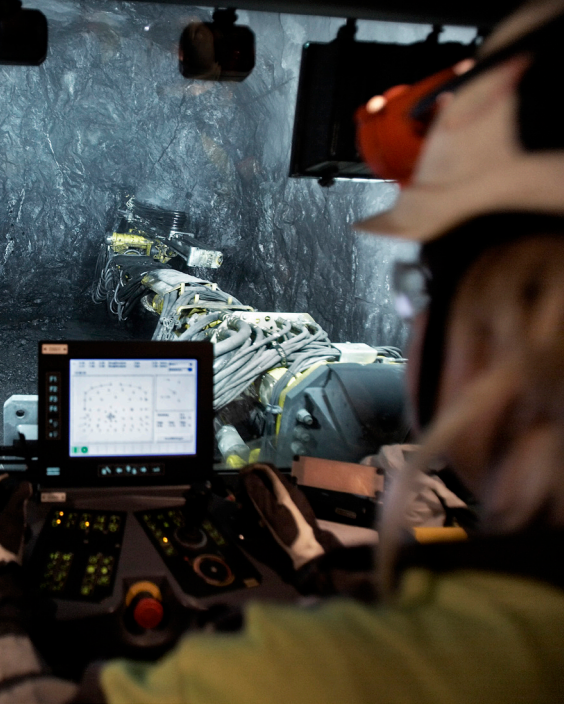


# Statistics of the Swedish Mining Industry 2022

SGU Geological Survey of Sweden

Periodiska publikationer 2023:2

**Changes implemented August 15, 2023**

Page 18: Table 5, average iron content for Kaunisvaara, text corrected.
New text: 27.8%
Original text: 0.278%

**Changes implemented November 21, 2023**

Page 11: The colors in the legend in Figure 6 has been corrected.
Page 31: The maps in Figures 12 and 13 have changed places and the colors have been corrected. The captions are unchanged.



*Author:* Carolina Liljenstolpe (SGU) with contributions from Roger Hamberg (SGU), Hans Selbach (SGU), Daniel Larsson (SGU) and Stig Abrahamsson (Bergsstaten).

*Cover images:* The collage shows a drilling rig underground (top left), a stack of copper cathodes (bottom left) and a pond for tailings at the Kristineberg mine (large image).
*Photo:* LKAB/Boliden/Carolina Liljenstolpe (SGU)

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## FOREWORD

This report constitutes a statistical summary of the Swedish mining and minerals industry. The content is a translated and shortened version of the publication *Bergverksstatistik 2022*. The target group comprises stakeholders in the mineral market, such as authorities and exploration or mining companies outside Sweden.

The Geological Survey of Sweden (SGU) has published Bergverksstatistik since 1985, with statistics dating back to 1978. The statistics also include a summary of mineral deposits of national importance under the Environmental Code, data on mining and mineral permits applied for and granted, environmental statistics, exports and imports, and economic statistics on the mining industry. This year, statistics on other mineral production in Sweden, such as production of natural stone, industrial minerals, as well as energy peat, are included in a publication entitled *Grus, sand och krossberg* ("Gravel, sand and crushed rock").

There was considerable geopolitical unrest in 2022, with a turbulent market for metals and minerals, combined with inflation and high energy prices. Challenges notwithstanding, the Swedish mining industry remained stable. It may be seen from the statistics that ore production in 2022 totalled just over 87 million tonnes, down 2 per cent on the previous year. The mining industry's total sales (not including smelters) totalled SEK 69 billion, roughly on a par with 2021.

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Swedish ore production has almost doubled over the past ten years. Much of the increase is attributable to the Aitik mine. Photo: Boliden

## The Swedish mining industry

Sweden's mineral resources and mineral reserves are mostly located in the three ore districts of Norrbotten and Skellefteå field in northern Sweden, and Bergslagen in the centre of the country. In addition to these locations, there are deposits in northern Sweden and in the provinces of Småland and Dalsland (Fig. 1).

Swedish ore production totalled 87.2 million tonnes in 2022, down 2 per cent on the previous year (Table 1).

In EU terms, Sweden is a fairly major producer of iron ore in particular, as well as lead and zinc. Internationally speaking, however, Sweden is a relatively small producer (Fig. 2). As shown in Figure 3, ore production has virtually doubled over the past ten years. Boliden's Aitik mine is one factor in the increase, but production has also risen at LKAB's mines and other mines.

There were 12 operational metal ore mines in Sweden in 2022. In addition, there is Svartliden, where no mining currently takes place and operations are confined to enrichment of imported ore concentrate. Statistics on the number of mining facilities include Svartliden and the Boliden concentrator, so there are 14 facilities in total (see Table 6 in the Employment section).

