DIRECTORATE OF MINING
WITH COMMISSIONER OF MINES AT SVALBARD

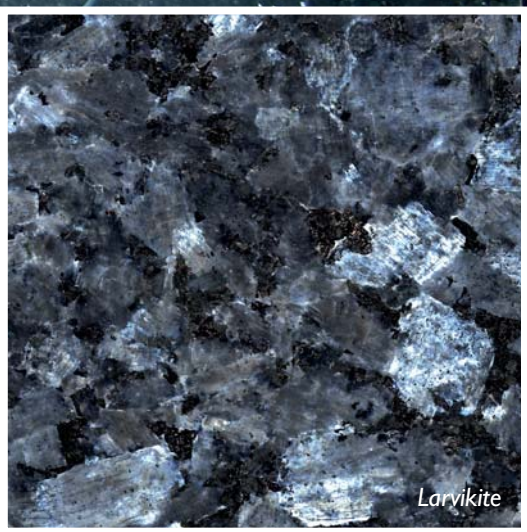
NGU
Norges geologiske undersøkelse
Geological Survey of Norway

MINERAL RESOURCES IN NORWAY 2008

Production data and annual report

Publication no. 2 2009

Photo: Peer-Richard Neeb



Larvikite

Norway's national rock

Norway's national rock, larvikite. Norway's new national rock has been used as dimension stone since the late 1800s. Its unique iridescence has given it a status as one of the world's most attractive types of natural stone. Larvikite is thus an excellent representative for the geology, culture and nature of Norway. The illustration shows a polished larvikite slab, ready for sale at Nordic Stone, Larvik.

Outside cover: Calcite marble quarry at Akselberg, Brønnøy municipality.
Photo: Brønnøy Kalk AS

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FOREWORD

This report on industrial mineral production was prepared by the Geological Survey of Norway (NGU) and the Directorate of Mines with the Commissioner of Mines at Svalbard (BV) based on the mining industry's own production and sales figures for 2008. The response deadline was set at May 8th , 2009.

In all, 807 producing quarries/mines have submitted data on the various types of mineral resource, as presented in a number of figures and tables in the report. Compared to previous reports "Norwegian mineral production" from the Directorate of Mines and "Mineral resources in Norway" from NGU, the results presented here for 2008 have never been better, even though production data from a number of smaller deposits are still lacking.

The mineral production data for 2008 have been compiled by Peer-Richard Neeb, Gunn Sandvik, Knut Riiber and Geir Strand (NGU) and by Peter Brugmans and Brit Kaasboll from the Directorate of Mining. The figures have been prepared by Arnhild Ulvik and Helge Hugdahl, NGU.

Trondheim 31.08.2009

Morten Smelror
Director
Geological Survey of Norway

Per Zakken Brekke
Commissioner of Mines,
Directorate of Mines with Commissioner of Mines for Svalbard

1. ABSTRACT

Calcite marble quarry at Akselberg, Brønnøy municipality. Photo: Brønnøy Kalk AS

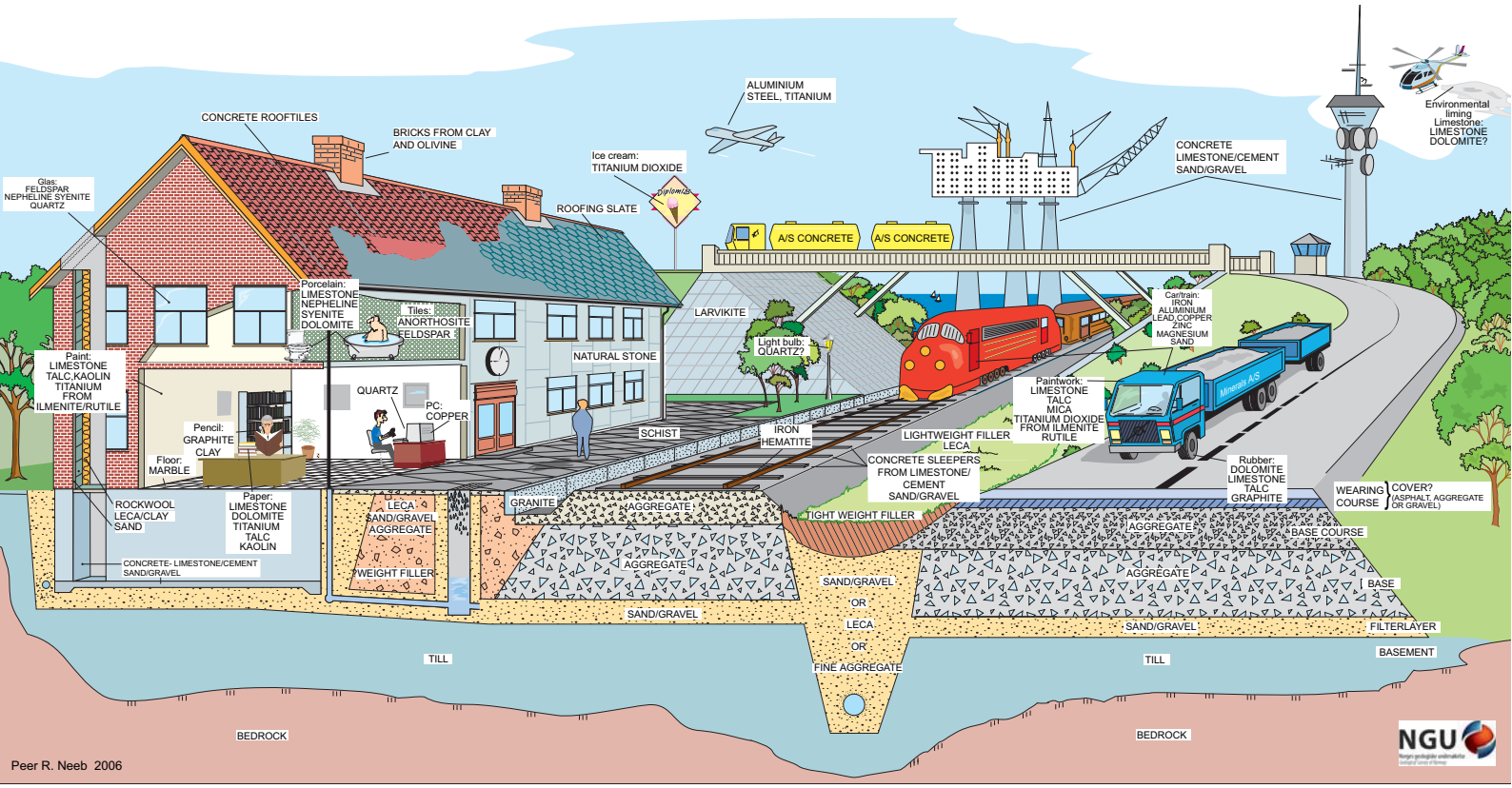
The Norwegian mineral and mining industry had an annual turnover of NOK 11,400 million in 2008, and exported products valued at NOK 7,200 million. Eighty-five million metric tonnes of mineral raw materials were produced, by c. 4,800 employees at 807 producing quarries/mines.

Coal production on Svalbard has increased considerably in the last year from NOK 1.900 million in 2007 to NOK 2.600 million in 2008. Gravel and hard-rock aggregate turnover was approximately the same as in 2007, NOK 3.9 million, while that of calcium carbonate showed a slight increase from NOK 1,800 million in 2007 to NOK 1,900 million in 2008.

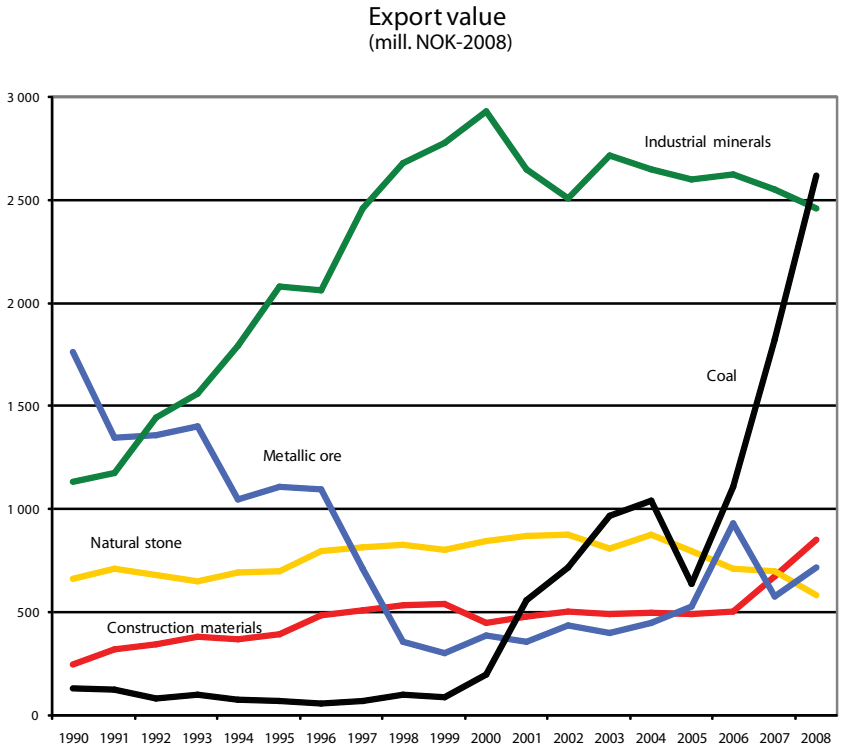
The mineral and mining industry is of great significance in outlying regions, with the highest turnovers in the counties of Møre og Romsdal, Rogaland, Nordland, Vestfold, and Finnmark.

1,227 applications for pre-claims were processed in 2008, as against 3,378 in 2007, the largest number in any year since the Directorate of Mines was established.

Mineral statistics are presented in figures, maps and tables.



Everyday use of mineral resources.



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), olivine, nepheline syenite, quartz and dolomite)
- **Natural and dimension stone** (e.g. larvikite, granite, marble, slate/flagstone and building stone)
- **Building materials** (sand, gravel, hard-rock aggregate, rock for ballast and clay)
- **Metallic ores** (e. g. iron, nickel, molybdenum and ilmenite - titanium)
- **Energy minerals** (e. g. 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 in 2008 amounted to 12.5 metric tonnes, 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 Mines (Bergvesenet - BV) and the Geological Survey of Norway (Norges geologiske undersøkelse - NGU) and were 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:

- To demonstrate the importance of the mineral industry to the Ministry of Trade and Industry, to other ministries and public authorities and to the general public.
- To assist county and local authorities, and 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 by the end of June the following year.

NGU and the Directorate of Mines have 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 from lists of producers registered in the Directorate of Mines' database.

