DIRECTORATE OF MINING
WITH COMMISSIONER OF MINES AT SVALBARD

NGU
Norges geologiske undersøkelse
Geological Survey of Norway

Mineral resources in Norway 2006

Production data and annual report

Publication no. 2 2007

Titania AS, Sokndal, Rogaland. Photo: Titania AS.

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Foreword

This report on production of mineral resources in Norway was prepared by the Geological Survey of Norway (NGU) and the Directorate of Mining with the Commissioner of Mines at Svalbard (BV). The response deadline was set at 20th June, 2007.

Six hundred and sixty seven producers have submitted data that are presented in a number of figures and tables. Compared to previous reports "Norwegian mineral production" from the Directorate of Mining and "Mineral resources in Norway" from NGU, the data set presented here has never been larger, even when production data from a number of smaller deposits are still lacking.

Project planning and verification of mineral production data from 2006 was done by Gunn Sandvik, Knut Riiber, Geir Strand and Peer-Richard Neeb all from NGU, and by Peter Brugmans and Brit Kaasbøl from the Directorate of Mining. Graphic design have been carried out by Bjørg Svendgård, NGU.

Trondheim 17.01.2008

Morten Smelror
Director
Geological Survey of Norway

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1. Abstract

In 2006, the Norwegian mineral and mining industry had an annual turnover of NOK 9.2 billion, and exported products valued at NOK 5.6 billion. Seventy-five million metric tons of mineral raw materials were produced, by some 4,700 employees in about 670 companies.

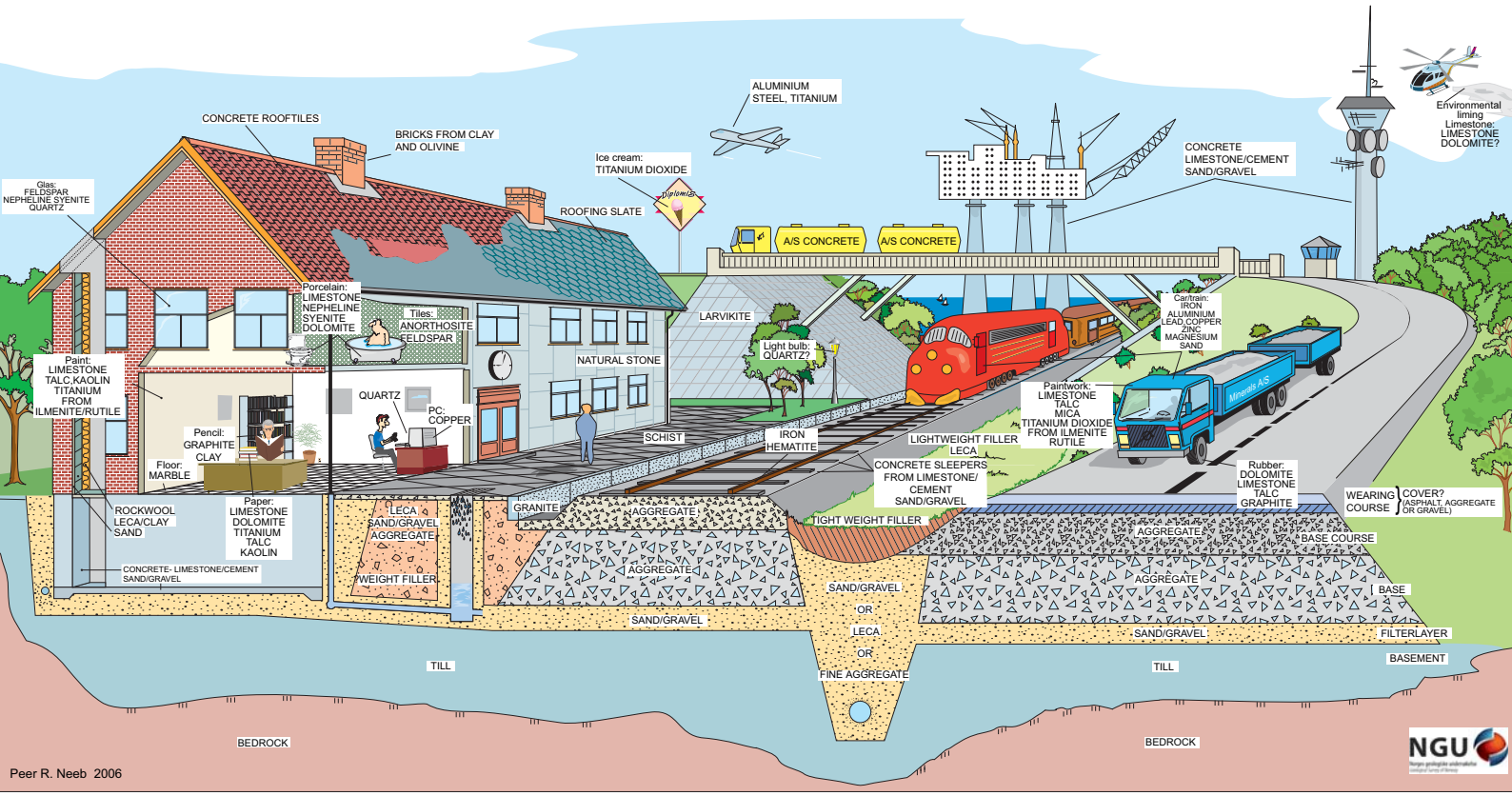
Aggregate production for export, Norsk Stein AS, Jelsa, Rogaland. Photo: Norsk Stein AS.

Photo: Norsk Stein AS.

Photo: Norsk Stein AS.

Photo: Norsk Stein AS.

The mineral and mining industry is of great significance in outlying regions, with the highest turnovers in the counties of Møre og Romsdal, Rogaland, Nordland, Vestfold and Finnmark.



Minerals in use.

2. Introduction

The mineral and mining industry comprises companies involved in extraction and processing of minerals and rocks, from bedrock and/or superficial deposits. Five main groups of materials can be distinguished:

Industrial minerals (e.g. calcium carbonate rock (marble and limestone), dolomite, olivine, nepheline syenite, quartz)

Natural and dimension stone (e.g. larvikite, granite, marble, slate/flagstone and building stone)

Building materials (e.g. gravel, sand, hard-rock aggregate, rock for ballast and clay)

Metallic ores (eg. iron, nickel and ilmenite - titanium)

Energy minerals (eg. coal and peat)

All of the above materials are essential for every-day life: modern society cannot exist without using mineral raw materials such as iron ore for production of steel, limestone for cement and paper, aggregate for road-building, sand and gravel for concrete, and coal for metallurgical processes and for energy production. Per capita annual consumption of minerals and mineral products amounts to 10-15 metric tons, which, over an average life-time, adds up to c. 1,000 tonnes/person.

Initially, production data from mineral producers were collected by the Directorate of Mining (Bergvesenet - BV) and the Geological Survey of Norway (Norges geologiske undersøkelse - NGU), published annually in 'Norway's mining production' and 'Mineral resources in Norway', respectively. Since 2006, the annual overview has been published in collaboration between NGU and BV.

The primary goals in publishing mineral production data include:

Demonstration of the importance of the mineral industry to the Ministry of Trade and Industry, to other ministries and public authorities and to the general public,

Assistance to county and local authorities, and to industry in ensuring optimal land-use planning, including appropriate attention to mineral reserves in production and to resources, which may be important in the future.

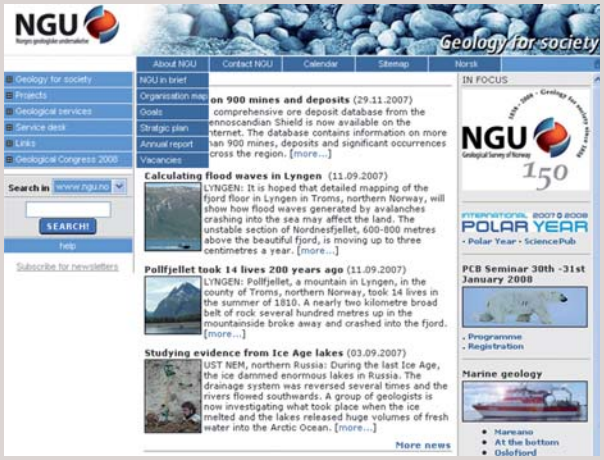
To provide an up-to-date annual overview of the mineral industry, to be available by the end of June the following year.

NGU has compiled the overview of mineral production data based on the response to enquiries to producers. The producers of gravel and aggregate contacted are mainly taken from the NGU Gravel and Aggregate Database, and on producers registered in the Directorate of Mining's database.

Where fewer than three companies are involved, NGU and BV have come to an agreerment with the producers on how the figures can be presented in diagrams and tables. Data on total production tonnage, annual overturn and employment are given priority.