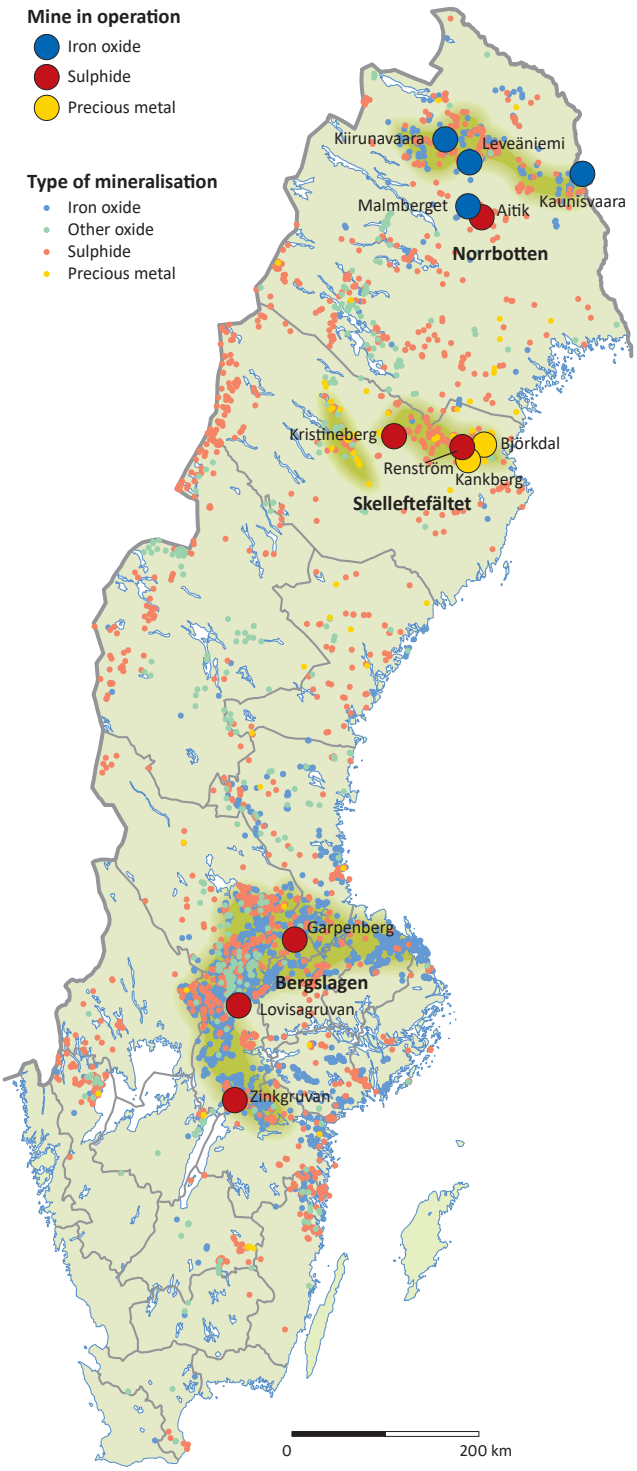



**Figure 1.** Active mines and known mineralisations in Sweden, 2022.

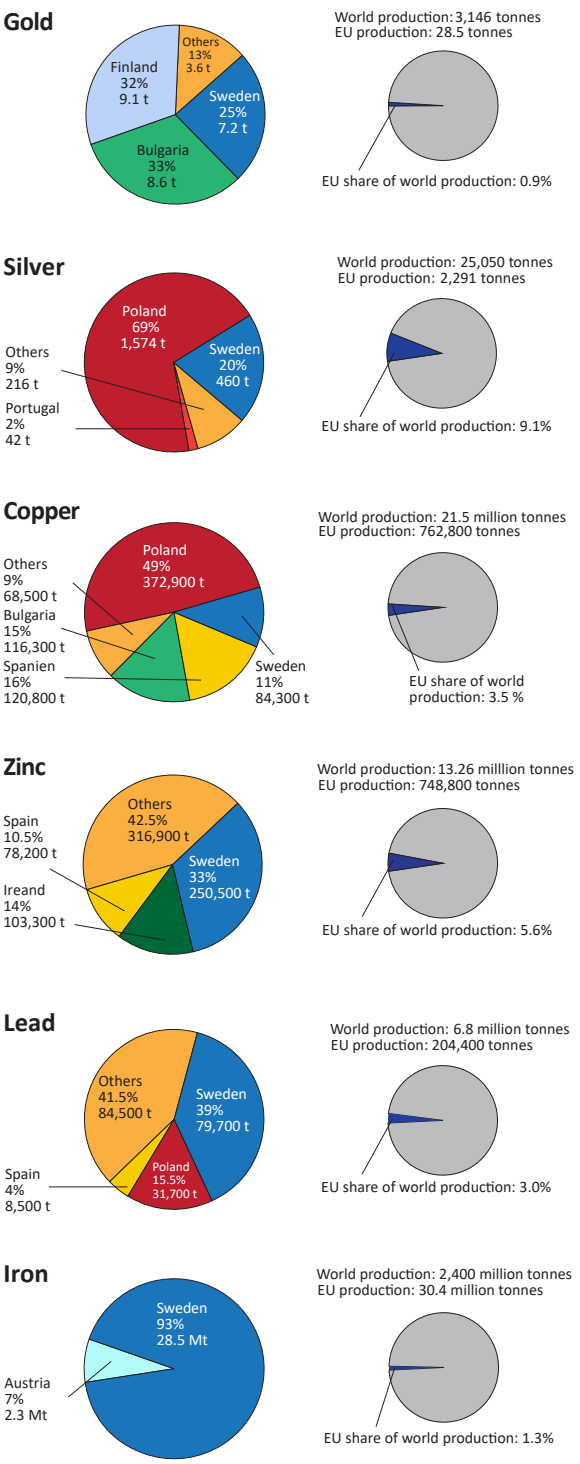



**Figure 2.** Sweden's mining production in 2022 in relation to the EU and the rest of the world.

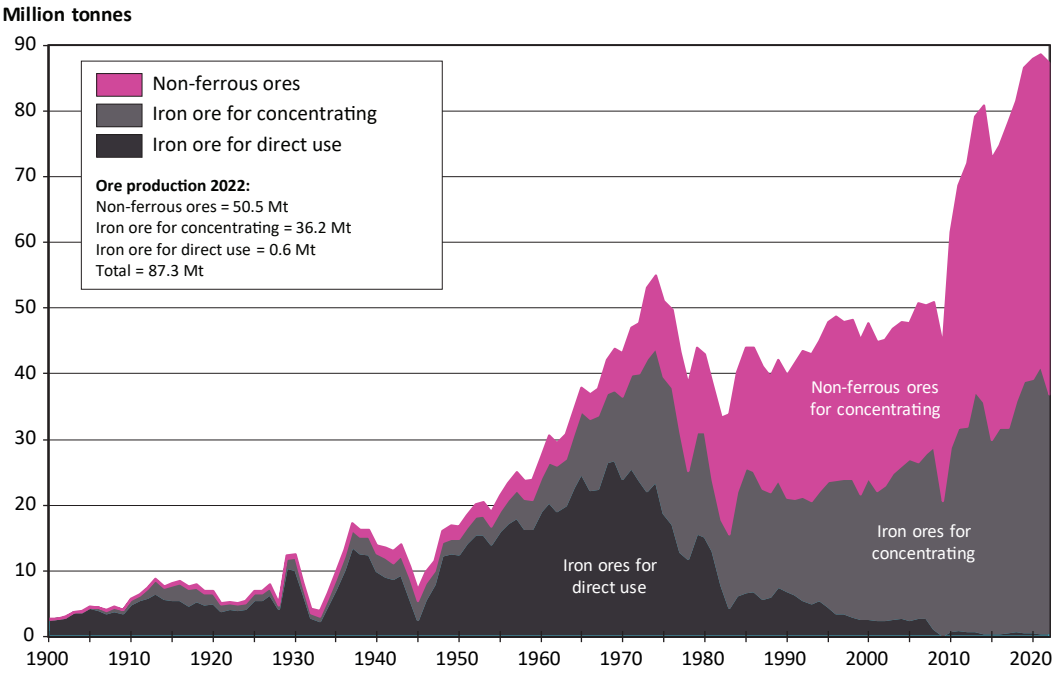



**Figure 3.** Production of ore in Sweden, 1900–2022.

**Table 1.** Production of iron ore (sorted) and non-ferrous ores in Sweden, 1953–2022.

| Year | Iron ore (sorted) 1,000 tonnes | | | Non-ferrous ores 1,000 tonnes | | | Iron ore and non-ferrous ores in total |
|---|---|---|---|---|---|---|---|
| | For direct use | For concentrating | Total | For direct use | For concentrating | Total | |