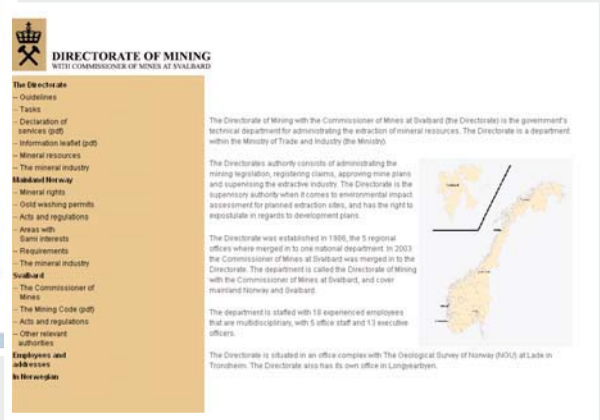
Where fewer than three companies are involved, NGU and the Directorate have come to an agreement with the producers on how the figures can be presented in figures and tables. Data on total production tonnage, annual turnover and employment are given priority. Data on health, environment and safety are presented in a specific table.
Data on mineral resources of national importance have been collated by NGU and are revised annually.

Peer - Richard Neeb,
Team Leader

Peter Johannes Brugmans,
Senior Engineer

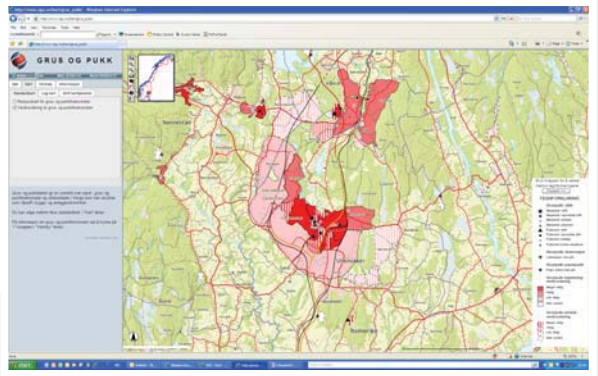
Mineral resource web sites

www.ngu.no

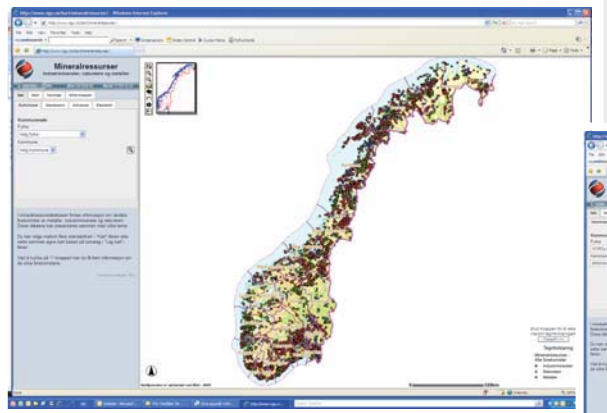


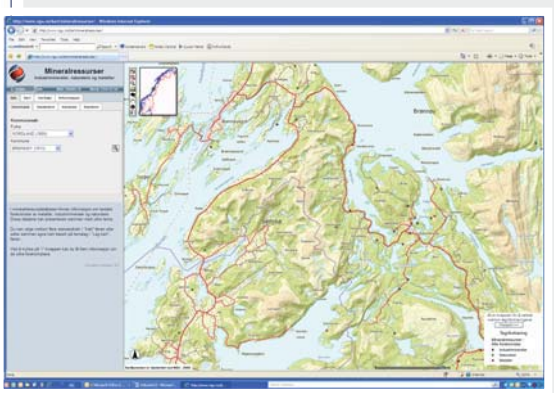
www.bergvesenet.no

www.prospecting.no



www.ngu.no/grusogpukk





www.ngu.no/kart/mineralressurser

3. WEB SITES AND DATABASES

NGU maintains and continuously expands its national databases on Norway's mineral resources. Data on sand and gravel, hard-rock aggregate, natural stone, ore and industrial mineral deposits are all freely accessible at **www.ngu.no**, under the links: Resources and Maps & data.

The Directorate of Mines web site (**www.bergvesenet.no**) gives information on the Directorate as such and about the mining industry and related activity. The site also provides information on relevant regulations and has links to the actual law texts. The site also has information on mining on Svalbard and the regulations which apply there.

NGU and the Directorate of Mines have developed an English-language internet portal (**www.prospecting.no**) in order to provide access to geological maps and data on deposits of industrial minerals, ores and natural stone, and data on mining claims and protected areas, etc. The site provides an overview of approved claims and pre-claims, with the exception of older claims according to legislation pre-1972 and applications being processed but not yet approved. The overview is updated every Monday.

NGU has developed an overview of mineral resources of national significance. These are deposits which have a substantial value, and which must be given appropriate attention in land-use planning processes. The criteria used to select the deposits of national interest are described in Chapter 7. The overview is revised annually.

Overview of the number of Norwegian mineral deposits for which NGU has information which is adapted for internet access.

Resource type	**Adapted for internet access**
Industrial Minerals	2314
Metals	4555
Natural stone	1162
Aggregates	1629
Sand/gravel	9212
Total	**18872**

Overview of the Directorate of Mines information

Valid pre-claims

4054

Number of areas reserved for resource extraction in municipal plans

2048


Svalbard
Barentsburg, coal
Gruve 7, coal
Svea Nord, coal
Tana
Repparfjord
Stjernøy
Alta
Hjellnes/Fornesset
Kautokeino
Trælen/Skaland
Andøy
Bjarkøy
Sortland
Rombak
Hekkelstrand
Lødingen
Kjøpsvik
Drag
Hammerfall
Løvgavlen
Bodø
Fauske
Mårnes
Ørtfjell
Altermark
Seljeli
Mosjøen
Akselberg
Hestvika
Nord-Fosen
Snåsa
Lierne
Leinsmyra
Verdal
Ottersbo
Lia/Skjøla/Vassfjell
Melhus
Kristiansund
Fræna/Eide
Oppdal
Raudbergvik
Åheim
Dyrstad
Bryggja
Otta
Sløvåg
Eikefet
Gudvangen
Askøy
Valdres
Hovemoen
Furuberget
Hole
Jondal
Nittedal
Ullensaker
Hønefoss
Gardermoen
Oslo
Feiringåsen
Røyken
Svelvik
Mona
Espevik
Jelsa
Sundland
Moss
Tau
Årdal
Sandnes
Risavika
Forsand
Jæren
Dirdal
Skien
Dalen
Sandefjord
Tjerbo
Iddefjord
Bollestad
Kragerø
Larvik
Hellvik
Valberg
Rekefjord
Tellnes
Glamsland
Important mineral deposits in production in Norway
Industrial minerals
Metallic ores
Natural stone
Hard-rock aggregate
Sand and gravel
Coal
Peat
DIRECTORATE OF MINING
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NGU
Norges geologiske undersøkelse
Geological Survey of Norway

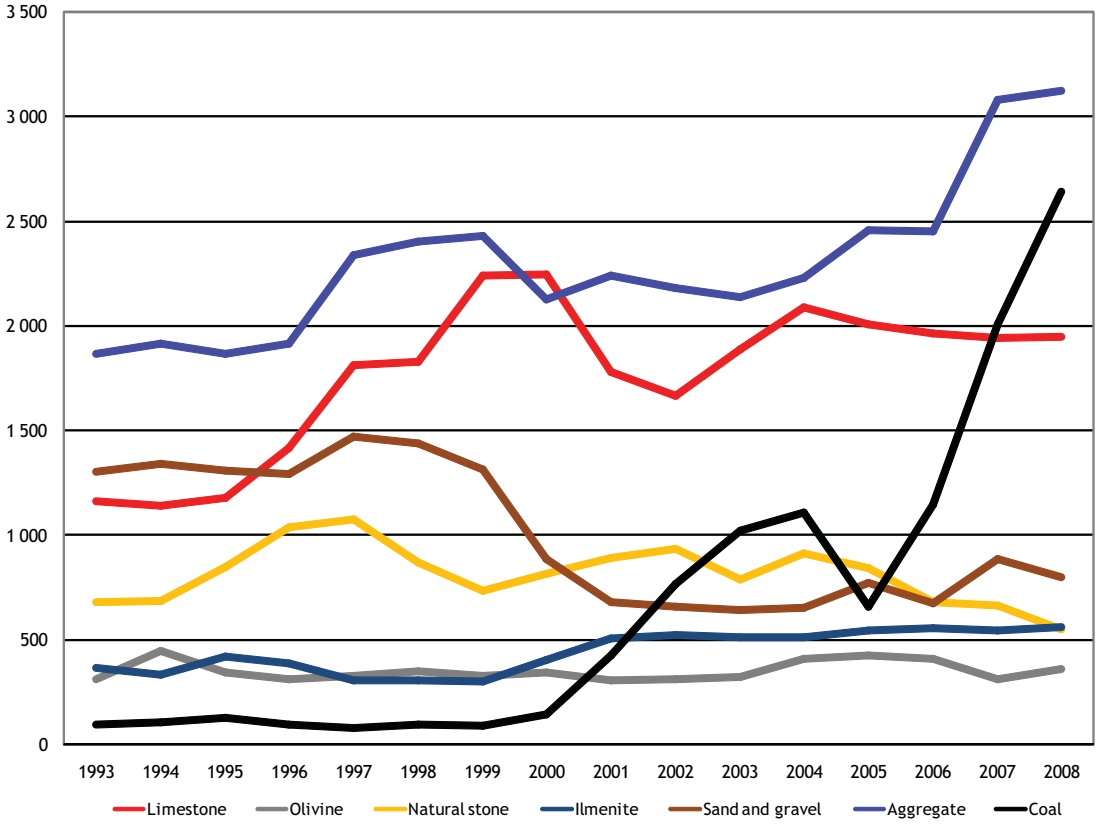
4. DEVELOPMENTS IN THE MINING AND QUARRYING INDUSTRY

The past 30 years have seen substantial structural changes in the industry. Production of industrial minerals has increased considerably and production of natural stone has increased moderately, whereas production of sand and gravel and hard rock-aggregate has increased significantly in the last year. Coal production on Svalbard has increased dramatically in recent years.

Twenty years ago the state was a major owner in the mining industry, especially in metal mining, through its ownership of Norsk Jernverk/Rana Gruber and AS Sydvaranger and its subsidiaries. The state, after the sale of AS Olivin, no longer has ownership in the mineral industry on mainland Norway. Most of the large, export-oriented companies in the mineral industry today are partly or wholly owned by international 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.