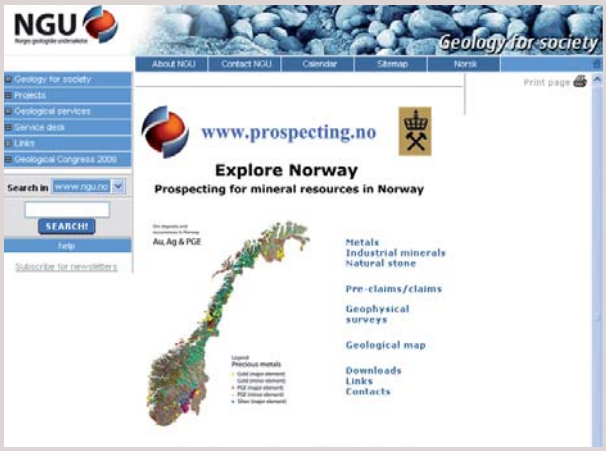
Data on mineral resources of national significance have been collated by NGU.

Peer - Richard Neeb, Team leader *Peter Brugmans, Senior consultant*

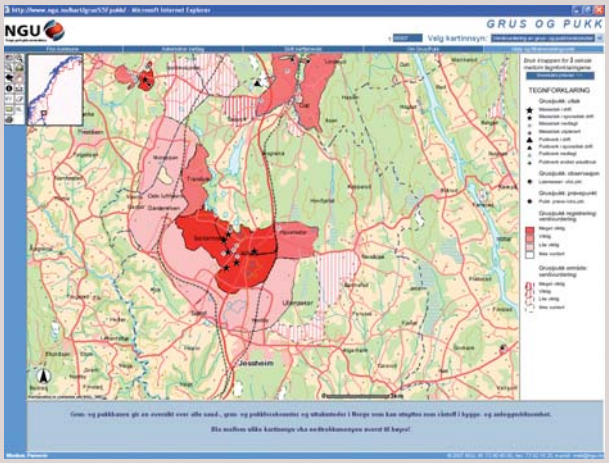


www.ngu.no

www.bergvesenet.no



www.prospecting.no



www.ngu.no/grusogpukk

3. Web sites and databases

NGU maintains and continuously expands databases on Norway's national mineral resources. Data on sand and gravel, hard-rock aggregate, industrial mineral and ore deposits, and natural stone are all freely accessible at www.ngu.no, under the headings: Geological services, then: Databases.

Distribution of information to industry and administrative users in an effective manner is a major challenge. The internet portal www.prospecting.no, developed by NGU and the Directorate of Mining, provides access to data on geology, mining claims and protected areas. Detailed geological maps and information on known mineral deposits are both essential in the identification of new prospects.

NGU has developed a provisional overview of mineral resources of national significance. These are deposits which have a substantial value, and which must be given appropriate attention in landuse planning processes. The criteria used to select the deposits of national interest are:

Deposits with a potential for major exports, including export after initial processing in Norway,

Deposits with a potential for becoming significant producers for the Norwegian market,

Deposits which could be expected to come into production within a time perspective of 50 years.

It is important to ensure that significant mineral deposits are a fully integrated part of municipal land-use planning. How firmly and in which way potential mineral deposits must be secured for future extraction may vary from deposit to deposit. National, county and municipal authorities will find NGU's database helpful in responsible long-term management of mineral resources.

The Directorate of Mining (BV) has the right to comment on matters regarding the significance of mineral resources in planning processes, in accordance with the Planning and Building Act. Local authorities (counties, municipalities) are referred to NGU's Gravel and Aggregate Database, and are made aware of any significant deposits that should remain available for future extraction.

The website of the Directorate of Mining (www.bergvesenet.no/eng_index.php) provides information on the Directorate's institutional role, and information about the mining industry and related activities. The site also gives information on relevant regulations and has links to the appropriate laws. The site also provides information on mining activities on Svalbard, and regulations applying there.

The prospecting portal (www.prospecting.no), which is updated every Monday, shows current claims and pre-claims.

Summary of the number of Norwegian mineral deposits that NGU has information on, together with the number of deposits considered of importance, where the information has been prepared for internet presentation.

Commodity type	**Prepared for internet presentation**
Industrial Minerals	2350
Metals	4513
Natural stone	1144
Aggregates	1100
Sand/gravel	9200
Total	**18307**

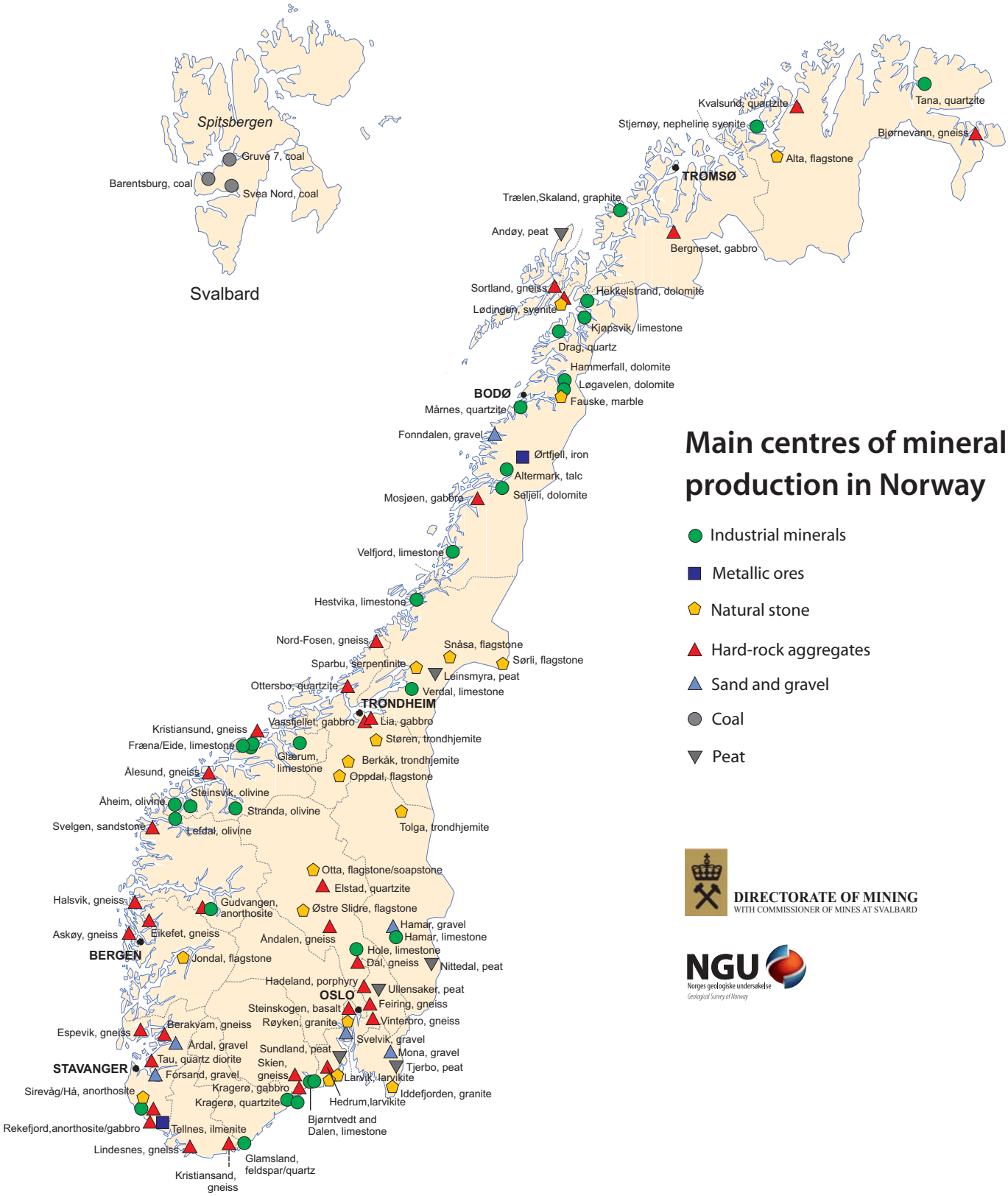
Summary of Directorate of Mining.