| 1953 | 15 633 | 2 803 | 18 436 | 25 | 2 036 | 2 061 | 20 497 |
| 1954 | 14 038 | 2 711 | 16 749 | 26 | 2 229 | 2 255 | 19 004 |
| 1955 | 15 999 | 3 093 | 19 092 | 12 | 2 341 | 2 353 | 21 445 |
| 1956 | 17 264 | 3 605 | 20 869 | 32 | 2 504 | 2 536 | 23 405 |
| 1957 | 18 092 | 4 258 | 22 350 | 17 | 2 693 | 2 710 | 25 060 |
| 1958 | 16 397 | 4 654 | 21 051 | 6 | 2 702 | 2 708 | 23 759 |
| 1959 | 16 439 | 4 447 | 20 886 | 10 | 2 920 | 2 930 | 23 816 |
| 1960 | 19 100 | 5 137 | 24 237 | 9 | 3 135 | 3 144 | 27 381 |
| 1961 | 20 517 | 6 049 | 26 566 | 17 | 4 068 | 4 085 | 30 651 |
| 1962 | 19 164 | 6 950 | 26 114 | 3 | 3 377 | 3 380 | 29 494 |
| 1963 | 19 922 | 7 210 | 27 132 | 7 | 3 612 | 3 619 | 30 751 |