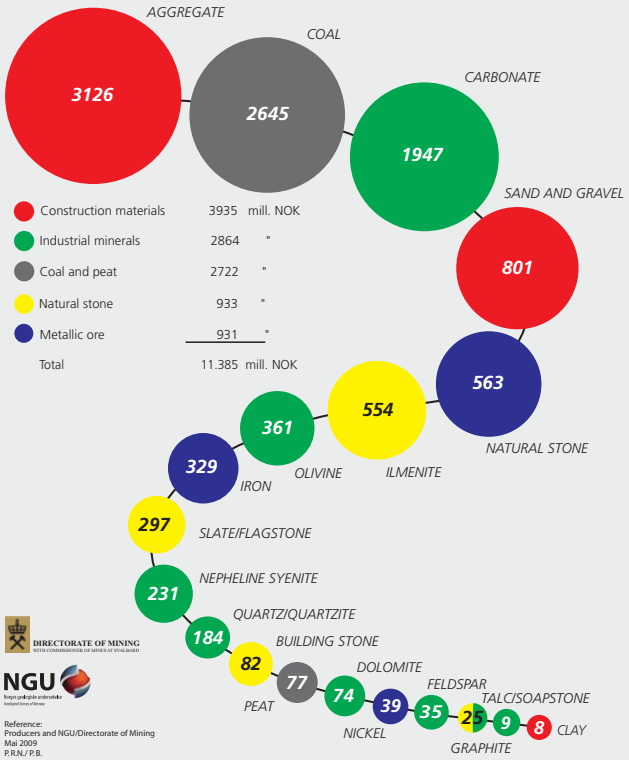
The mineral and mining industry is capital intensive, requiring a higher investment per employee than industry in general. Approximately 64% of the total mineral production (calculated on the basis of turnover) is exported, and the domestic share of production is the basis for an important mineral processing 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 (2008)



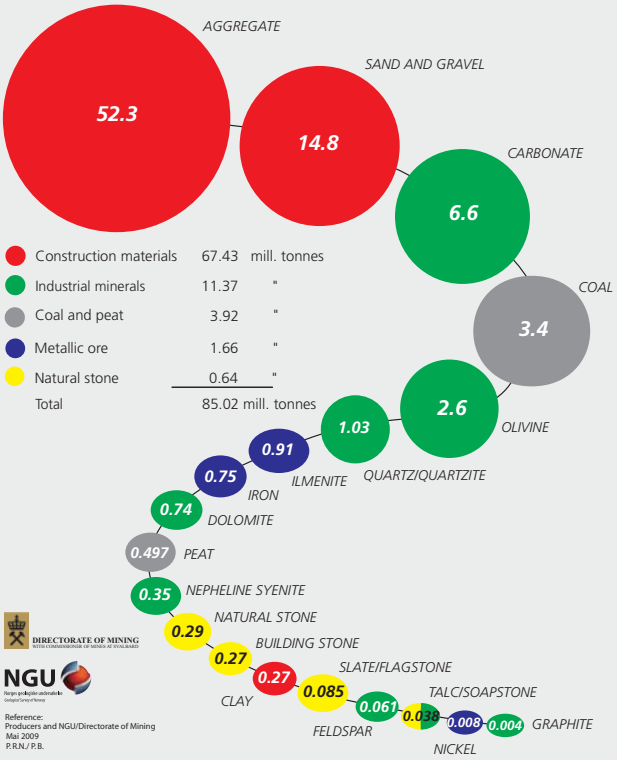
PRODUCTION OF NORWAY'S MOST IMPORTANT MINERAL PRODUCTS

(2008, FOB MILL NOK)
TOTAL 10.4 BILLION NOK



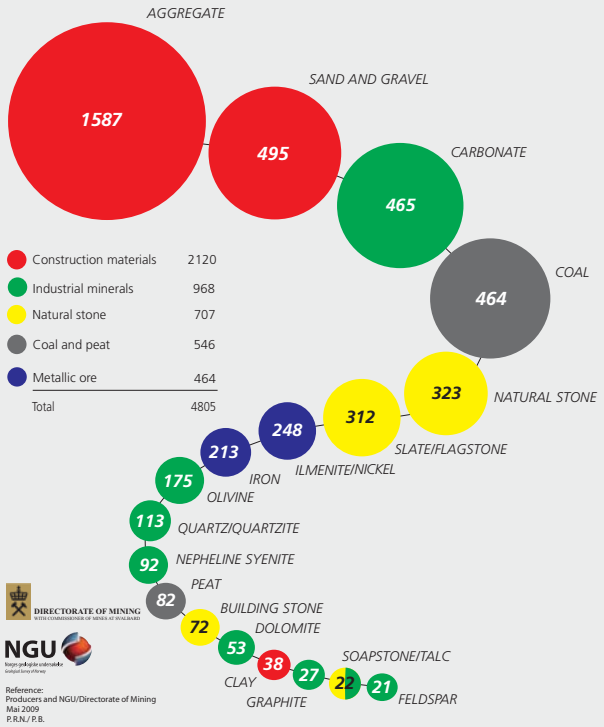
PRODUCTION OF NORWAY'S MOST IMPORTANT MINERAL PRODUCTS

(2008, MILL. METRIC TONNES)



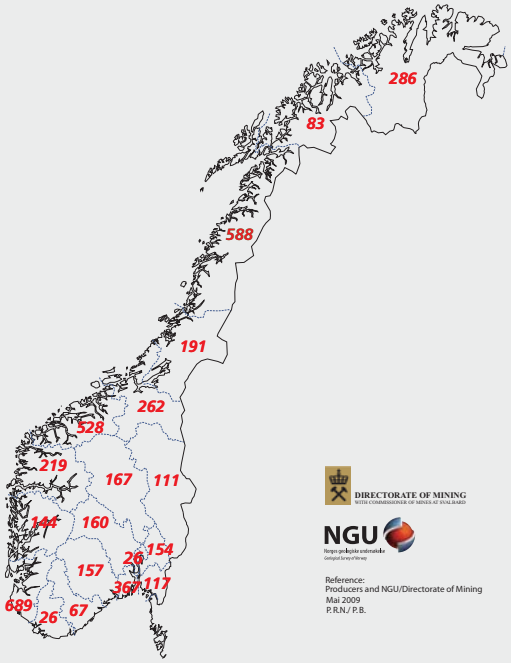
EMPLOYEES IN THE MINERAL INDUSTRY

2008



EMPLOYEES IN THE MINERAL INDUSTRY

2008: 4805 employed,
and at Svalbard 464



5. MINING AND QUARRYING INDUSTRY IN 2008

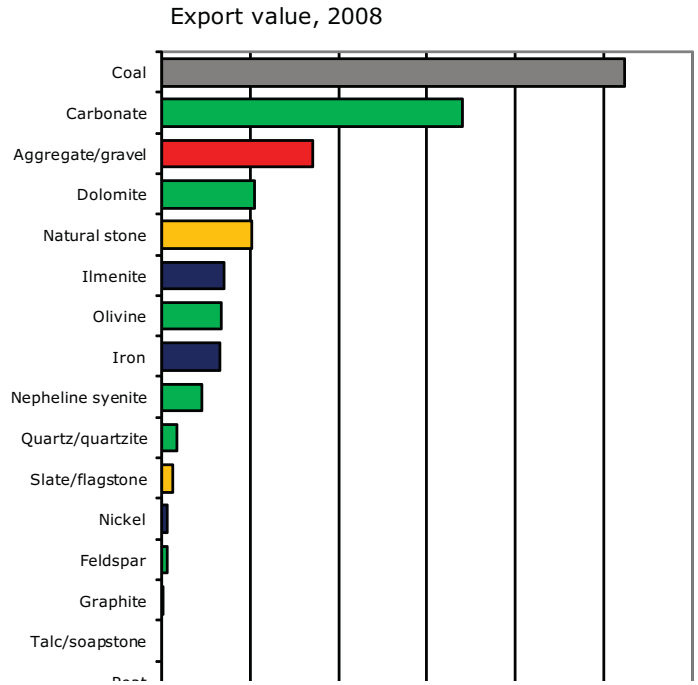
General overview

Approximately 85 million tonnes of mineral resources were extracted in Norway in 2008, representing a total value of NOK 11,400 million. Turnover of industrial minerals was unchanged from 2007 to 2008, at NOK 2,900 million and turnover of natural stone was also unchanged, at NOK 900 million. Turnover of metallic ores increased from NOK 800 to 900 million. Turnover of gravel and hard-rock aggregate for the building industry was unchanged at NOK 3,900 million in 2008. Turnover of coal increased from NOK 1,900 to NOK 2,700 million, and of peat from NOK 67 to NOK 77 million.

The total export value for the industry in 2008 was NOK 7,200 million, representing 64 % of the overall turnover. The export value for industrial minerals was NOK 2,500 million, of which calcium carbonate slurry, olivine and nepheline syenite are the most important products. The natural stone industry exported stone blocks for NOK 514 million (of which NOK 481 million relates to larvikite), and slate/flagstone and building stone for NOK 70 million. Similar data for hard-rock aggregate, rock for ballast and gravel indicate an export value of NOK 858 million, whereas exports from ore production amounted to NOK 722 million, consisting of ilmenite, iron and nickel. Finally, export of coal to Europe represented a value of NOK 2,600 million.

The mining and quarrying industry is a typical regional industry, especially strongly represented along the coast. The industry gives employment to about 4,800 full-time employees at a total of 807 producing quarries/mines. Measured according to turnover, the most important mineral-producing counties are Møre og Romsdal, Rogaland, Nordland, Vestfold and Finnmark.

The individual products are shown collectively and according to the producing county in Tables 1 - 14.



- Extraction of various mineral resources:
  85 million tonnes
- Production value:
  11.400 million NOK
- Export:
  7.200 million NOK
  64 per cent
- Number of companies:
  693
- Other companies:
  114
- Number of employees:
  4800

Loading calcite marble from Brønnøy Kalk AS at Akselberg, Brønnøy municipality. Photo: Brønnøy Kalk AS

5.1 Industrial minerals

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 2008 amounted to NOK 2,900 million, for a production of 11.4 million tonnes. 968 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 2,460 million.

Norway is among the world's leading producers of olivine and nepheline syenite. A total of 2.6 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 in Sogn og Fjordane. 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 emissions, 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 has a large share of the world markets for quartz, feldspar, olivine and nepheline syenite.

Fifteen companies produce calcite marble and 4 produce dolomite: they have altogether 518 employees. 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. The data in the mineral overview are for calcium carbonate slurry.

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 252 million in 2008. Regarding cement production, the value of the burnt clinker products is not included.