Number of pre-claims:

3221

Number of areas in the Planning and Building Act reserved for resource exploitation:

1908



Main centres of mineral production in Norway

- Industrial minerals
- Metallic ores
- Natural stone
- Hard-rock aggregates
- Sand and gravel
- Coal
- Peat

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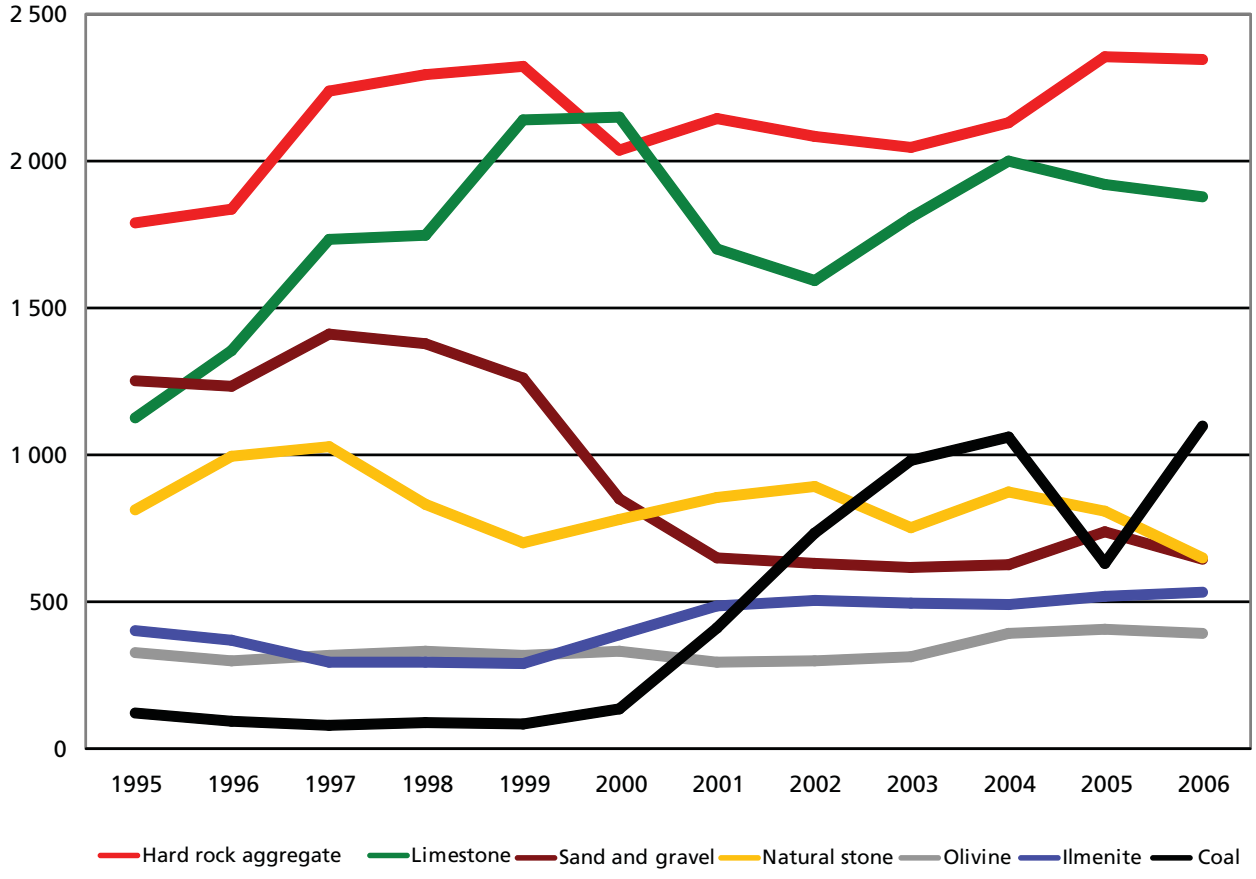
4. Developments in the mining and quarrying industry

The past 20-25 years have seen substantial structural changes in the industry. Production of industrial minerals has increased and production of natural stone has increased moderately, whereas sand and gravel production has more or less remained stable. Recently, coal production on Svalbard has increased significantly. In contrast, production of metallic ores has decreased sharply in recent years.

Twenty years ago, the state was a major player in the industry, particularly through its ownership of Norsk Jernverk / Rana Gruber, AS Sydvaranger and their subsidiaries. Having sold AS Olivin, the state no longer has shares in the mineral industry on mainland Norway. Today, most large export-orientated mineral producers are wholly or largely owned by foreign companies. At current rates, the total production value of the mining and quarrying industry has seen approximately the same positive development as other land-based industries in recent years. The mineral and mining industry is capital intensive, requiring a higher investment per employee than industry in general. Over half of the total mineral production (calculated on the basis of turnover) is exported, and the domestic share of production is the basis for an important mineral processing industry. Profitability varies between different branches throughout the industry, and between individual companies within each branch.

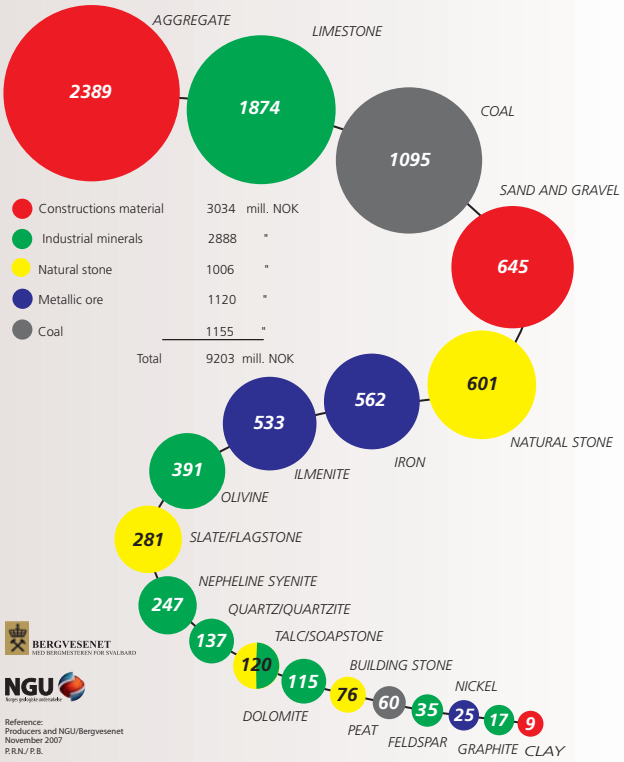
Production of Norway's most important mineral products

Values in mill. NOK (2006)



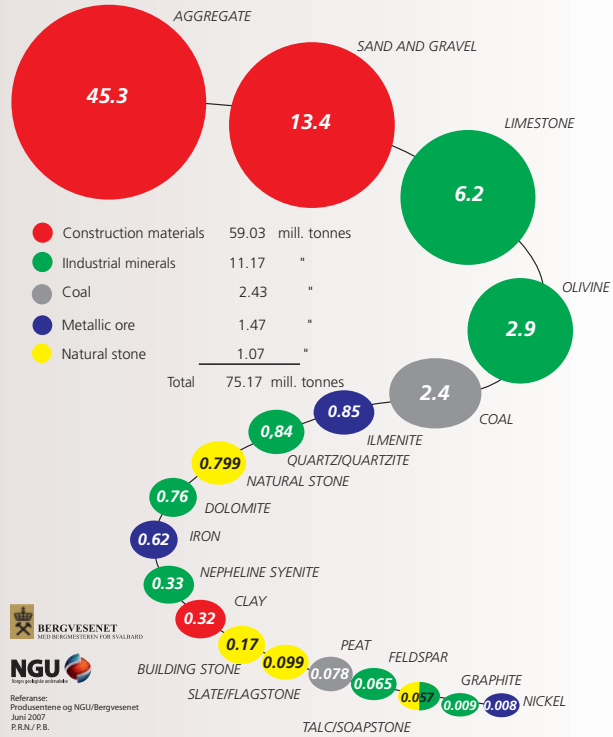
PRODUCTION OF NORWAY'S MOST IMPORTANT MINERAL PRODUCTS

(2006, FOB MILL NOK)



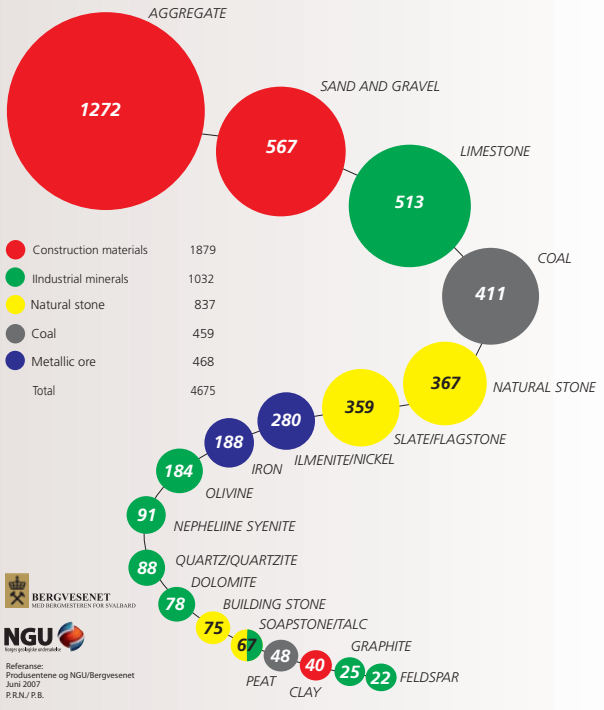
PRODUCTION OF NORWAY'S MOST IMPORTANTE MINERAL PRODUCTS

(2006, MILL. METRIC TONNES)