| 1964 | 22 685 | 8 036 | 30 721 | 6 | 3 554 | 3 560 | 34 281 |
| 1965 | 24 876 | 9 417 | 34 293 | 26 | 3 533 | 3 559 | 37 852 |
| 1966 | 22 243 | 10 862 | 33 105 | 22 | 3 738 | 3 760 | 36 865 |
| 1967 | 22 450 | 11 170 | 33 620 | 19 | 4 000 | 4 019 | 37 639 |
| 1968 | 26 632 | 10 368 | 37 000 | 12 | 5 009 | 5 021 | 42 021 |
| 1969 | 26 883 | 10 657 | 37 540 | 9 | 6 207 | 6 216 | 43 756 |
| 1970 | 24 092 | 12 410 | 36 502 | 0 | 6 679 | 6 679 | 43 181 |
| 1971 | 25 649 | 14 192 | 39 841 | 0 | 7 236 | 7 236 | 47 077 |
| 1972 | 23 917 | 16 189 | 40 106 | 0 | 7 500 | 7 500 | 47 606 |
| 1973 | 22 106 | 20 234 | 42 340 | 0 | 10 695 | 10 695 | 53 035 |
| 1974 | 23 643 | 20 394 | 44 037 | 0 | 10 910 | 10 910 | 54 947 |