Quartz and quartzite are produced by 7 companies, with 113 employees. In 2008, 1 million tonnes were produced, representing a value of NOK 184 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, solar cells and in the manufacture of fibre-optical cable. It is also used as 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 in addition to their current production at Drag in Tysfjord municipality in Nordland.

Talc is produced by Norwegian Talc Altemark AS in Rana municipality, and is processed in Knarrvik in Hordaland. Kvam Talk AS in Gudbrandsdalen is also in production. Graphite is produced by Skaland Grafittverk AS on the island of Senja, and the company has now opened a new graphite mine at Trælen on Senja.

5.2 Natural stone

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

In 2008, the industry produced dimension stone representing a value of NOK 554 million, slate/flagstone with a value of NOK 297 million and building stone with a value of NOK 82 million. Prior to 2007 the industry produced soapstone for use in hearths and ovens at Otta, but from 2007 the company quarried its soapstone in Sweden. The whole Norwegian stone industry provides employment for 708 people. The total export value of dimension stone amounted to NOK 514 million, of which NOK 479 million was for larvikite, while the export value of slate was NOK 70 million.

Larvikite, selected as Norway's national stone early last year, is produced from several quarries in the vicinity of Larvik and dominates Norwegian dimension stone production: the larvikite is a resource of unique quality, fetching high prices on the world market. Turnover was NOK 481 million in 2008, from 6 companies with 278 employees. Lundhs AS is the largest producer. Most of the production was exported as rough blocks to China, Italy, India, Spain, France, Taiwan and Belgium. New technology has made production more efficient, and the favourable location of the deposits, near the coast, adds to the profitability of the industry. Sales have been variable in recent years.

Dimension stone is also produced from: Gneiss in Sogn og Fjordane and Hedmark, syenite at Lødingen in Nordland, anorthosite in Rogaland, granites in Buskerud, Oslo, and Østfold, trondhjemite in Sør Trøndelag, soapstone at Bardu, quartzite in Finnmark and from marble in the Fauske area.

Slate/flagstone and building stone are produced from many different localities throughout the country. In 2008, 43 companies with 385 employees produced slate/flagstone with a value of NOK 379 million, an increase ffrom NOK 359 million in 2007. More building-stone producers have submitted data in 2008 than in previous years.

The most important products for the industry are flagstone from Alta and Oppdal and phyllitic slate from Otta. All the material produced is processed near the quarries. C. 24 % of the production is exported, and the flagstone is recognized as being very resistant to wear, making it particularly suitable for areas with heavy traffic.

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.

Production of larvikite blocks at the Lundh AS quarry at Klaastad. Photo: Peer - Richard Neeb

Armourstone produced at Larvik. Photo: Norsk Stein AS, Stema Shipping

5.3 Construction materials

Sand and gravel, hard-rock aggregate and clay

Hard-rock aggregate and gravel are used in building and construction. The materials are extracted from bedrock by blasting 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 is 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 all aspects can be considered in the planning process. NGU's on-line Gravel and Aggregate Database has proven to be very useful for this purpose.

Hard-rock aggregate can 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 is increasing. 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.

Annual consumption of hard-rock aggregate and gravel per person in Norway is currently 10.4 tonnes. To minimize transport costs, most sand/gravel and hard-rock aggregate are 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. Approximately one third is used as rock fill at construction sites, as well as rock fill and cover for sub-sea pipelines on the Norwegian continental shelf.

NGU has mapped about 9,200 sand and gravel deposits, and some 1,200 deposits for extraction of hard-rock aggregate. The online database is located at www.ngu.no/grusogpukk. Some780 of the actual producers have been asked to supply production data for 2008; c. 351 sand and gravel producers have responded, and 342 producers of hard-rock aggregate. The production value of sand, gravel and hard-rock aggregate in 2008 was NOK 3,934 million (NOK 3,925 million in 2007), based on extraction of 67 million tonnes (69 million tonnes in 2007). The actual figures are probably much higher. The industry employs about 2,080 persons, in 690 companies of widely ranging size.

About 53 million tonnes of hard-rock aggregate have been sold, with a total value of NOK 3,100 million: 30 % is used for road construction, 20 % for surface paving, 10 % in concrete, and 40 % for other uses. The production of sand and gravel was 14.8 million tonnes, representing a value of NOK 801 million: 13 % is used in road construction, 12 % for surface paving, 48 % in concrete, and 27 % for other applications.

Altogether, 25 % by volume of hard-rock aggregate production, is exported, of which 43 % for use in road construction, 22 % in concrete and 35 % for other applications. Since 1990, export to the European mainland has increased by 175% in volume. In 2008, total export tonnage amounted to 17.1 million tonnes of hard-rock aggregate and 0.1 million tonnes of sand and gravel, with a value of NOK 858 million. The most important export destinations were Germany, Denmark, the United Kingdom, the Netherlands and Poland. In addition, another 2.7 million tonnes of hard-rock aggregate was produced for use on the Norwegian and British/Dutch continental shelf areas.

About 152 companies of significant size produce tonnages varying from 100,000 to 5.5 million tonnes annually of sand and gravel and hard-rock aggregate annually. 35 of these produce sand and gravel and 117 produce hard-rock aggregate. The largest of these are 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, Bremanger Quarry AS and Oster Grus og Sand AS.

Clay is used for the production of light-weight prefabricated building blocks, branded Leca: clay is extracted by Maxit Leca Rælingen at Enebakk, exclusively for the company plant at Rælingen in Akershus. Near Bratsberg in Bø, Telemark, clay is produced by Wieneberger AS for production of building bricks. The total value of the 279,000 tonnes of clay produced, before burning and processing, amounts to NOK 8 million. The companies had 38 employees.

Gravel and aggregate production are compiled in Tables 8 to 13, according to product-type and county: an overview of the royalty to the ground owners is also shown.

5.4 Metallic ores

Metallic ores are rocks that contain metal-bearing minerals in such a quantity that the metals can be extracted economically. Total production for metallic ores increased from NOK 783 in 2007 to NOK 931 million in 2008. The export value was NOK 722 million. 1.7 million tonnes of ore concentrate were produced. The industry had 464 employees. Production in Norway has changed in recent years and at present only two deposits are in production.

Titania AS in Sokndal in Rogaland is Europe's largest producer of ilmenite (iron-titanium oxide) which, after further refining to titanium dioxide, is used as white pigment in paints, plastics and paper; some nickel concentrate is produced from the same deposit. 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, owned by Leonard Nilsen & Sønner AS, focuses on fines concentrate and speciality products requiring substantial processing, as well as on traditional metallurgical products. Interest in the iron ore at Bjørnevatn near Kirkenes is considerable, with the establishment of a new company, Sydvaranger Gruve AS (owned by Northern Iron, which is Australian). Production is scheduled to commence in September 2009 with a planned production of 7 million t.p.a.

After the gold mine at Bidjovagge near Kautokeino was closed in 1992 there has been renewed interest in gold exploration at Pasvik, Kvænangen, Mo i Rana, Setesdal and Bindal. Gexco is working to extend trial production at Bindal. Store Norske Gull AS is working on exploration projects in Finnmark (Cu-Au) and Senja (Ni-Cu).

Knaben Molyden AS has applied for a concession for production of c. 50,000 tonnes of ore from the molybdenum deposit at Knaben in Vest-Agder. In addition to the projects already mentioned there is considerable interest for exploration for, i.a. gold, molybdenum, iron and thorium.

Three different types of pigment consisting of the iron oxide, hematite, produced by Rana Gruber. The pigments are used in concrete, paint, lacquer, cosmetics and other applications. Photo: Rana Gruber AS

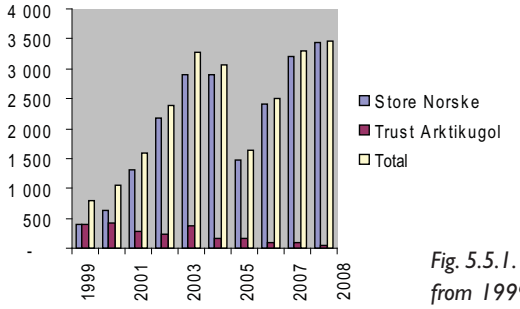


Fig. 5.5.1. Total coal production on Svalbard from 1999-2008.

5.5 Energy minerals

Coal and peat

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 133 years, whereas reserves of oil and gas are sufficient for 42 and 60 years respectively at current production levels. Economically mineable coal deposits have been found in c. 70 countries. World coal production increased by 6.6% from 2006 to 2007. New gas scrubbing technology is leading to cleaner combustion of coal in power stations.

The world's coal consumption was estimated at 5,540 million tonnes in 2007, the main increase in demand being from China, India and the USA. The price of coal in the second half of 2008 reached a level that would have been regarded as unrealistic only a few years ago. Delivery times for equipment have increased because of rising demand. USA, Russia, China and India have large reserves of coal. New coal mines have been opened, especially 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. A total of c. 70 million tonnes have been produced since regular production began.

Two companies currently mine coal on Svalbard, Store Norske Spitsbergen Grubekompani AS (SNSG) has Gruve 7 in operation near Longyearbyen, and Svea Nord, and the Russian company, Trust Artikugol, which has a mine at Barentsburg.
Svea Nord was opened in 2001. Production at Gruve 7 and Svea Nord was 3.43 million tonnes in 2008, with a value of NOK 2,645 million. 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, Denmark, Finland, the United Kingdom, France, Norway, Sweden and Iceland.

SNSG is currently planning a new mine at Lunckefjell, north of Svea Nord, and is also mapping other deposits for possible exploitation in the future.

5.5.2 Peat

Peat, in the sense of peat for fuel, is a humus- and carbon-rich substance found under the water table in bogs. Peat is actually coal at an early stage of development, formed in the period after the last Ice Age, which ended c. 10,000 years ago.

Peat was an important fuel throughout the Middle Ages, but there are no good records of consumption prior to 1900. Prior to WW II production was c. 1.5 million m^3. During the fuel crisis caused by the war production in 1943 rose to 2.1 million m^3, or c. 2 TWh in fuel value. Annual production in the 1970s and 1980s was 2,000-3,000 m^3. Total reserves have been calculated to be c. 5,000 million m^3. This corresponds to c. 300 million tonnes of coal, and has a calculated fuel value of 8,000 TWh, i.e. a major energy reserve in Norway: Source: **www.energilink.no**. Production in Norway is quite modest and is restricted to so-called white moss bogs. Most of the production is nowadays used for soil improvement in gardens.

497,000 tonnes was sold in 2008, with a value of NOK 77 million, from 7 producers with a staff of 82. The deposits in production are in Østfold, Akershus, Hedmark, Vestfold, Nord Trøndelag, Nordland and Finnmark counties.