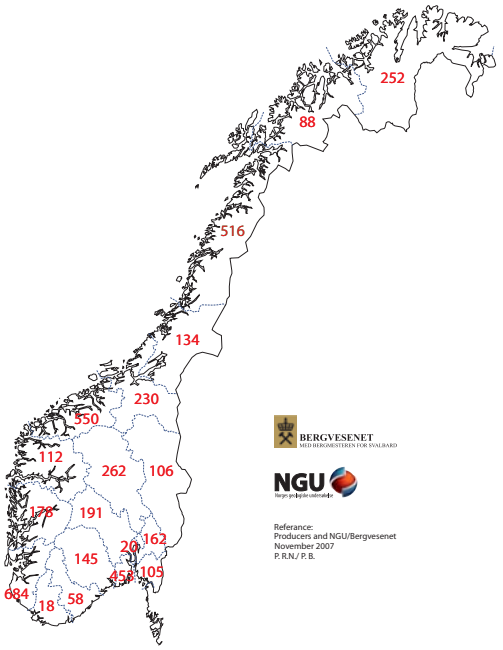
EMPLOYED IN THE MINERAL INDUSTRY

2006



EMPLOYED IN THE MINERAL INDUSTRY

2006: 4264 employed,
and at Svalbard 411



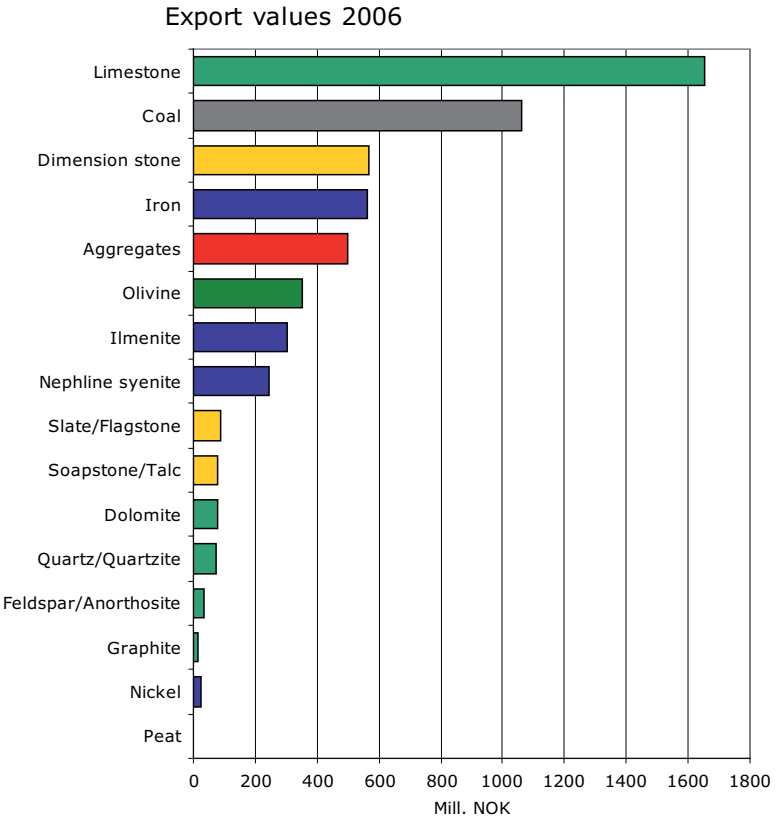
5. Mining and quarrying industry in 2006

General overview

Approximately 75 million tonnes of mineral resources were extracted in Norway in 2006, representing a total value of NOK 9.2 billion. Turnover of industrial minerals increased slightly from 2005 to 2006, from NOK 2.80 to NOK 2.89 billion, turnover of natural stone decreased from NOK 1.09 to NOK 1.00 billion and turnover of metallic ores increased from NOK 0.7 to 1.1 billion NOK. Turnover of gravel and hard-rock aggregate for the building industry showed a slight fall from NOK 3.00 to NOK 2.99 billion.

The total export value for the industry in 2006 was NOK 5.6 billion, representing 61% of the overall turnover. The export value for industrial minerals was NOK 2.52 billion, of which calcium carbonate slurry, olivine and nepheline syenite are the most important products. The natural stone industry exported stone blocks for NOK 567 million (of which NOK 532 million relates to larvikite), and slate/flagstone and building stone for NOK 89 million. Similar data for hard-rock aggregate, rock for ballast and gravel indicate an export value of NOK 500 million, whereas exports from ore production amounted to NOK 890 million, consisting of ilmenite, iron and nickel. Finally, export of coal to Europe represented a value of NOK 1059 million.

The mining and quarrying industry is a typical regional industry, especially strongly represented along the coast. The industry gives employment to about 4,700 full-time employees, in a total of 670 companies. Numbers are slightly lower than for 2005, as earlier data included estimates for companies from which no response has been received for 2006. Measured according to turnover, the most important mineral-producing counties are Møre og Romsdal, Rogaland, Nordland, Vestfold and Finnmark.



- Extraction of various mineral resources:
  C. 75 million tonnes
- Production value:
  9.2 billion NOK
- Export:
  61 prosent
- Number of companies:
  560
- Other companies:
  110
- Number of employees:
  4675

Hustadmarmor AS, Elnesvågen, Møre og Romsdal. Photo: Hustadmarmor AS.

Industrial minerals are minerals and rocks, which form a basis for industrial applications because of their non-metallic, chemical and/or physical properties. Applications are numerous, and include many common products used in every-day life, such as paper, plastic, ceramics, glass and paint.

The total turnover of industrial minerals in 2006 amounted to NOK 2.89 billion, for a production of 11.2 million tonnes. 1032 persons were employed. Most of the production is exported; mainly calcium carbonate slurry, olivine and nepheline syenite. According to the producers, the total export value amounted to NOK 2.5 billion.

Norway is among the world's leading producers of olivine and nepheline syenite. A total of 2.9 million tonnes of olivine were produced, mostly by North Cape Minerals from production sites at Åheim and Raubergvika in Møre og Romsdal, and Bryggja in Nordfjord. Olivine serves as a flux in iron ore smelting, increasing production capacity in the smelting process. Olivine replaces the carbonate mineral dolomite in steel production, thus strongly reducing CO_2 emission, while also forming slag.

Nepheline syenite is produced on Stjernøy in Alta municipality, also by North Cape Minerals, and is mainly used in the glass and ceramics industries. The same company produces quartz and feldspar at Glamsland near Lillesand. The main owners of the company are UNIMIN/Sibelco, which have a large share of the world markets for quartz, feldspar, olivine and nepheline syenite.

Twenty-four companies with 591 employees produce calcite marble and/or dolomite. Norway has become a major producer of calcium carbonate for fillers, with Hustadgruppen as the main supplier. The extracted carbonate rock is transported to Hustadmarmor AS in Møre where calcium carbonate slurry is produced. Most of the production is exported.

Hustadmarmor is the world's largest producer of calcium carbonate slurry for the paper industry, for which production data have been included in this overview. In addition, substantial amounts of carbonate rock are produced for other applications, cement production, burnt lime, and lime for soil improvement and environmental acid neutralization. The overall production value for these applications amounted to NOK 227 million NOK. Regarding cement production, the value of the burnt clinker product is not included.

Quartz and quartzite are produced by 6 companies, with 88 employees. In 2006, 0.8 million tonnes were produced, representing a value of NOK 137 million. Quartz is used as a raw material for the production of glass, ceramics and porcelain, and, in the metallurgical industry for a range of silicon-based products. Quartz is used in semiconductor technology, quartz glass and in manufacture of fibre-optical cable. It is also used as a filler in plastic, rubber and paint. Elkem Salten is preparing to open a new quartz quarry near Nasa in Rana municipality, and Norwegian Crystallites has started trial production at Svanvik in Sør-Varanger municipality.

Talc is produced by Norwegian Talc Altemark AS in Rana municipality, and is processed in Knarrvik in Hordaland before it is sold. Kvam Talk AS in Gudbrandsdalen is also in production.

Graphite is produced by Skaland Grafittverk AS on the island of Senja, and the company recently opened a new graphite mine at Trælen on Senja.

Natural stone production, Grorud, Oslo read syenite. Photo: Peer-Richard Neeb.

5.2 NATURAL STONE

Natural stone is defined as all stone that can be cut, split or hewn for outside use, in buildings and in monuments. There is further division between dimension or block stone, slate/flagstone and building stone.

In 2006, the industry produced 799,000 tonnes of dimension stone, representing a value of NOK 601 million, 99,000 tonnes of slate/flagstone with a value of NOK 281 million and 170,000 tonnes of building stone with a value of NOK 76 million. In addition, the industry produced soapstone with a value of NOK 48 million for use in hearths and ovens. The whole Norwegian stone industry provides employment for 837 people. The total export value of dimension stone amounted to NOK 567 million, of which NOK 529 million was for larvikite, while the export value of slate was NOK 59 million.