**Table 1.** Continued.

| Year | Iron ore (sorted) 1,000 tonnes | | | Non-ferrous ores 1,000 tonnes | | | Iron ore and non-ferrous ores in total |
|---|---|---|---|---|---|---|---|
| | For direct use | For concentrating | Total | For direct use | For concentrating | Total | |
| 1975 | 18 847 | 20 732 | 39 579 | 0 | 11 407 | 11 407 | 50 986 |
| 1976 | 17 126 | 20 685 | 37 811 | 0 | 11 854 | 11 854 | 49 665 |
| 1977 | 12 845 | 18 325 | 31 170 | 0 | 12 159 | 12 159 | 43 329 |
| 1978 | 11 886 | 13 336 | 25 222 | 0 | 13 189 | 13 189 | 38 411 |
| 1979 | 15 696 | 15 431 | 31 127 | 0 | 12 891 | 12 891 | 44 018 |
| 1980 | 15 296 | 15 889 | 31 185 | 0 | 11 819 | 11 819 | 43 004 |
| 1981 | 13 061 | 10 807 | 23 868 | 0 | 14 514 | 14 514 | 38 382 |
| 1982 | 7 835 | 9 878 | 17 713 | 0 | 15 617 | 15 617 | 33 330 |
| 1983 | 4 455 | 11 065 | 15 520 | 0 | 18 236 | 18 236 | 33 756 |
| 1984 | 6 267 | 15 735 | 22 002 | 0 | 18 237 | 18 237 | 40 239 |
| 1985 | 6 821 | 18 872 | 25 693 | 0 | 18 181 | 18 181 | 43 874 |
| 1986 | 6 977 | 18 137 | 25 114 | 0 | 18 899 | 18 899 | 44 013 |
| 1987 | 5 706 | 16 767 | 22 473 | 0 | 18 634 | 18 634 | 41 107 |
| 1988 | 6 170 | 15 872 | 22 042 | 0 | 17 599 | 17 599 | 39 641 |
| 1989 | 7 607 | 16 300 | 23 907 | 0 | 18 259 | 18 259 | 42 166 |
| 1990 | 6 879 | 14 343 | 21 222 | 0 | 18 566 | 18 566 | 39 788 |
| 1991 | 6 492 | 14 469 | 20 961 | 0 | 20 634 | 20 634 | 41 595 |
| 1992 | 5 559 | 15 675 | 21 234 | 0 | 22 164 | 22 164 | 43 398 |
| 1993 | 4 998 | 15 607 | 20 605 | 0 | 22 333 | 22 333 | 42 938 |
| 1994 | 5 540 | 16 609 | 22 149 | 0 | 22 801 | 22 801 | 44 950 |
| 1995 | 4 624 | 19 058 | 23 682 | 0 | 24 226 | 24 226 | 47 908 |
| 1996 | 3 493 | 20 273 | 23 766 | 0 | 24 917 | 24 917 | 48 683 |
| 1997 | 3 577 | 20 441 | 24 018 | 0 | 23 895 | 23 895 | 47 913 |
| 1998 | 3 017 | 21 034 | 24 052 | 0 | 24 182 | 24 182 | 48 234 |
| 1999 | 2 755 | 18 832 | 21 587 | 0 | 23 526 | 23 526 | 45 112 |
| 2000 | 2 687 | 21 437 | 24 124 | 0 | 23 608 | 23 608 | 47 732 |
| 2001 | 2 592 | 19 575 | 22 167 | 0 | 22 695 | 22 695 | 44 862 |
| 2002 | 2 527 | 20 530 | 23 057 | 0 | 22 099 | 22 099 | 45 156 |
| 2003 | 2 730 | 22 116 | 24 846 | 0 | 22 043 | 22 043 | 46 889 |
| 2004 | 2 833 | 23 290 | 26 123 | 0 | 21 707 | 21 707 | 47 830 |
| 2005 | 2 576 | 24 502 | 27 078 | 0 | 20 609 | 20 609 | 47 687 |
| 2006 | 2 907 | 23 622 | 26 529 | 0 | 24 162 | 24 162 | 50 691 |
| 2007 | 2 864 | 24 988 | 27 852 | 0 | 22 614 | 22 614 | 50 466 |
| 2008 | 1 234 | 27 713 | 28 947 | 0 | 21 897 | 21 897 | 50 844 |
| 2009 | 257 | 20 389 | 20 646 | 0 | 23 576 | 23 576 | 44 222 |
| 2010 | 880 | 27 917 | 28 797 | 0 | 32 721 | 32 719 | 61 516 |
| 2011 | 991 | 29 849 | 30 840 | 0 | 36 707 | 36 877 | 67 717 |
| 2012 | 822 | 31 376 | 32 198 | 0 | 40 176 | 40 176 | 72 374 |
| 2013 | 843 | 36 568 | 37 411 | 0 | 41 675 | 41 675 | 79 086 |
| 2014 | 570 | 35 189 | 35 759 | 0 | 45 077 | 45 077 | 80 836 |
| 2015 | 470 | 29 391 | 29 861 | 0 | 42 873 | 42 873 | 72 734 |
| 2016 | 500 | 31 343 | 31 843 | 0 | 42 890 | 42 890 | 74 733 |
| 2017 | 687 | 31 076 | 31 763 | 0 | 46 501 | 46 501 | 78 264 |
| 2018 | 898 | 34 876 | 35 774 | 0 | 45 650 | 45 650 | 81 424 |
| 2019 | 678 | 38 235 | 38 913 | 0 | 47 641 | 47 641 | 86 554 |
| 2020 | 609 | 38 619 | 39 228 | 0 | 48 721 | 48 721 | 87 949 |
| 2021 | 595 | 40 718 | 41 313 | 0 | 47 303 | 47303 | 88 616 |
| **2022** | **565** | **36 192** | **36 757** | **0** | **50 474** | **50 474** | **87 231** |