6. MANAGEMENT FUNCTIONS (BV)

The Directorate of Mines has several management tasks related to the mining industry. The following descriptions give an overview of some of these.

6.1 Pre-claims and claims

Norwegian legislation distinguishes between claimable and non-claimable minerals. Claimable minerals are owned by the state: 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/cm^3, 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.

The online portal **www.prospecting.no,** a cooperative service provided by the Directorate of Mining and the Geological Survey of Norway (NGU), shows active claims and pre-claims, but not applications which are being processed. The overview of claims and pre-claims is updated weekly.

6.1.1 Pre-claims

The interest for new claims decreased considerably in 2008 relative to 2007: 1,227 new pre-claim applications were submitted, as against 3,378 in 2007. Nickel, gold, copper, molybdenum, iron and thorium are the metals which attract most interest. By the end of 2008, 4.054 pre-claims were held in Norway (excluding Svalbard).

In the past year, exploration activities related to pre-claiming occurred mainly in two areas, south-eastern 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 (i.e. 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

One claim, at Bindal in Nordland county, was approved by tender in 2008. By the end of the year, 153 claims were held in Norway, exclusive of Svalbard.

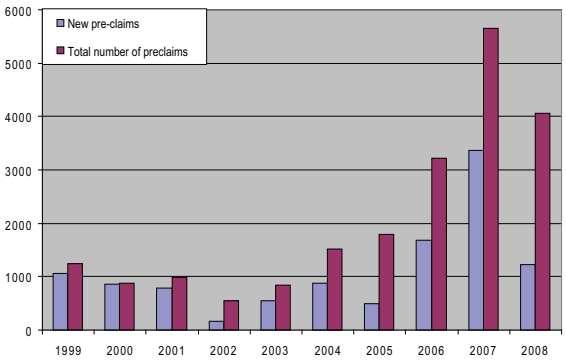
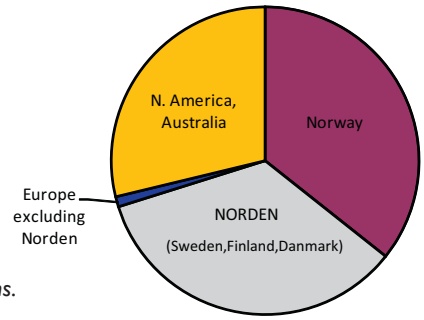


Fig. 6.1 Number of pre-claims in the period 1998-2008.



Distribution of ownership of pre-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 land-owner.

In practice, non-claimable minerals can be grouped as Construction materials (sand and gravel and hard-rock aggregate), industrial minerals and natural stone. 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 Carbonate 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 the 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. Only 1 concession according to the Carbonate Act has been approved in 2008.

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 2008.

6.2.3

The Directorate entered into an agreement for lease of the state claims in Rana municipality in Nordland.

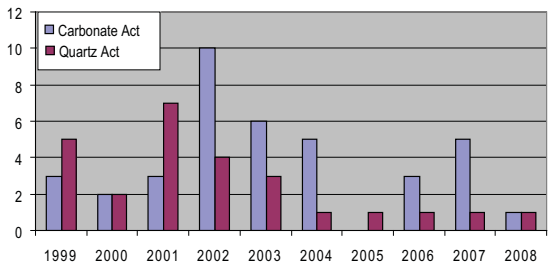


Fig. 6.2 Overview of active concessions according to both the Carbonate Act and the Quartz Act in the period 1999-2008.

Shipping of aggregate/sandstone from Dyrstad, Bremanger municipality. Photo: Bremanger Quarry AS

7. MINERAL DEPOSITS OF NATIONAL SIGNIFICANCE (NGU)

NGU has prepared an overview of mineral resources of national significance. Most of these are also of importance as sources of exports to Europe and the rest of the world. Examples include nepheline syenite on Stjernøy in Finnmark, marble from Brønnøy in Nordland, larvikite from Larvik, ilmenite from Tellnes in Rogaland and gneiss for aggregate production from Jelsa in Rogaland. Such deposits have a substantial value and should be given a satisfactory treatment if 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.

It is very important to ensure that important mineral deposits are given satisfactory consideration in municipal plans. The manner in which this should be done will vary from deposit to deposit. There is a continuing need for accurate, up-to-date information on new deposits. NGU revises its overview of mineral resources of national significance annually, an overview which may contribute to answering the question: What are the possibilities for future production?

NGU's overview should contribute to a sound, long-term management of mineral resources at national, county and municipal levels, 7.1 - 7.4.

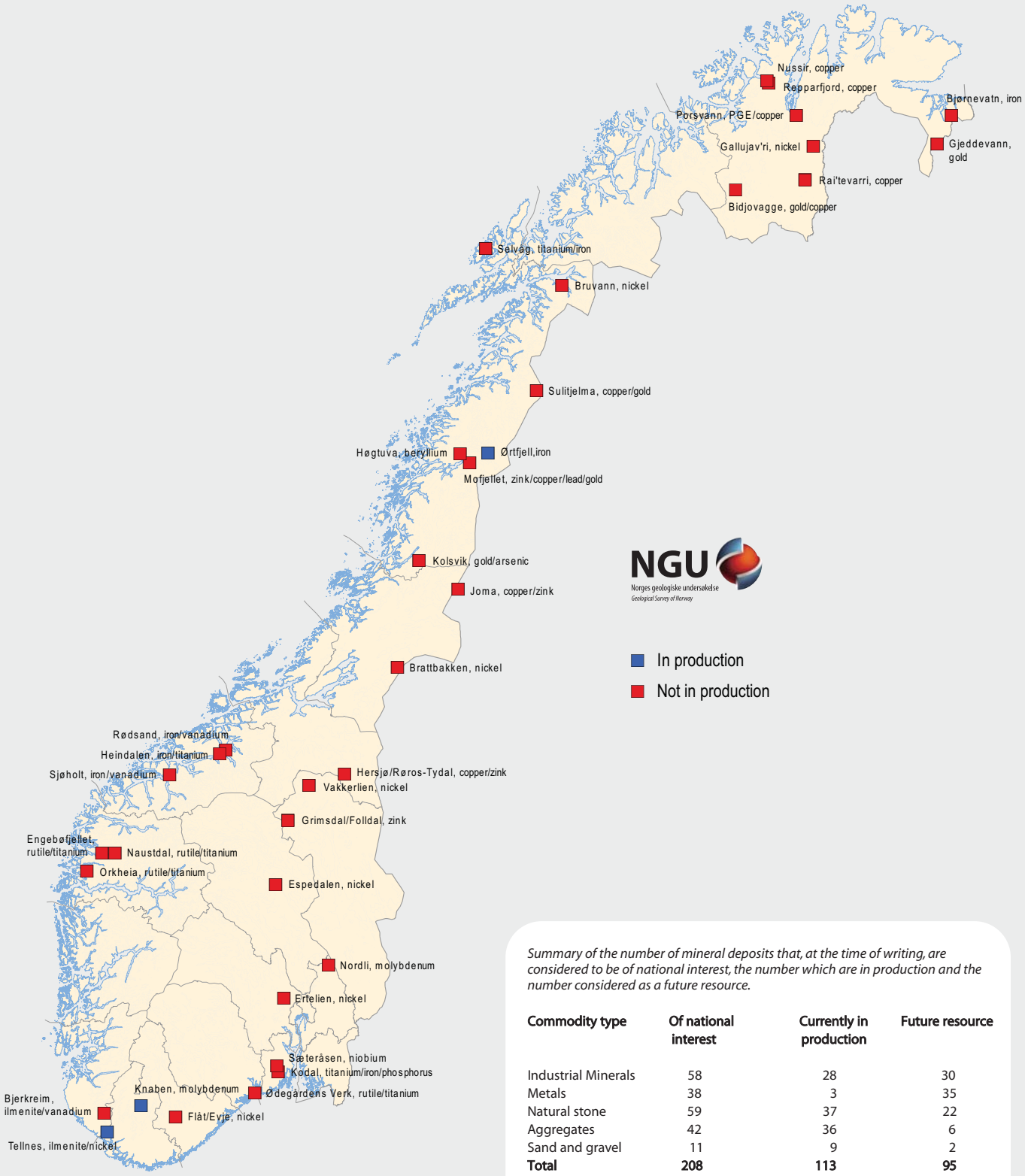
The Directorate's databases show that 2,048 areas have been reserved for mineral-resource extraction in municipal plans, including current operations and areas for future extraction. The Directorate is entitled to express an opinion in planning processes, according to the plan- and building law. It refers municipalities to the Gravel- and Aggregate data-base in relation to municipal plans, as well as referring to other important deposits, which should be available for exploitation.

7.1 Important industrial mineral deposits of national interest

7.2 Important natural stone deposits of national interest

7.3 Important sand, gravel and aggregate deposits of national interest

7.4 Important metallic ore deposits 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	58	28	30
Metals	38	3	35
Natural stone	59	37	22
Aggregates	42	36	6
Sand and gravel	11	9	2
Total	**208**	**113**	**95**

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 accessible for shipping, and proximity to the European market are important. Norway is a considerable mineral producer by European standards and will probably increase in importance in the future due to the ever-increasing competition for long-term access to metals, industrial minerals and building materials. Norway itself has a high consumption of mineral products. The mining and quarrying industry creates very substantial values, with great importance for outlying regions.

Strong economic 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 copper, nickel and zinc have doubled or tripled in price and, after a dramatic fall in the second half of 2008, have made a significant recovery through the first half of 2009.

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 the exploration and development of new mineral resources for the future. International exploration companies have, so far, been most interested in Norway's nickel resources and NGU has carried out helicopter-borne geophysical surveys over many of Norway's nickel provinces for the exploration companies. NGU and BV now register an increasing interest from international companies in exploration for copper and gold. 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.

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 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 1,000,000 million. The mineral and mining industry faces some major challenges, including:

- Competition for skilled employees.
- Exploration and development of future mineral deposits.
- Increased research efforts in all areas - from understanding of the deposits, via processing of the products to responsible deposition of waste.
- Securing the availability of future mineral deposits in planning processes for area development.

In the period 1960-1990, exploration in Norway was rather extensive, after which activity declined, up until 2005. Exploration increased from NOK 40 million in 2006 to c. NOK 100 million in 2007 and c. NOK 120 million in 2008. Expenditure on pro-

specting was much higher in Sweden and Finland (Raw Materials Group, 2008). 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.

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 100,000 million. Known mineral resources in surficial deposits and bedrock on mainland Norway have a potential value in excess of NOK 1,000,000 million.

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 land area. Most of this area is related to extraction of sand and gravel. However, the locations of mineral companies are constrained by the location of the deposits: they cannot be moved elsewhere.