Larvikite from several quarries in the vicinity of Larvik dominates Norwegian dimension stone production: the larvikite is a resource of unique quality, fetching high prices on the world market. Turnover was NOK 532 million in 2006 (NOK 704 million in 2005), from 7 companies with 311 employees. Most of the production was exported as rough blocks to Italy, China, Spain and France. New technology has made production more efficient, and the favourable location of the deposits, near the coast, adds to the profitability of the industry. Lundh Labrador AS is the largest producer.

Dimension stone is also produced from: Gneiss in Finnmark and Sogn og Fjordane, syenite in Lødingen in Nordland, anorthosite in Rogaland, granites in Buskerud, Oslo, and Østfold, trondhjemite in Sør Trøndelag and Hedmark, soapstone at Otta and Bardu, and finally marble at Fauske. Altogether, 17 companies with 56 employees produced dimension stone with a value of NOK 67 million in 2006. Many of the smaller stone producers have not submitted production data for 2006, so that the actual overall production tonnage and its value are probably higher than reported here.

Slate/flagstone and building stone are produced from many different localitites throughout the country. In 2006, 34 companies with 434 employees produced slate/flagstone with a value of NOK 281 million and bulding stone with a value of NOK 76 million. The most important products for the industry are flagstone from Alta and Oppdal and phyllitic slate from Otta.

All material produced is processed near the quarries. C. 32% of the production is exported, and the flagstone, being resistant to wear, is particularly suitable for areas with heavy traffic, such as Railway stations and pavements.

Some growth is expected in demand for slate/flagstone for export, whereas dimension stone is experiencing increased competition. Over the past few years, the domestic market has varied somewhat regarding dimension stone for building and outdoor structures. In recent decades, the Norwegian stone industry has consolidated into fewer, larger units, especially within production of slate/flagstone and larvikite. In addition to the production centres mentioned above, a number of small contracting companies produce building stone for their own use.

Sand and gravel production for concrete. Monaryggen, Eidsberg comune, Østfold. Photo: Peer-Richard Neeb.

5.3 BUILDING MATERIALS:

sand and gravel, hard-rock aggregate, and clay

Hard-rock aggregate and gravel are extensively used in building and construction. The materials are extracted from bedrock by blasting (especially hard-rock aggregate) or from natural sand and gravel deposits. The material is crushed and sorted to the most appropriate size for use in buildings, roads and other constructions.

It can no longer be claimed that Norway has unlimited resources of sand, gravel and rock for crushing. Information on the deposits of sand, gravel and rock for crushing are of major importance for area development planning. Areas with suitable deposits are frequently allocated to other purposes than material extraction in municipal land-use plans. It is essential that authorities have information about these deposits so that the resources can be utilized before the areas are used for other purposes. NGU's online Gravel and Aggregate Database has proved to be very useful for this purpose.

Hard-rock aggregate can in many cases be used for the same building and construction applications as natural sand and gravel, but is more expensive due to the cost of blasting and crushing. Nevertheless, consumption of hard-rock aggregate for such applications has increased. This can partly be attributed to local scarcity of sand and gravel, but is also due to more demanding quality specifications, that cannot always be met by natural gravel and sand.

To minimize transport costs, most sand/gravel and hard-rock aggregate is produced locally, near the place where it is to be used. Of the total production, 46% is used for road construction and 19% is used for concrete aggregate. One third is used for rock fill at construction sites, as well as for rock fill and cover of subsea piping on the Norwegian continental shelf.

NGU has mapped about 9,200 sand and gravel deposits, and some 1,100 deposits for extraction of hard-rock aggregate. The online database is located at **www.ngu.no/grusogpukk.** According to the databases of the Directorate of Mining, 1,908 areas have been reserved for extraction of such resources in land-use plans by local authorities, including both deposits currently in production and prospective deposits. Some 1,200 of the actual producers have been asked to supply production data for 2006; c. 290 sand and gravel producers have responded, and 270 producers of hard-rock aggregate.

In 2006, total production of sand, gravel and hard-rock aggregate was 59 million tonnes, representing a turnover of NOK 2.98 billion. Actual production value is presumably well over NOK 3 billion, as would have been documented if more producers had responded with their production data.

About 45 million tonnes of hard-rock aggregate have been sold, with a total value of NOK 2.345 billion: 35% is used for road making, 15% for surface paving, 10% in concrete, and 40% for other uses. In 2006, the production of sand and gravel reached 13.4 million tonnes, representing a value of NOK 643 million: 17% is used in road making, 10% for surface paving, 53% in concrete, and 20% for other applications.

The industry employs about 1,880 persons, in 560 companies of widely ranging size. Altogether, 25% of hard-rock aggregate production is exported, of which 37% for use in road making, 24% in concrete, 24% in the offshore industry, and 15% for other applications. Since 1990, export to the European mainland has increased by 150% in volume. In 2006, total export tonnage amounted to 11.5 million tonnes of hard-rock aggregate and 0.3 million tonnes of sand and gravel. The most important export destinations were Germany, the United Kingdom, the Netherlands and Poland. In addition, another 3.8 million tonnes of hard-rock aggregate was produced for use on the Norwegian and British/Dutch continental shelf areas.

In Norway, about 160 companies of significant size produce tonnages varying from 80,000 to 4.6 million tonnes of sand and gravel and hard-rock aggregate annually. The largest of these are all located in southern Norway, including Feiring Bruk AS, Franzefoss Pukk AS, Mesta AS, NorStone AS, Norsk Stein AS, NCC Roads Norge AS, Kolo-Veidekke AS, Halsvik Aggregates AS and Oster Grus og Sand AS.

Clay is used for the production of lightweight prefabricated building blocks, branded Leca: clay is extracted by Maxit AS/Leca exclusively for Leca Rælingen in Akershus. Near Bratsberg in Bø, Telemark, clay is produced for production of building bricks. The total value of the 320,000 tonnes of clay produced, before burning and processing, amounts to NOK 9 million. The companies had c. 40 employees.

5.4 METALLIC ORES

Rana Gruber AS, Nordland. Photo: Rana Gruber AS.

Metallic ores are rocks that contain metal-bearing minerals in such quantity that the metals can be extracted economically. Market prices for metals are highly variable, with consequences for the value of mineral concentrates. Total production value and export value for metallic ores increased substantially in 2006, to NOK 1,120 and 866 million, respectively. 1.47 million tonnes of ore concentrate were produced. The industry had 468 employees.

Production in Norway has changed in recent years, and at present only two deposits are in production. Titania AS in Sokndal in Rogaland produces ilmenite concentrate, which after further refinery to titanium dioxide, is used as white pigment in paints, plastics and paper. Norway has very large resources of titanium minerals, including a rutile deposit near Førde that has gained international attention in recent years.

In the early 1980s, iron ore was the most important mineral raw material being produced in Norway. Iron ore production has subsequently declined. The only iron ore mine currently in operation, Rana Gruber AS in Nordland has changed its production process and now focuses on fines concentrate and speciality products requiring substantial processing. Due to the high price for iron ore, there has been considerable interest in purchase of Rana Gruber AS. Similarly, the interest for Sydvaranger AS in Kirkenes, Finnmark is also increasing, with prospects for re-opening production.

Production at the sulphide mine of Nikkel og Olivin AS in Ballangen municipality was discontinued in the autumn of 2003 due to insufficient reserves. The company had produced nickel-copper and cobalt concentrates. A minor amount of nickel concentrate is produced by Titania AS. In 2004 and 2005, Falconbridge drilled nickel-copper mineralizations at Espedalen in Oppland county, and in 2006 also in Buskerud and Telemark. The interest for additional areas for prospecting is great.

Gold was produced at Bidjovagge near Kautokeino from 1985 to 1992. Recently, there has been renewed interest in gold exploration at Pasvik, Kvænangen, Mo i Rana, Setesdal and Bindal. Within the past two years, there has been trial production at Bindal. The mining company Store Norske Spitsbergen Grubekompani has unsuccessfully applied for permission to drill for gold in a deposit near Ny Ålesund in the summer of 2003. They are now working on new exploration prospects in Finnmark.

5.5.1 Coal

Energy minerals comprise all mineral compounds that release heat upon combustion, including oil, gas, coal, oil shale and peat. The world's known coal reserves are estimated to last for another 155 years, whereas reserves of oil and gas are sufficient for 41 and 65 years respectively at current production levels. Over 68% of the oil reserves and 67% of the gas reserves are located in the Middle East and Russia. Mineable coal reserves have been identified in 70 countries. The world's coal production increased by 7.4% in 2005; over the past 25 years, the increase amounts to 78%. New exhaust gas scrubbing technology reduces pollution from coal combustion.