## NUMBER OF MINES 1900–2022

There were between 100 and 200 operating mines and ore fields in Sweden in the early 20th century. There were up to 260 mines by the end of the First World War (Figure 4). But there are discrepancies between early statistical reporting and the reports published from the 1930s onwards. The main difference is that production was originally reported for all individual mines within an ore field, but later figures refer to entire ore fields. For instance, production from 12 separate mines in the Dannemora field was reported during the period 1910–1920. Since 1940 the statistics have been aggregated as "Dannemora".

Mining is often a long-term operation. Of mines currently operational in Sweden, eight are more than 50 years old (Fig. 5). In 2022 there were twelve active mines in Sweden (Fig. 6).

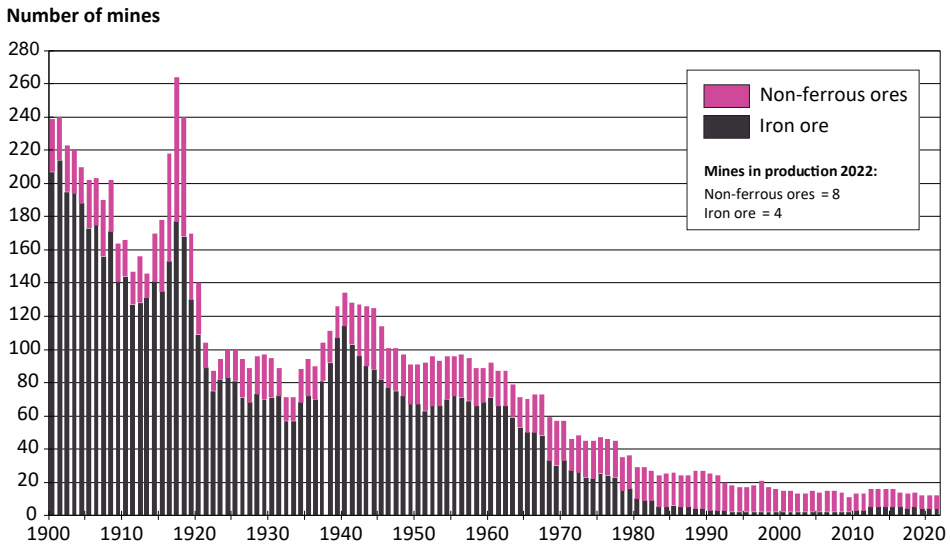



**Figure 4.** Number of mines in operation in Sweden, 1900–2022.

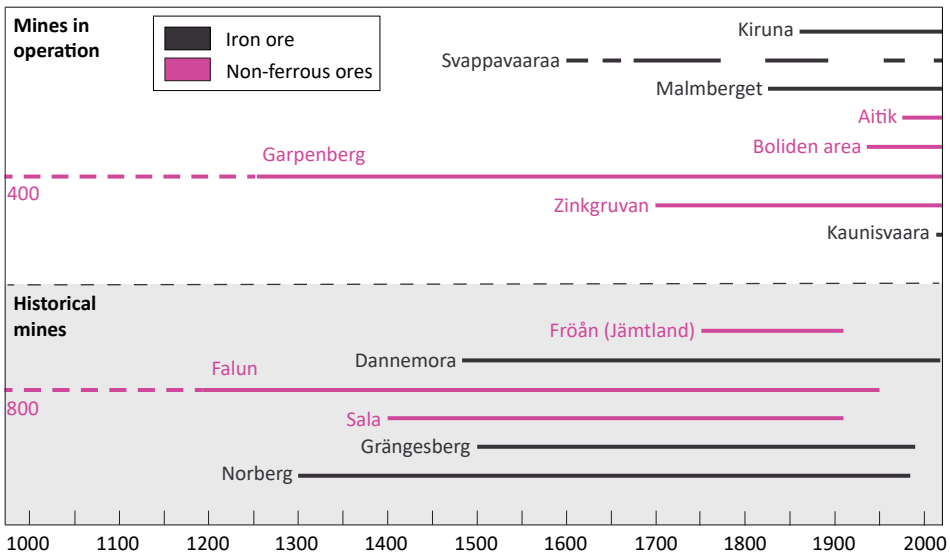



**Figure 5.** Swedish mines have a long history. The upper part of the diagram shows mines in operation; the lower part shows some major historical mines. Several of these date back to the Middle Ages. Dark grey/black shows iron ore mines; pink represents non-iron ore mines.


**Figure 6.** Mines and current mining concessions in Sweden. In December 2022 there were 12 mines in Sweden, all of them metal ore mines. The term "current mining concessions" means concessions mentioned in the companies' annual reports, newsletters or where there are other indications that the company is working to open a mine. There are 165 current mining concessions in total.

## EMPLOYMENT IN THE MINING INDUSTRY

All twelve mines in Sweden employed more people than in the preceding year. Some 7,773 people were employed in the Swedish mining industry in 2022. Iron ore mines employ slightly more people but non-ferrous ore mines have more mining facilities (Table 2). Employment, including sub-contractors also rose in 2022 (Fig. 7). Most mining industry workers are employed in the provinces of Norrbotten and Västerbotten, since this is where most of the facilities are located (Table 3).

Figures from Statistics Sweden on employees in the labour market are always reportedwith a delay of one year, so the latest figures are for 2021. According to Statistics Sweden, the entire Swedish minerals industry employed 9,739 people in 2021.

The proportion of women among manual and white-collar workers in the industry continues to increase. Female workers employed by mining companies totalled 1,993 in 2022 (Table 4). The proportion of women employed in the mining industry is now higher than for manufacturing industry as a whole. In 2022 26 per cent of all employees in the mining industry were women, compared with 25 per cent in manufacturing industry as a whole (Fig. 8).

### Work-related accidents and sick leave rates

Statistics from the Swedish Work Environment Authority show that, in absolute terms, the number of accidents at work leading to absenteeism and work-related illnesses has remained relatively stable at about 100 over the past five years (Fig. 9). The frequency of accidents at work per 1,000 employees was 10 for men and 11 for women.