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, such 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 and dimension stone. Slate/flagstone comprises a group of rock types, which have a naturally occurring platy cleavage. Common types of slate/flagstone 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. Building stone is produced from slate, flagstone, gneiss and granite which can be cleaved along a plane of schistosity.

CONSTRUCTION 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: 0.06-2 mm sand, 2-64 mm gravel, and 64-256 mm 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.

APPENDIX

Table 1. Mineral statistics, 2008

Table 1											
Mineral statistics 2008		**EXTRACTION (1000 tonnes)**			**SALE/DELIVERED (1000 tonnes)**			**SALES VALUE(FOB* 1.000 NOK)**			**No. of empl.**
2008	**No. of produ-cers**	**Production**	**Waste rock**	**Total**	**Domistic**	**Export**	**Total**	**Domistic**	**Export**	**Total**	**Total**
Construction material											
Crushed rock	342	48553029	950387	49503416	35243150	17094878	52338028	2273771795	851904046	3125675841	1587
Sand/gravel	351	13495452	94727	13590179	14700537	116199	14816736	795794043	5607955	801401998	495
Clay	5	27346		27346	279300		279300	7847888		7847888	38
Total	**698**	**62 075 827**	**1 045 114**	**63 120 941**	**50 222 987**	**17 211 077**	**67 434 064**	**3 077 413 726**	**857 512 001**	**3 934 925 727**	**2 120**
Natural stone											
	18	670664	1993282	2663946	35510	250437	285947	39441000	514439832	553880832	323
Building stone	27	150654	376208	526862	271307	60	271367	82180258	50000	82230258	72
Slate/flagstone	16	193645	627630	821275	64139	20798	84937	226798693	70048574	296847267	312,5
Total	**61**	**1 014 963**	**2 997 120**	**4 012 083**	**370 956**	**271 295**	**642 251**	**348 419 951**	**584 538 406**	**932 958 357**	**708**
Industrial minerals											
Dolomite	4	744020	64850	808870	268151	473455	741606	20800000	52700000	73500000	53
Feldspar	1	95200	94500	189700	1000	61000	62000	1000000	34000000	35000000	21
Graphite	1	15238	11180	26418	71	4029	4100	376470	8095965	8472435	27
Limestone	15	6780694	2440836	9221530	6104767	496550	6601317	244260962	1702684991	1946945953	465
Quartz/quartzite	7	1306854	257531	1564385	791185	233821	1025006	96090246	88289635	184379881	113
Nepheline syenite	1	520000	105000	625000	1000	345000	346000	1000000	230000000	231000000	92
Olivine	4	2542000		2542000	62010	2491900	2553910	23001000	338350000	361351000	175
Soapstone/Talc	3	32015	10687	42702	35320	2295	37615	20716000	4157000	24873000	22
Total	**36**	**12 036 021**	**2 984 584**	**15 020 605**	**7 263 504**	**4 108 050**	**11 371 554**	**407 244 678**	**2 458 277 591**	**2 865 522 269**	**968**
Ores											
Iron	2	2046128	349784	2395912		746154	746154		328698784	328698784	213
Ilmenite	1	3338740	4348510	7687250	382371	532558	914929	208516341	354192759	562709100	248
Nickel	1	34420	44830	79250		8781	8781		39444510	39444510	3
Total	**4**	**5 419 288**	**4 743 124**	**10 162 412**	**382 371**	**1 287 493**	**1 669 864**	**208 516 341**	**722 336 053**	**930 852 394**	**464**
Energy minerals											
Coal	1	3430243	90032	3520275	30868	3398277	3429145	26174020	2618397051	2644571071	464
Peat	7	796200		796200	496267	400	496667	76540172	433000	76973172	82
Total	**8**	**4 226 443**	**90 032**	**4 316 475**	**527 135**	**3 398 677**	**3 925 812**	**102 714 192**	**2 618 830 051**	**2 721 544 243**	**546**
Total	**807**	**84 772 542**	**11 859 974**	**96 632 516**	**58 766 953**	**26 276 592**	**85 043 545**	**4 144 308 888**	**7 241 494 102**	**11 385 802 990**	**4 806**

* FOB = freight on board

Table 2. Value of production sold (NOK), 2008

COUNTY/REGION	Construction material	Natural stone	Industrial minerals	Ores	Energy - minerals	Total
01 Østfold	232 076 881	12 654 000	-	-	4 389 000	249 119 881
02 Akershus	375 109 187	-	-	-	478 170	375 587 357
03 Oslo	65 571 156	1 600 000	-	-	-	67 171 156
04 Hedmark	165 502 427	3 965 000	9 404 000	-	35 433 000	214 304 427
05 Oppland	151 722 968	87 009 000	12 823 000	-	-	251 554 968
06 Buskerud	270 237 365	9 252 000	-	-	-	279 489 365
07 Vestfold	218 514 497	482 008 832	-	-	4 900 000	705 423 329
08 Telemark	150 682 473	2 380 000	79 683 116	-	-	232 745 589
09 Aust-Agder	93 713 800	-	54 000 000	-	-	147 713 800
10 Vest-Agder	65 189 745	-	-	-	-	65 189 745
11 Rogaland	846 148 203	65 541 675	-	608 052 394	-	1 519 742 272
12 Hordaland	217 861 132	29 203 798	-	-	-	247 064 930
14 Sogn og Fjordane	292 280 032	16 513 000	25 500 000	-	-	334 293 032
15 Møre og Romsdal	214 239 695	6 300 000	2 057 165 519	-	-	2 277 705 214
16 Sør-Trøndelag	171 062 307	123 071 052	-	-	-	294 133 359
17 Nord-Trøndelag	124 944 181	18 491 000	109 637 434	-	12 000 000	265 072 615
18 Nordland	172 005 216	925 000	196 938 765	322 800 000	19 523 002	712 191 983
19 Troms	71 797 232	-	10 746 435	-	-	82 543 667
20 Finnmark	36 267 230	74 044 000	309 624 000	-	250 000	420 185 230
21 Svalbard	-	-	-	-	2 644 571 071	2 644 571 071
Total	**3 934 925 727**	**932 958 357**	**2 865 522 269**	**930 852 394**	**2 721 544 243**	**11 385 802 990**

Table 3. Tonnage produced, 2008

COUNTY/REGION	Construction material	Natural stone	Industrial minerals	Ores	Energy - minerals	Total
01 Østfold	3 377 492	5 058	-	-	7 700	3 390 250
02 Akershus	5 813 391	-	-	-	567	5 813 958
03 Oslo	978 543	450	-	-	-	978 993
04 Hedmark	2 637 765	2 313	31 072	-	40 000	2 711 150
05 Oppland	2 521 848	22 061	30 216	-	-	2 574 125
06 Buskerud	3 968 637	3 701	-	-	-	3 972 338
07 Vestfold	3 206 761	240 137	-	-	9 500	3 456 398
08 Telemark	2 685 339	14 070	1 762 170	-	-	4 461 579
09 Aust-Agder	1 867 245	-	88 000	-	-	1 955 245
10 Vest-Agder	1 061 366	-	-	-	-	1 061 366
11 Rogaland	16 743 951	106 978	-	943 250	-	17 794 179
12 Hordaland	4 071 600	56 184	-	-	-	4 127 784
14 Sogn og Fjordane	5 064 072	38 434	247 000	-	-	5 349 506
15 Møre og Romsdal	3 658 418	79 000	3 396 466	-	-	7 133 884
16 Sør-Trøndelag	2 916 665	38 995	-	-	-	2 955 660
17 Nord-Trøndelag	2 241 244	11 325	829 471	-	8 900	3 090 940
18 Nordland	2 707 401	2 505	3 888 724	726 614	280 000	7 605 244
19 Troms	1 135 243	-	4 535	-	-	1 139 778
20 Finnmark	777 083	21 040	1 093 900	-	150 000	2 042 023
21 Svalbard					3 429 145	3 429 145
Total	**67 434 064**	**642 251**	**11 371 554**	**1 669 864**	**3 925 812**	**85 043 545**

Table 4. Number of employees

COUNTY/REGION	Construction material	Natural stone	Industrial minerals	Ores	Energy - minerals	Total
01 Østfold	110	3	-	-	4	117
02 Akershus	154	-	-	-	0	154
03 Oslo	25	2	-	-	-	26
04 Hedmark	77	7	6	-	22	111
05 Oppland	76	86	6	-	-	167
06 Buskerud	156	4	-	-	-	160
07 Vestfold	82	280	-	-	5	367
08 Telemark	105	3	49	-	-	157
09 Aust-Agder	37	-	30	-	-	67
10 Vest-Agder	26	-	-	-	-	26
11 Rogaland	399	34	-	256	-	689
12 Hordaland	114	30	-	-	-	144
14 Sogn og Fjordane	187	9	23	-	-	219
15 Møre og Romsdal	111	7	410	-	-	528
16 Sør-Trøndelag	137	125	-	-	-	262
17 Nord-Trøndelag	99	32	52	-	9	191
18 Nordland	126	6	237	208	12	588
19 Troms	52	-	31	-	-	83
20 Finnmark	47	84	125	-	31	286
21 Svalbard					464	464
Total	**2 119**	**708**	**968**	**464**	**546**	**4 805**

Table 5. Tonnage produced, 1999-2008

Rock/mineral	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Olivine	3 190	3 600	3 200	3 100	3 300	3 400	3 100	2 923	2 562	2 554
Nephelinesyenite	300	330	340	330	320	330	320	330	312	346
Quartz/quartzite	1 150	1 530	1 290	1 140	1 100	1 200	1 100	834	1 041	1 025
Soapsone/talc	-	-	47	43	48	32	34	57	66	38
Feldspar/anorthosite	93	126	160	210	530	510	270	65	65	62
Graphite	3	9	9	14	-	6	9	9	3	4
Limestone	6 870	6 100	5 500	5 500	6 300	6 300	6 300	6 221	7 521	6 601
Dolomite	820	950	810	570	570	600	610	762	750	741
Total industrial minerals	**12 426**	**12 645**	**11 356**	**10 907**	**12 168**	**12 378**	**11 743**	**11 201**	**12 320**	**11 371**
Ilmenite	590	691	777	827	859	870	810	850	882	915
Nickel concentrate	21	17	21	14	8	8	8	8	6	9
Iron	524	470	380	480	390	590	700	620	630	746
Total metallic ores	**1 135**	**1 178**	**1 178**	**1 321**	**1 257**	**1 468**	**1 518**	**1 478**	**1 518**	**1 670**
Coal	400	630	1 720	2 200	2 800	2 900	1 620	2 359	3 223	3 429
Peat	-	-	-	-	-	-	-	78	159	497
Total energy minerals	**400**	**630**	**1 720**	**2 200**	**2 800**	**2 900**	**1 620**	**2 437**	**3 382**	**3 926**
Dimension stone	250	230	210	380	330	340	390	800	299	286
Slate/flagstone	9	100	180	160	250	260	470	99	225	85
Building stone	-	-	-	-	-	-	-	166	85	271
Total natural stone	**259**	**330**	**390**	**540**	**580**	**600**	**860**	**1 065**	**609**	**642**
Crushed rock	39 000	34 000	38 000	35 000	36 000	37 000	38 000	45 947	52910*	52 338
Sand/gravel	23 000	19 000	15 000	15 000	15 000	15 000	15 000	13 418	15325*	14 817
Clay	410	410	440	450	370	230	230	320	319	279
Total construction material	**62 410**	**53 410**	**53 440**	**50 450**	**51 370**	**52 230**	**53 230**	**59 685**	**68 554**	**67 434**
Total	**76 630**	**68 193**	**68 084**	**65 418**	**68 175**	**69 576**	**68 971**	**75 866**	**86 383**	**85 043**