World coal consumption is increasing rapidly and is now in excess of 5 billion tonnes per year. Consumption is, in particular, increasing in the USA and China. Demand has continued to increase, especially because of economic growth in China and India. The price of coal has now reached a level that would have been regarded as unrealistic only a few years ago. As a result, the delivery time of newly ordered mining equipment and materials has increased significantly, in parallel with the general price increase of most raw materials. China and India have major reserves of coal.

New deposits are now being opened for full-scale production in the USA, South Africa, the Philippines, and Australia.

Interest for coal production on Svalbard developed towards the end of the 19th century. There has been coal production on Svalbard with export to Norway and other countries since 1906, only interrupted by WWII. Today, Store Norske Spitsbergen Grubekompani AS (SNSG) has Gruve 7 in operation near Longyearbyen, and Svea Nord, which was opened in 2001 with sufficient reserves for 15-20 years. About 30% of Svalbard coal goes to the metallurgical industry; the remainder is used for energy and for cement production. SNSG exports coal to Germany, the United Kingdom, France and all the Nordic countries.

Production increased steadily in recent years, but was interrupted by a complete production stop for 9 months after a fire in July 2005. Production was resumed at the end of April 2006.

SNSG is currently prospecting for new mineable coal deposits: Ispallen, south of Svea, seems to be the most promising target.

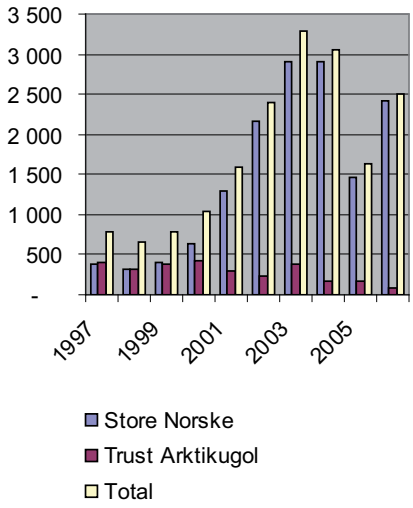


Figure 5.5.1 Coal production on Svalbard in the period 1997-2006.

5.5.2 Peat

About 6 peat deposits are currently in production in Norway: those, which have submitted reports are located in Østfold, Akershus, Hedmark, Vestfold, Nord Trøndelag and Nordland.

Production is restricted to so-called white moss bogs, where the product dug out before further processing for use in soil improvement and other applications. Most of the production is nowadays used by gardening centres and in farming.

6. Management functions (BV)

6.1 PRE-CLAIMS AND CLAIMS

Norwegian legislation distinguishes between claimable and non-claimable minerals. Claimable minerals are owned by they are defined by the Mining Act of 30 June 1972 (mining law). Claimable minerals include all metals with a specific gravity higher than 5 g/cm3, and any minerals containing these metals, as well as titanium and arsenic and minerals containing these metals, and pyrrhotite and pyrite. Bog ores and alluvial gold are exempt from the Mining Act. Alluvial gold occurs in unconsolidated sand and gravel deposited by rivers.

The online portal www.prospecting.no which is a cooperative service provided by the Directorate of Mining and the Geological Survey of Norway (NGU) shows active claims. The website is updated weekly.

6.1.1 Pre-claim

The interest for new pre-claims increased considerably in 2006, relative to 2005: 1,743 new pre-claim applications were submitted, as against 535 in 2005. The number of claim applications has not been higher since 1998. Nickel, gold, copper and molybdenum remain the most interesting metals. Most recently, there has also been interest in thorium and uranium.

Number of pre-claims in the period 1997-2006

In the past year, exploration activities related to pre-claiming occurred mainly in two areas, southeastern and northern Norway.

It is of major importance that the claimant is required to submit reports on the results of the exploration to the Directorate of Mining after the investigations have been completed. These reports become public domain if and when the pre-claim expires naturally (ie. is not renewed). These are then an important source of information for companies when interest in that particular area or adjacent areas revives and new phases of exploration commence.

6.1.2 Claims

In 2006, 30 new claims were approved in two tenders. By the end of the year, 159 claims were held in Norway, exclusive of Svalbard, of which 95 new-type claims conform to current legislation as effective after 30 June 1972 (so-called 'flateutmål') and 64 are old-type claims predating 1972 (so-called 'lengdeutmål').

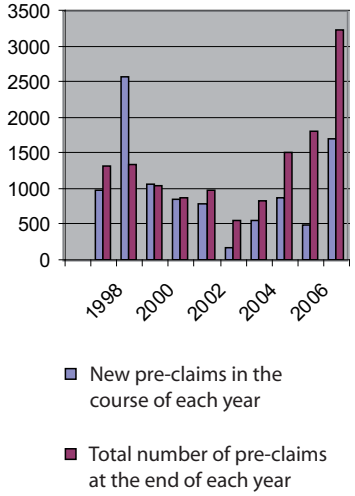


Figure. 6.1 Pre-claim transactions in the period 1997-2006 (number of pre-claims).

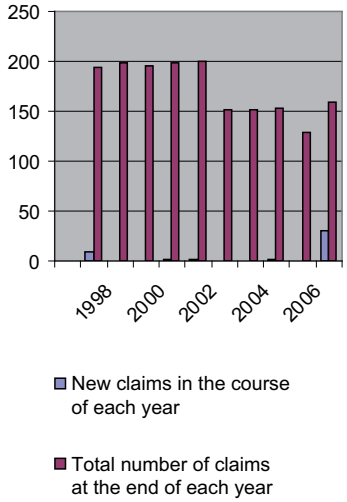


Figure. 6.2 Claim transactions in the period 1997-2006 (number of claims).

6.2 NON-CLAIMABLE MINERALS

Non-claimable minerals are not subject to the Mining Act, and are thus in principle the property of the landowner. Exploration and production of such minerals is therefore the responsibility of the landowner, or of others, upon agreement with the landowner.

In practice, non-claimable minerals can be grouped as industrial minerals, natural stone, and sand and gravel and hard-rock aggregate for building and construction purposes. Alluvial gold and bog ores are also classified as non-claimable.

Acquisition of deposits of non-claimable minerals is covered in the Concession Act of 2003 that regulates acquisition of real estate and fixed property. Rights of ownership and/or extraction of carbonate and quartz deposits are laid down in the Limestone Act of 1914, and in the Quartz Act of 1949 respectively. Extraction of alluvial gold on state-owned property is governed by separate legislation.

6.2.1 Rights defined in the Carbonate Act

Acquisition of carbonate deposits is regulated in the Carbonate Act of 03 July 1914 nr. 5. A concession is required if total production from one or more deposits in the same municipality exceeds 100,000 tonnes. Similar rules apply to acquisition of shares in companies, which own carbonate concessions. If the total ownership after the acquisition exceeds 20% of all shares, then the acquisition is subject to aforementioned Carbonate Act. A concession is also required for agreements involving supply of carbonate rock for periods exceeding 5 years. The Carbonate Act also applies to marble and dolomite. In 2006, 3 concessions according to the Carbonate Act have been approved.

6.2.2 Rights defined in the Quartz Act of 1949

Acquisition of quartz deposits is regulated by the Quartz Act of 17 June 1949. There is no lower limit for the production volume requiring a concession.

The same applies to acquisition of shares from quartz concession owners. If the total ownership after the acquisition exceeds 20% of all shares, then the acquisition is subject to the aforementioned Quartz Act. A concession is also required for agreements involving supply of quartz for periods exceeding 2 years. The Quartz Act also applies to quartzite and rock crystal. One concession according to the Quartz Act was approved in 2006: it related to acquisition of shares in a company with a quartz concession.

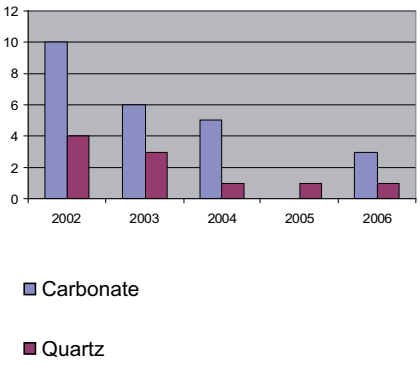


Figure 6.3 Overview of the number of carbonate and quartz concessions approved in the period 2002-2006.

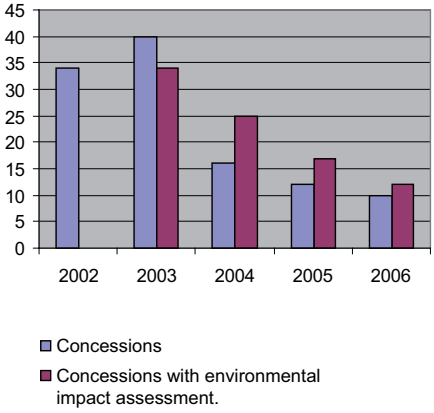


Figure 6.4 Overview of the number of planning documents on which comments have been made in the period 2002-2006.