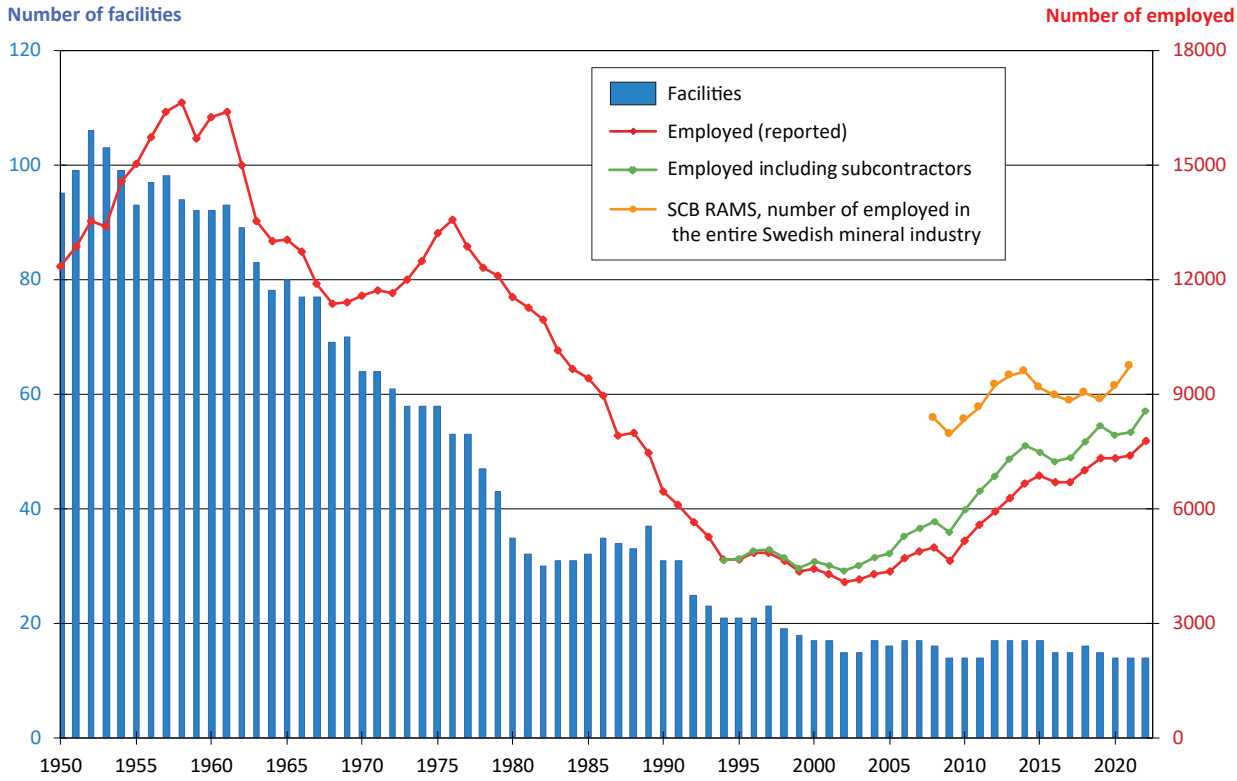



**Figure 7.** Number of facilities and people working in the mining industry, 1950–2022.

**Table 2.** Number of facilities and people working in the mining industry, 1950–2022*. Source: SGU survey.

| | Iron ore mines | | | | Non-ferrous ore mines | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Facilities | White-collar workers | Workers | Total employed | Facilities | White-collar workers | Workers | Total employed | Facilities | Employed |
| 1950 | 68 | 927 | 8 375 | 9 302 | 27 | 421 | 2 630 | 3 051 | 95 | 12 353 |
| 1951 | 68 | 1 012 | 8 876 | 9 888 | 31 | 462 | 2 521 | 2 983 | 99 | 12 871 |
| 1952 | 72 | 1 125 | 9 310 | 10 435 | 34 | 503 | 2 593 | 3 096 | 106 | 13 531 |
| 1953 | 72 | 1 186 | 9 008 | 10 194 | 31 | 518 | 2 688 | 3 206 | 103 | 13 400 |
| 1954 | 69 | 1 279 | 9 612 | 10 891 | 30 | 585 | 3 087 | 3 672 | 99 | 14 563 |
| 1955 | 66 | 1 378 | 9 979 | 11 357 | 27 | 594 | 3 092 | 3 686 | 93 | 15 043 |
| 1956 | 68 | 1 556 | 10 437 | 11 993 | 29 | 627 | 3 113 | 3 740 | 97 | 15 733 |
| 1957 | 69 | 1 799 | 10 983 | 12 782 | 29 | 625 | 2 981 | 3 606 | 98 | 16 388 |
| 1958 | 68 | 2 002 | 11 244 | 13 246 | 26 | 652 | 2 723 | 3 375 | 94 | 16 621 |
| 1959 | 68 | 2 074 | 10 404 | 12 478 | 24 | 719 | 2 479 | 3 198 | 92 | 15 676 |
| 1960 | 68 | 2 164 | 10 742 | 12 906 | 24 | 742 | 2 604 | 3 346 | 92 | 16 252 |
| 1961 | 69 | 2 318 | 10 685 | 13 003 | 24 | 793 | 2 572 | 3 365 | 93 | 16 368 |
| 1962 | 65 | 2 282 | 9 488 | 11 770 | 24 | 799 | 2 416 | 3 215 | 89 | 14 985 |
| 1963 | 59 | 2 173 | 8 542 | 10 715 | 24 | 733 | 2 080 | 2 813 | 83 | 13 528 |
| 1964 | 57 | 2 146 | 8 160 | 10 306 | 21 | 725 | 1 979 | 2 704 | 78 | 13 010 |
| 1965 | 57 | 2 093 | 8 155 | 10 248 | 23 | 781 | 2 006 | 2 787 | 80 | 13 035 |
| 1966 | 53 | 2 084 | 7 819 | 9 903 | 24 | 734 | 2 105 | 2 839 | 77 | 12 742 |
| 1967 | 50 | 1 975 | 7 109 | 9 084 | 27 | 734 | 2 085 | 2 819 | 77 | 11 903 |
| 1968 | 39 | 1 804 | 6 606 | 8 410 | 30 | 795 | 2 171 | 2 966 | 69 | 11 376 |
| 1969 | 40 | 1 718 | 6 636 | 8 354 | 30 | 800 | 2 238 | 3 038 | 70 | 11 392 |
| 1970 | 36 | 1 685 | 6 697 | 8 382 | 28 | 873 | 2 310 | 3 183 | 64 | 11 565 |
| 1971 | 36 | 1 723 | 6 881 | 8 604 | 28 | 881 | 2 247 | 3 128 | 64 | 11 732 |
| 1972 | 35 | 1 753 | 6 633 | 8 386 | 26 | 890 | 2 366 | 3 256 | 61 | 11 642 |
| 1973 | 33 | 1 755 | 6 833 | 8 588 | 25 | 884 | 2 528 | 3 412 | 58 | 12 000 |