Table 6. Value of production, 1999-2008

Rock/mineral	1999 MNOK	2000 MNOK	2001 MNOK	2002 MNOK	2003 MNOK	2004 MNOK	2005 MNOK	2006 MNOK	2007 MNOK	2008 MNOK
Olivine	275	297	270	278	297	377	398	391	301	361
Nephelinesyenite	213	220	232	219	221	211	235	247	229	231
Quartz/quartzite	108	145	148	140	135	158	143	137	170	184
Soapsone/talc	-	76	50	48	54	53	50	120	76	25
Feldspar/anorthosite	-	46	51	52	73	79	51	35	35	35
Graphite	42	23	19	19	-	13	19	17	6	8
Limestone	1 860	1 927	1 571	1 488	1 731	1 925	1 877	1 874	1 873	1 947
Dolomite	60	93	68	57	51	60	61	115	133	74
Total industrial minerals	**2 558**	**2 827**	**2 409**	**2 301**	**2 562**	**2 876**	**2 834**	**2 936**	**2 823**	**2 866**
Ilmenite	250	345	345	470	472	473	508	533	523	563
Nickel concentrate	96	109	109	93	8	17	15	25	27	39
Iron	105	94	94	91	74	131	185	562	232	329
Total metallic ores	**451**	**548**	**548**	**654**	**554**	**621**	**708**	**1 120**	**782**	**931**
Coal	74	122	378	654	938	1 021	615	1 095	1 936	2 645
Peat	-	-	-	-	-	-	-	59	67	77
Total energy minerals	**74**	**122**	**378**	**654**	**938**	**1 021**	**615**	**1 154**	**2 003**	**2 722**
Dimension stone	609	699	787	836	722	842	788	601	640	554
Slate/flagstone	187	209	200	234	219	233	275	281	68	297
Building stone	-	-	-	-	-	-	-	76	291	82
Total natural stone	**796**	**908**	**987**	**1 070**	**941**	**1 075**	**1 063**	**958**	**999**	**933**
Crushed rock	2 019	1 825	1 980	1 950	1 960	2 040	2 300	2 390	3052*	3 126
Sand/gravel	1 094	760	600	590	590	600	720	645	875*	801
Clay	6	6	6	10	9	8	7	9	9	8
Total construction material	**3 119**	**2 591**	**2 586**	**2 550**	**2 559**	**2 648**	**3 027**	**3 044**	**3 936**	**3 935**
Total	**6 998**	**6 996**	**6 908**	**7 229**	**7 554**	**8 241**	**8 247**	**9 212**	**10 543**	**11 386**

Table 7. Number of employees, 1999-2008

Rock/mineral	1999 No. of empl.	2000 No. of empl.	2001 No. of empl.	2002 No. of empl.	2003 No. of empl.	2004 No. of empl.	2005 No. of empl.	2006 No. of empl.	2007 No. of empl.	2008 No. of empl.
Olivine	193	298	218	205	199	225	210	184	199	175
Nephelinesyenite	120	112	114	107	105	97	100	91	91	92
Quartz/quartzite	71	80	92	94	92	94	84	88	100	113
Soapsone/talc	95	-	101	102	75	67	67	67	35	22
Feldspar/anorthosite	26	33	37	34	43	45	42	22	23	21
Graphite	32	36	32	-	-	26	26	25	25	27
Limestone	450	446	398	401	417	421	479	513	475	465
Dolomite	45	61	60	51	63	68	70	78	86	53
Total industrial minerals	**1 032**	**1 066**	**1 052**	**994**	**994**	**1 043**	**1 078**	**1 068**	**1 034**	**968**
Ilmenite	195	212	203	236	247	246	245	277	245	248
Nickel concentrate	95	90	102	2	-	-	-	3	2	3
Iron	166	165	160	160	160	160	178	188	197	213
Total metallic ores	**456**	**467**	**465**	**398**	**407**	**406**	**423**	**468**	**444**	**464**
Coal	226	223	248	225	233	362	430	411	396	464
Peat	-	-	-	-	-	-	-	48	45	82
Total energy minerals	**226**	**223**	**248**	**225**	**233**	**362**	**430**	**459**	**441**	**546**
Dimension stone	507	532	459	465	474	470	465	367	358	323
Slate/flagstone	388	309	350	357	378	325	347	359	58	313
Building stone	-	-	-	-	-	-	-	75	328	72
Total natural stone	**895**	**841**	**809**	**822**	**852**	**795**	**812**	**801**	**745**	**708**
Crushed rock	1 114	1 200	1 200	1 242	1 340	1 205	1 312	1 291	1563*	1 587
Sand/gravel	2 102	1 482	1 343	1 353	1 178	1 333	1 355	571	532*	495
Clay	226	188	180	-	-	78	59	40	92	38
Total construction material	**3 442**	**2 870**	**2 723**	**2 595**	**2 518**	**2 616**	**2 726**	**1 902**	**92**	**2 120**
Total	**6 051**	**5 467**	**5 297**	**5 034**	**5 004**	**5 222**	**5 469**	**4 698**	**2 756**	**4 806**

Table 8. Production of gravel and sand by county, 2008

		EXTRACTION (metric tonnes)			SALE/DELIVERED (metric tonnes)			SALES VALUE (FOB NOK)			
											No. of employees
COUNTY/REGION	No. of produ-cers	Production	wasterock	Total	Domistic	Export	Total	Domistic	Export	Total	Total
01 Østfold	7	639 703	9 000	648 703	621 775		621 775	26 320 130		26 320 130	13
02 Akershus	10	932 001	4 047	936 048	1 023 555		1 023 555	58 214 296		58 214 296	24
03 Oslo	1	7 500		7 500	7 500		7 500	300 000		300 000	0
04 Hedmark	18	482 047	23 359	505 406	577 647		577 647	31 023 585		31 023 585	30
05 Oppland	36	1 182 500	6 805	1 189 305	1 167 729		1 167 729	60 962 256		60 962 256	35
06 Buskerud	33	1 804 151	1 553	1 805 704	1 845 080	16 143	1 861 223	117 258 580	551 800	117 810 380	78
07 Vestfold	3	23 648		23 648	43 497		43 497	2 160 792		2 160 792	2
08 Telemark	20	788 175	2 788	790 963	789 785		789 785	38 802 444	5 000	38 807 444	23
09 Aust-Agder	11	577 272	360	577 632	1 061 732		1 061 732	30 400 864		30 400 864	12
10 Vest-Agder	5	19 965		19 965	24 400		24 400	1 140 500		1 140 500	1
11 Rogaland	19	2 518 900	100	2 519 000	2 403 515	63 000	2 466 515	141 653 414	3 694 625	145 348 039	54
12 Hordaland	9	723 900	1 000	724 900	782 800		782 800	45 721 100		45 721 100	29
14 Sogn og Fjordane	27	497 092	176	497 268	484 860	20 000	504 860	26 217 816	1 000 000	27 217 816	24
15 Møre og Romsdal	24	808 830	12 792	821 622	1 006 098	17 056	1 023 154	59 605 140	356 530	59 961 670	38
16 Sør-Trødelag	32	616 265	15 840	632 105	730 822		730 822	32 575 186		32 575 186	32
17 Nord-Trødelag	27	736 439		736 439	776 273		776 273	40 337 563		40 337 563	43
18 Nordland	24	151 053	1 260	152 313	257 683		257 683	16 574 550		16 574 550	16
19 Troms	26	447 114	15 647	462 761	555 073		555 073	35 168 527		35 168 527	26
20 Finnmark	19	538 897		538 897	540 713		540 713	31 357 300		31 357 300	14
21 Svalbard				-			-			-	
Total	**351**	**13 495 452**	**94 727**	**13 590 179**	**14 700 537**	**116 199**	**14 816 736**	**795 794 043**	**5 607 955**	**801 401 998**	**495**

Table 9. Production of hard-rock aggregate by county, 2008

		EXTRACTION (metric tonnes)			SALE/DELIVERED (metric tonnes)			SALES VALUE (FOB NOK)			
											No. of employees
COUNTY/REGION	No. of produ-cers	Production	wasterock	Total	Domistic	Export	Total	Domistic	Export	Total	Total
01 Østfold	22	2 193 539	73 470	2 267 009	2 541 019	214 698	2 755 717	192 359 751	13 397 000	205 756 751	97
02 Akershus	21	4 836 612	125	4 836 737	4 532 836		4 532 836	310 469 891		310 469 891	130
03 Oslo	3	1 046 462		1 046 462	971 043		971 043	65 271 156		65 271 156	25
04 Hedmark	17	2 068 624	20 141	2 088 765	2 060 083	35	2 060 118	134 476 812	2 030	134 478 842	46
05 Oppland	20	1 324 520	21 637	1 346 157	1 354 119		1 354 119	90 760 712		90 760 712	41
06 Buskerud	21	1 963 513	20 047	1 983 560	2 107 414		2 107 414	152 426 985		152 426 985	78
07 Vestfold	16	3 054 844		3 054 844	2 314 664	848 600	3 163 264	151 385 705	64 968 000	216 353 705	80
08 Telemark	12	2 024 420	5 601	2 030 021	1 034 254	840 000	1 874 254	55 367 541	55 240 000	110 607 541	44
09 Aust-Agder	12	765 888	2 640	768 528	805 513		805 513	63 312 936		63 312 936	25
10 Vest-Agder	11	937 728		937 728	923 573	113 393	1 036 966	57 049 245	7 000 000	64 049 245	25
11 Rogaland	26	13 284 531	221 783	13 506 314	4 814 736	9 462 700	14 277 436	286 444 452	414 355 712	700 800 164	345
12 Hordaland	9	3 412 359	2 000	3 414 359	2 084 151	1 204 649	3 288 800	127 409 228	44 730 804	172 140 032	85
14 Sogn og Fjordane	27	2 836 255	21 517	2 857 772	934 183	3 625 029	4 559 212	49 822 216	215 240 000	265 062 216	163
15 Møre og Romsdal	24	2 256 846	202 787	2 459 633	2 569 495	64 769	2 634 264	151 064 625	3 138 000	154 202 625	74
16 Sør-Trødelag	26	2 024 705	28 660	2 053 365	2 164 838	21 005	2 185 843	137 354 621	1 132 500	138 487 121	105
17 Nord-Trødelag	30	1 429 903	66 719	1 496 622	1 464 971		1 464 971	84 606 618		84 606 618	56
18 Nordland	26	2 295 198	161 050	2 456 248	1 749 718	700 000	2 449 718	122 730 666	32 700 000	155 430 666	110
19 Troms	11	550 300	90 064	640 364	580 170		580 170	36 548 705		36 548 705	26
20 Finnmark	8	246 782	12 146	258 928	236 370		236 370	4 909 930		4 909 930	33
21 Svalbard				-			-			-	
Total	**342**	**48 553 029**	**950 387**	**49 503 416**	**35 243 150**	**17 094 878**	**52 338 028**	**2 273 771 795**	**851 904 046**	**3 125 675 841**	**1 587**

