals area. The survey is to identify recycling and substitution initiatives, for which progress reports are to be presented in 2013 as a basis for the work done within the European Innovation Partnership on Raw Materials. Sweden's strengths and challenges within mining and minerals research in an international perspective are to be identified and the strategic benefit of implementing initiatives on these is to be assessed. The task shall also include submitting proposals for how to improve forms of cooperation among research players in the mining and minerals area.

Photo: LKAB.

Skills supply that meets the needs of the industry and the regions

Objective: To safeguard the supply of skills to the industry and the regions by means of close cooperation between the industry and local regional and national actors.

Forecasts from the Swedish Public Employment Service indicate that the mining industry alone may need to recruit around 5 000 people over the next few years. The employers' and industrial association for mines, mineral and metal producers in Sweden, SveMin, has recently published a Vision for Growth for the

Swedish mining sector. The vision presents a forecast showing that the mining sector may need to employ 10 000 - 15 000 people up until 2025 in order to cope with the expansion.

The labour requirement is expected to be on all levels, both on the mining and on the minerals side, where large-scale retirements are to be expected. It is, however, the need for academically educated staff, such as geologists, rock engineers and process engineers, that is most urgent since these types of degree programmes take several years to complete. The need for mine workers and process operators is also considerable.

A survey carried out by SveMin of university programmes in relevant subjects for the mining and minerals industry has shown that the number of available places is relatively high. The lack of an appropriately skilled workforce is instead due to the low number of programme applicants. The mining and minerals industry does not seem to be a first-hand choice for young people when choosing their career path. Efforts should therefore be made especially by the mining and minerals industry to promote itself as an attractive career proposition with interesting and stimulating jobs. Initiatives to improve gender equality within the industry are a key issue when it comes to increasing the recruitment base and enhancing the industry's attractiveness.

The future skills base in mathematics, science and technology in Sweden has been under threat due to the weak interest shown by children and young people in these types of subjects. The Government has therefore carried out a number of measures to stimulate interest among children and young people in science and technology and to safeguard the future skills base in these subjects on the Swedish labour market.

Only national programmes, diploma objectives and subject plans may be used in Sweden's new upper secondary school system. Geology is not a subject on its own, but is studied as part of subjects such as sustainable society, geography, chemistry, biology and nature studies. If there are requests for new courses, subjects or special alternatives, applications to provide them can be submitted to the National Agency for Education. Every vocational programme has a national programme council linked to it, the aim of which is to listen to and survey the opinions and requests of the relevant industry and other actors to improve the programme. The relevant industry can also communicate to the programme council any new skill requirements that need to be satisfied within the programme. School governors, i.e. the municipalities or independent governors, can also profile their programmes within the framework of the national programmes.

A pilot scheme with a four-year upper secondary technology programme is currently underway. In its 2013 Budget Bill (Govt Bill 2012/13, expenditure area 16), the Government has proposed an extension to the pilot scheme for an extra academic year, up to and including 30 June 2015. The profiles currently on offer within the pilot scheme are Innovation and Production, Information Technology and Community Planning. In this context, different industries have the opportunity to submit comments on any skill requirements that need to be satisfied or might be worth satisfying within the framework of the extra fourth year of the technology programme.

The activities at colleges of higher vocational education are based on the idea of the labour market creating educational programmes that can be included in the colleges' regulatory framework. The Swedish National Agency for Higher Vocational Education does not run programmes itself, nor can it commis-

Brief facts:
Government education initiatives that can help meet the need for a skilled workforce in the mining and minerals industry include:

- An assignment given to the National Agency for Education aimed at increasing students' interest in science and technology.
- Policy documents and curricula for all forms of education, from preschool up to upper secondary school, that clarify objectives, content and knowledge requirements for science and technology.
- The initiation of a campaign to attract interested students to science and technology teacher training programmes.