6.2.3 Permission for production from state-owned claims

The Directorate of Mining has entered into 3 agreements involving permission to third parties for production from state-owned claims. The actual claims for which these agreements apply are located in Rana, Nome and Ballangen municipalities.

6.3 MANAGEMENT ISSUES GOVERNED BY OTHER LAWS

This mainly comprises comments made on draft land-use plans, concessions according to the Concession Act of 2003, etc., which are subject to official hearings. By the end of 2006, the Directorate of Mining had registered c. 350 municipal plans, 40 partial municipal plans, and 7 shore-zone plans. Of the 434 municipalities in Norway, 29 municipal area development plans are lacking, 5 municipalities do not have such plans, and 3 municipalities have not yet been contacted regarding the issue.

6.3.1 The Concession Act of 2003

Acquisition of mineral deposits, including sand and gravel for building and construction applications is regulated in the Concession Act of 28 November 2003 nr. 98, effective as of 1st January 2004. The concession authority is either the County Agricultural Board, or the municipality. The Directorate of Mining is the sole hearing instance in cases concerning such mineral deposits, and has, in collaboration with the Ministry of Agriculture, defined standard requirements to be included with the concession requirements. Among others, the requirements include an operational plan, monitoring reports as well as supervision.

6.3.2 Chapter VII-a of the Planning and Building Act of 2005

As of 01 April 2005, a new guideline for environmental impact studies became effective. This guideline envisages the development that the Directorate of Mining's role as responsible authority will eventually lapse, after which all responsibility for obligatory impact assessments will be held by the municipalities. Applications submitted before the above date may still be processed by the Directorate if so desired, and many municipalities actually prefer this. The Directorate has registered 14 such applications, which will be processed according to the previous practice.

Paragraph §7 of above guideline states that land regulation and municipal area development plans that involve extraction from deposits must be submitted to the Directorate for comment prior to final approval. In 2006, the Directorate processed 7 applications, which were all processed within the set deadline.

Two additional applications were submitted according to Appendix 1 of the previous law after 01 April 2005. At the request of the respective municipalities, the Directorate of Mining accepted responsibility for administering these applications, conforming to the pre-2005 guideline, and also processed these within the set deadline.

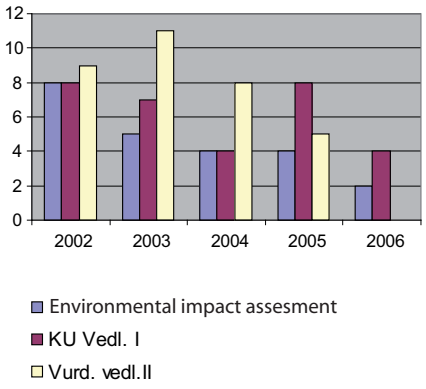


Figure 6.6 Number of cases according to Planning and Building Act in the period 2002-2006.

7. Mineral deposits of national importance (NGU)

Natural stone quarry in Larvikite, Tvedalen, Larvik comune, Vestfold. Photo: Lundhs Labrador AS.

NGU has prepared an overview of mineral resources of national significance, combining substantial value and where a satisfactory treatment is needed in land-use planning processes. Criteria for the selection of deposits include:

Deposits with a potential for sizeable exports, including export after initial processing in Norway,

Deposits with a potential for becoming significant producers for major home markets, and

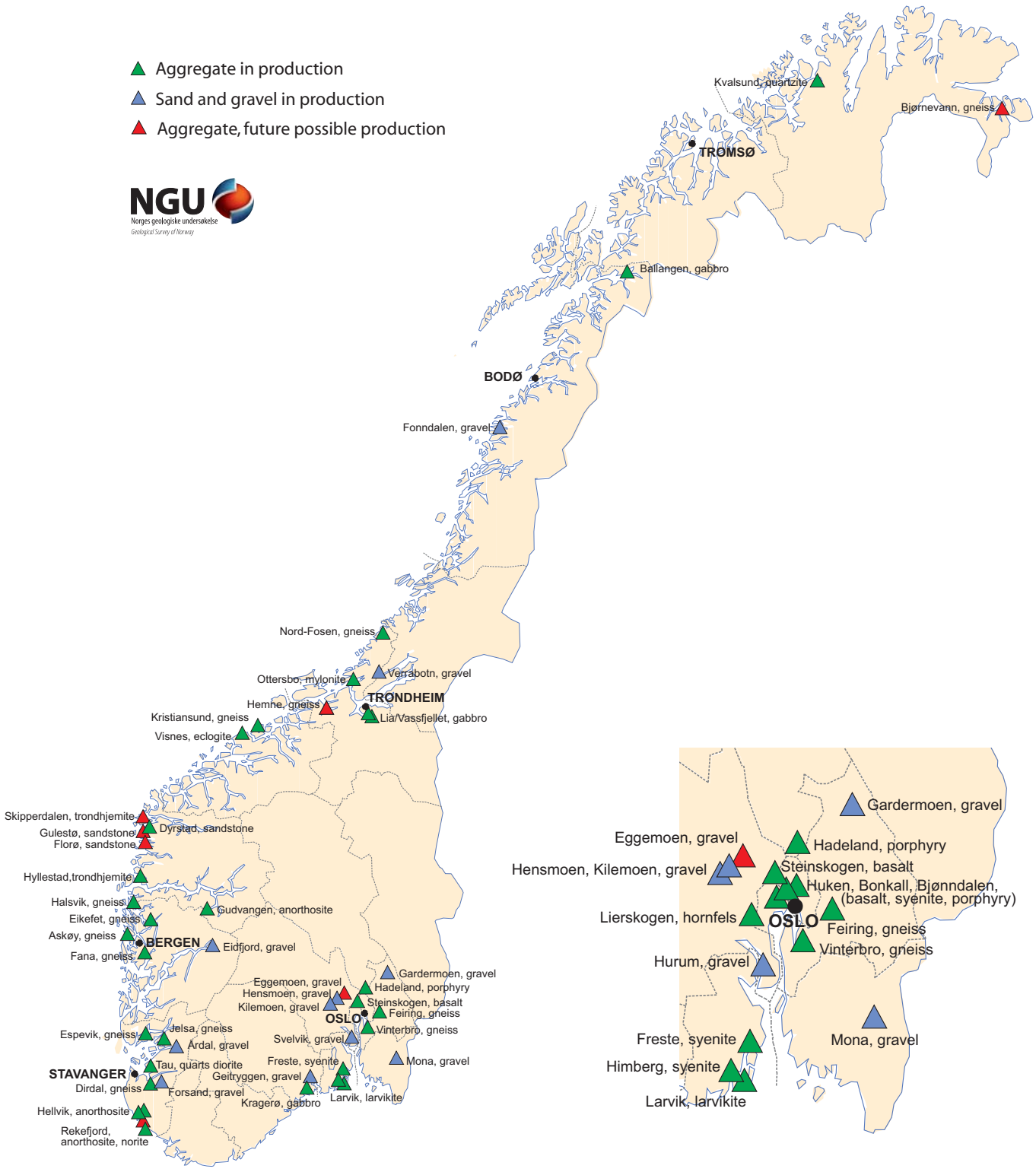
New deposits which can be expected to come into full production within 50 years.

There is a continuing need for accurate, up-to-date information on new deposits and for a more integrated overview, both in relation to planning processes and for the mineral and mining industry. NGU has prepared an overview of mineral resources of national significance, which may contribute to answering the question: What are the possibilities for future production?