Table 10. Size and royalty distribution for gravel producers based on tonnage sold in 2008

SIZE AND ROYALTY DISTRIBUTION FOR GRAVEL PRODUCERS BASED ON TONNAGE SOLD IN 2008										
	PRODUCTION						ROYALTY (NOK/tonnes)			
Size (metric tonnes)	Produ-cers	%-	Production	%-	Average	Produ-cers	Min	Max	Average	Median
1 - 10000	181	52.0	691372	4.7	3820	111	1.33	33.00	7.97	6.66
10001 - 50000	102	29.3	2733743	18.5	26801	84	0.35	22.50	7.19	6.63
50001 - 100000	30	8.6	2204591	14.9	73486	24	2.50	15.00	6.10	4.81
100001 - 250000	24	6.9	4213980	28.4	175583	20	3.07	12.88	7.44	7.36
250001 - 500000	9	2.6	3331027	22.5	370114	8	3.50	11.50	6.99	6.55
500001 -1000000	1	0.3	567023	3.8	567023	0				
1000001 -	1	0.3	1075000	7.3	1075000	1	7.67	7.67	7.67	7.67
TOTAL	**348**	**-**	**14 816 736**		**42 577**	**248**	**0.35**	**33.00**	**7.45**	**6.52**

Table 11. Size and royalty distribution for hard-rock aggregate producers based on tonnage sold in 2008

SIZE AND ROYALTY DISTRIBUTION FOR HARD-ROCK AGGREGATE PRODUCERS BASED ON TONNAGE SOLD IN 2008										
	PRODUCTION					ROYALTY (NOK/TONNES)				
Size (metric tonnes)	Produ-cers	%-	Production	%-	Average	Produ-cers	Min	Max	Average	Median
1 - 10000	69	20.2	347 379	0.7	5034	35	0.40	12.00	3.24	2.60
10001 - 50000	106	31.0	2 830 098	5.4	26699	68	0.75	16.00	3.18	2.32
50001 - 100000	50	14.6	3 574 066	6.8	71481	40	0.30	8.00	3.11	2.62
100001 - 250000	66	19.3	10 556 235	20.2	159943	49	0.50	25.00	3.13	2.12
250001 - 500000	34	9.9	12 313 122	23.5	362151	28	0.19	9.00	2.37	2.10
500001 -1000000	10	2.9	7 463 607	14.3	746361	7	0.14	5.00	2.20	1.90
1000001 -	7	2.0	15 253 521	29.1	2179074	4	0.39	2.24	0.95	0.59
TOTAL	**342**	**-**	**52 338 028**	**0**	**153035**	**231**	0.14	25.00	3.00	2.27

Table 12. Consumption/sector for gravel in 2008

COUNTY/REGION	Sale (metric tonnes)	ROAD CONSTRUCTION		ASPHALT		CONCRETE		OTHER USES	
		%	metric tonnes	%	metric tonnes	%	metric tonnes	%	metric tonnes
01 Østfold	621 775	11,0	68 375	8,3	51 654	61,9	384 870	18,8	116 876
02 Akershus	1 023 555	20,2	206 594	17,4	177 815	33,2	340 078	29,5	301 868
03 Oslo	7 500	100,1	7 500						
04 Hedmark	577 647	29,8	172 200	26,2	151 610	20,2	116 737	23,7	137 100
05 Oppland	1 167 729	19,2	224 106	11,6	135 820	11,6	135 910	57,5	671 893
06 Buskerud	1 861 223	2,4	44 270	6,8	127 490	67,9	1 263 377	22,9	426 085
07 Vestfold	43 497	10,9	4 725			48,1	20 912	41,1	17 860
08 Telemark	789 785	8,8	69 664	4,3	34 185	67,0	528 982	19,9	156 955
09 Aust-Agder	1 061 732	19,0	201 698	17,6	186 450	49,6	526 553	13,8	147 032
10 Vest-Agder	24 400	21,9	5 350			47,5	11 600	30,5	7 450
11 Rogaland	2 466 515	4,9	120 822	3,2	77 797	81,7	2 014 537	10,3	253 359
12 Hordaland	782 800	7,7	59 870	14,1	110 000	30,8	240 950	47,5	371 980
14 Sogn og Fjordane	504 860	17,1	86 006	7,8	39 252	31,8	160 535	43,4	219 067
15 Møre og Romsdal	1 023 154	9,0	92 366	17,5	179 345	52,0	531 779	21,5	219 664
16 Sør-Trøndelag	730 822	25,8	188 216	12,5	91 029	32,1	234 503	29,7	217 074
17 Nord-Trøndelag	776 273	16,3	126 410	8,5	66 146	43,4	336 817	31,8	246 900
18 Nordland	257 683	12,6	32 467	10,5	27 172	37,6	96 775	39,3	101 269
19 Troms	555 073	28,4	157 532	20,7	115 024	14,0	77 876	36,9	204 641
20 Finnmark	540 713	20,9	112 767	28,4	153 578	24,9	134 554	25,9	139 813
TOTAL	**14 816 736**	**13,4**	**1 980 938**	**11,6**	**1 724 367**	**48,3**	**7 157 345**	**26,7**	**3 956 886**

Table 13. Consumption/sector for hard-rock aggregate in 2008

COUNTY/REGION	Sale (metric tonnes)	ROAD CONSTRUCTION		ASPHALT		CONCRETE		OTHER USES	
		%	metric tonnes	%	metric tonnes	%	metric tonnes	%	metric tonnes
01 Østfold	2 755 717	33,8	931 774	18,7	515 453	11,5	318 080	35,9	990 410
02 Akershus	4 532 836	46,3	2 095 756	9,0	409 200	7,7	347 793	37,1	1 680 087
03 Oslo	971 043	28,6	277 400	20,4	197 638	4,9	47 377	46,2	448 629
04 Hedmark	2 060 118	40,1	824 552	7,2	148 742	3,8	77 900	49,0	1 008 924
05 Oppland	1 354 119	42,4	573 728	7,8	105 021	2,9	39 630	46,9	635 741
06 Buskerud	2 107 414	32,2	677 016	9,6	202 868	11,1	233 162	47,2	994 368
07 Vestfold	3 163 264	7,5	238 321	8,6	272 371	4,9	154 709	79,0	2 497 863
08 Telemark	1 874 254	29,1	544 510	33,3	624 200	4,9	91 660	32,8	613 885
09 Aust-Agder	805 513	21,1	170 075	20,1	162 176	24,7	199 168	34,0	274 094
10 Vest-Agder	1 036 966	31,9	330 127			6,5	67 729	61,6	639 111
11 Rogaland	14 277 436	19,6	2 796 510	33,7	4 811 422	17,5	2 495 205	29,2	4 174 299
12 Hordaland	3 288 800	31,6	1 038 612	35,7	1 173 076	3,5	113 940	29,3	963 173
14 Sogn og Fjordane	4 559 212	29,3	1 336 210	26,3	1 198 012	11,8	537 280	32,6	1 487 711
15 Møre og Romsdal	2 634 264	46,8	1 231 487	0,9	24 300	0,7	17 250	51,7	1 361 227
16 Sør-Trøndelag	2 185 843	45,9	1 002 571	14,4	314 138	5,2	112 684	34,6	756 450
17 Nord-Trøndelag	1 464 971	48,9	715 671	9,0	132 000	3,3	47 995	38,9	569 305
18 Nordland	2 449 718	27,4	670 434	16,4	401 802	5,9	144 818	50,3	1 233 042
19 Troms	580 170	35,8	207 518	6,2	36 250	11,9	69 061	46,1	267 341
20 Finnmark	236 370	17,0	40 122					83,0	196 248
TOTAL	**52 338 028**	**30,0**	**15 702 394**	**20,5**	**10 728 669**	**9,8**	**5 115 441**	**39,7**	**20 791 908**

Table 14. Employment, injury, H-value and sick leave statistics for 2008

		MAN LABOUR YEAR							PERSONAL INJURIES			INJURIES PER MILLION MAN-HOURS			DAYS LOST DUE TO ILLNESS	
			Own			Hired										
	No. of produ-cers	Admini-stration	Produc-tion	Total	Admini-stration	Produc-tion	Total	Total	Own	Hired	Total	Own	Hired	Total	(No. of days)	% of worked hours
Construction material	614	309	1 540	1 849	10	261	271	2 119	92	8	100	29,3	17,4	27,8	8 819	2,10
Natural stone	53	64	558	622	5	69	75	697	27		27	25,5		22,8	3 382	2,40
Industrial minerals	37	49	810	859	5	115	120	979	25	3	28	17,1	14,7	16,8	4 341	2,23
Ores	2	78	378	456		8	8	464	7	1		9,0	73,5	-	366	0,35
Energy minerals	8	58	404	462		84	84	546	20			25,5	-	-	5 913	5,65
Total	**714**	**558**	**3 690**	**4 248**	**19**	**538**	**557**	**4 805**	**171**	**12**	**155**	**23,7**	**12,7**	**19,0**	**22 821**	**2,37**

(The H-value is the number of accidents resulting in absence from work multiplied by 1,000,000 and then divided by the total number of hours worked.)

Bremanger Quarry AS, Dyrstad. Photo: Peer- Richard Neeb


CAT

Layout: Bjørg Svendgård, NGU

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