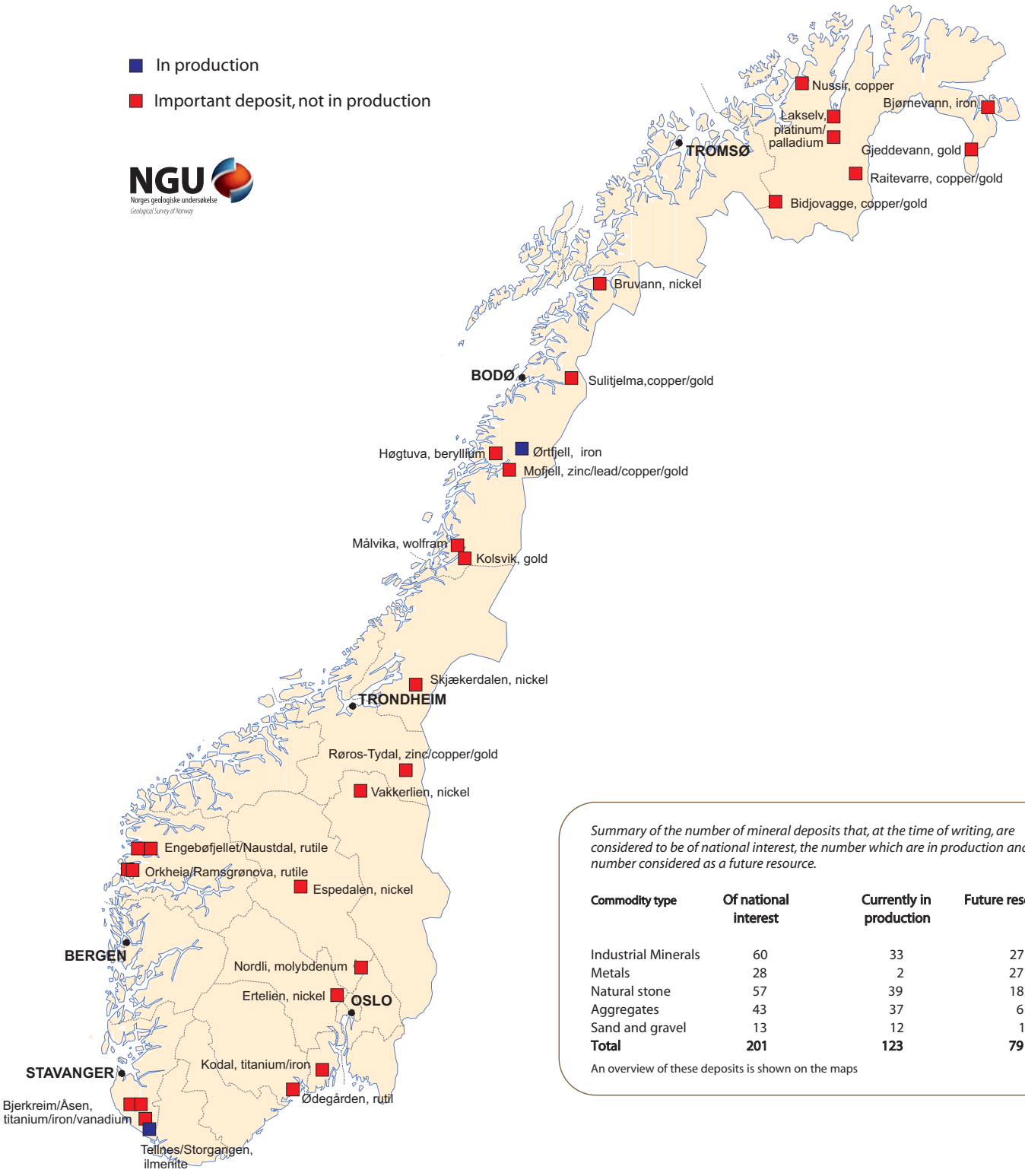
7.1 Industrial minerals of national interest

7.2 Natural stone of national interest

7.3 Sand, gravel and aggregate of national interest



7.4 Metallic ores of national interest



Summary of the number of mineral deposits that, at the time of writing, are considered to be of national interest, the number which are in production and the number considered as a future resource.

Commodity type	Of national interest	Currently in production	Future resource
Industrial Minerals	60	33	27
Metals	28	2	27
Natural stone	57	39	18
Aggregates	43	37	6
Sand and gravel	13	12	1
Total	**201**	**123**	**79**

An overview of these deposits is shown on the maps

8. Challenges for the future

Norway has a varied geology, offering great potential for mineral production. The long shoreline and proximity to the European market are important. Norway is a considerable mineral producer by European standards.

Norway itself has a high consumption of mineral products. The mining and quarrying industry creates very substantial values, with great importance for outlying regions. Typically, mineral deposits should be planned with a projected production time of 50-100 years. This is, in itself, a contribution to sustainable development.

Strong growth in Asia, especially in the World's two most heavily populated nations, China and India, has led to shortages and high prices for many natural resources. Prices for metals such as gold, copper, nickel and iron have doubled or tripled in price in the last two to three years. Prices have also increased for industrial minerals, coal and uranium. These price increases have led to a substantial increase in exploration for new resources.

These price increases and the stronger focus on exploration and investigation of new deposits have led to an increase in the need for geoscientific knowledge, relating to the location of economic mineral deposits and the processes leading to their formation. NGU will contribute to exploration for, and development of new mineral resources for the future.

International exploration companies have, so far, been most interested in Norway's nickel resources and have carried out helicopter-borne geophysical surveys over many of Norway's nickel provinces. NGU and BV now register an increasing interest from international companies in exploration for copper, gold and zinc. The portal www.prospecting.no, developed by NGU and BV came on line at the right time for use as an aid in their search for new, potential exploration areas.

Production of ultrapure silicon for use in solar cells and other electronic applications is very interesting, and the demand for knowledge about quartz as a raw material for silicon production is increasing.
Norway also has a range of speciality mineral deposits that are not readily available elsewhere in Europe. These include industrial minerals such as nepheline (syenite) and olivine, the ore minerals ilmenite and rutile, larvikite and another anorthosite with colour play for use as natural stone and white anorthosite and Devonian sandstone for use as hard-rock aggregate. Innovative technological research on the use of these raw materials could provide a basis for new domestic processing industries.

Currently, the total potential value of proven mineral resources in surficial deposits and in bedrock on the Norwegian mainland exceeds NOK 1 000 billion. The mineral and mining industry faces some major challenges, including:

Exploration and development of future mineral deposits,

Increased research efforts,

Securing the availability of future mineral deposits in area development planning processes.

Exploration for and development of future mineral deposits

In the period 1960-1990, exploration in Norway was rather extensive, after which activity declined. Today, mineral and mining companies spend NOK 40-80 million annually on exploration, which represents a meager 1% of the industry's annual turnover. In contrast, the mining industry has spent SEK 300 million annually on exploration activities in Sweden, for the past 5 years. It is a tremendous challenge to motivate the industry to increase the annual budget spent on exploration in Norway.

Increased research effort

Quality requirements for mineral products increase steadily. The industry copes by either enhancing processing of their products, or by finding new deposits with purer resources. This development necessitates improved skills in the industry and in research institutions.

The Research Council of Norway supported the project "From quartz sand to solar cells" , which was completed in 2005. The project is an example of the type of research needed in order to add value to resources in the future. A major increase in research and development efforts will be required to achieve the same effect for other mineral resources.

Securing future mineral deposits in area development planning

In the oil and gas industry, it is common to calculate the in-situ value of the oil and gas in a reservoir as the product of the extractable reserves and a given price. The same exercise, when applied to the mineral and mining industry, shows that many deposits represent very substantial values, in some cases of the order of NOK 100 billion.

Measured in land usage, the mineral and mining industry takes little space. Data from Sweden indicate that the industry uses only 0.05% of the total area. Most of this area is related to extraction of sand and gravel.

Society has long neglected important aspects of management of mineral resources. This is clear when we compare public management of mineral resources with the efforts made in relation to other types of natural resource or sectors, including forestry, agriculture and nature reserves. While there is extensive land management consideration in relation to these types of resources and the areas where they occur, mineral resources are typically omitted from area development plans, despite the tremendous value they may represent. This is yet another reason for mapping currently known deposits as well as areas with a potential for new deposits in greater detail.

INDUSTRIAL MINERALS

Industrial minerals are defined as mineral and rocks with economic value, which are produced because of their non-metallic, physical and chemical properties, except for fossil fuels, water and gemstones. Industrial minerals are used in many products, i.a. as filler in paint, paper and plastic and as major constituents in ceramics, glass and cement.

NATURAL STONE

Natural stone is defined as all stone that can be cut, split or hewn into slabs or blocks for outside use, as building material, and for ornamental or decoration purposes. There is further distinction between slate/flagstone anddimension stone. Slate/flagstone comprises a group of rock types, which have a naturally occurring platy cleavage. Common types of slate/flagtsone include shale, phyllite, mica schist, and flagstone. Dimension stone is extracted as large blocks, which are then sawn or cleaved into slabs or other forms. Important types of dimension stone include larvikite, marble, granite, limestone and sandstone. Bulding stone is produced from slate, flagstone, gneiss and granite which can be cleaved along a plane of schistosity.

BUILDING MATERIALS

These materials include sand, gravel, hard-rock aggregate and clay. Sand and gravel are terms used interchangeably for surficial materials used in building and construction. Particle size fraction determines the nomenclature used in a geological context: 0.06-2mm sand, 2-64mm gravel, and 64-256mm is designated as stone.

HARD-ROCK AGGREGATE

The most common rock types suitable for production of hard-rock aggregate include: gneiss, granite, quartzite, gabbro and syenite.

METALLIC ORES

Metallic ores comprise all rock types containing minerals and metals with a specific gravity higher than 5 g/cm^3, occurring in large enough amounts to make extraction economically feasible. Norway has a long-standing tradition of ore extraction, dating back to the 1600s, with Røros (copper) and Kongsberg (silver) among the best-known historical mining centres.

ENERGY MINERALS

Energy minerals comprise all rock types and minerals that release energy on combustion: coal, which occurs on Svalbard, and peat found throughout Norway belong here. Coal is used in the metallurgical industry and in the manufacture of cement. Peat is mainly used in gardening and in agriculture.

Design: B. Svendgård, NGU Trykk: NGU

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