| 1974 | 32 | 1 746 | 7 208 | 8 954 | 26 | 933 | 2 605 | 3 538 | 58 | 12 492 |
| 1975 | 32 | 1 831 | 7 547 | 9 378 | 26 | 990 | 2 859 | 3 849 | 58 | 13 227 |
| 1976 | 30 | 1 892 | 7 672 | 9 564 | 23 | 1 051 | 2 948 | 3 999 | 53 | 13 563 |
| 1977 | 30 | 1 917 | 7 079 | 8 996 | 23 | 1 006 | 2 878 | 3 884 | 53 | 12 880 |
| 1978 | 24 | 1 754 | 6 871 | 8 625 | 23 | 996 | 2 677 | 3 673 | 47 | 12 298 |
| 1979 | 21 | 1 675 | 6 560 | 8 235 | 22 | 951 | 2 901 | 3 852 | 43 | 12 087 |
| 1980 | 15 | 1 570 | 6 024 | 7 594 | 20 | 902 | 3 048 | 3 950 | 35 | 11 544 |
| 1981 | 12 | 1 537 | 5 557 | 7 094 | 20 | 929 | 3 242 | 4 171 | 32 | 11 265 |
| 1982 | 10 | 1 402 | 5 110 | 6 512 | 20 | 980 | 3 451 | 4 431 | 30 | 10 943 |
| 1983 | 8 | 1 134 | 4 358 | 5 492 | 23 | 913 | 3 729 | 4 642 | 31 | 10 134 |
| 1984 | 7 | 867 | 3 816 | 4 683 | 24 | 1 095 | 3 893 | 4 988 | 31 | 9 671 |
| 1985 | 8 | 967 | 3 607 | 4 574 | 24 | 1 079 | 3 778 | 4 857 | 32 | 9 431 |
| 1986 | 7 | 939 | 3 429 | 4 368 | 28 | 1 026 | 3 552 | 4 578 | 35 | 8 946 |
| 1987 | 7 | 862 | 3 089 | 3 951 | 27 | 871 | 3 083 | 3 954 | 34 | 7 905 |
| 1988 | 7 | 838 | 3 291 | 4 129 | 26 | 840 | 3 017 | 3 857 | 33 | 7 986 |
| 1989 | 7 | 772 | 3 083 | 3 855 | 30 | 674 | 2 931 | 3 605 | 37 | 7 460 |
| 1990 | 5 | 631 | 2 512 | 3 143 | 26 | 590 | 2 704 | 3 294 | 31 | 6 437 |
| 1991 | 5 | 635 | 2 308 | 2 943 | 26 | 615 | 2 540 | 3 155 | 31 | 6 098 |
| 1992 | 5 | 653 | 2 296 | 2 949 | 20 | 588 | 2 107 | 2 695 | 25 | 5 644 |
| 1993 | 4 | 611 | 2 150 | 2 761 | 19 | 556 | 1 940 | 2 496 | 23 | 5 257 |
| 1994 | 4 | 527 | 2 077 | 2 604 | 17 | 311 | 1 757 | 2 068 | 21 | 4 672 |

**Table 2.** Continued.

| Year | Iron ore mines | | | | Non-ferrous ore mines | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Facilities | White-collar workers | Workers | Total employed | Facilities | White-collar workers | Workers | Total employed | Facilities | Employed |
| 1995 | 4 | 416 | 2 130 | 2 546 | 17 | 315 | 1 817 | 2 132 | 21 | 4 678 |
| 1996 | 3 | 603 | 2 141 | 2 744 | 18 | 325 | 1 784 | 2 109 | 21 | 4 853 |
| 1997 | 3 | 612 | 2 036 | 2 648 | 20 | 329 | 1 886 | 2 215 | 23 | 4 863 |
| 1998 | 3 | 573 | 1 956 | 2 529 | 16 | 316 | 1 792 | 2 108 | 19 | 4 637 |
| 1999 | 3 | 520 | 1 816 | 2 336 | 15 | 304 | 1 708 | 2 012 | 18 | 4 348 |
| 2000 | 3 | 641 | 1 933 | 2 574 | 14 | 279 | 1 593 | 1 872 | 17 | 4 446 |
| 2001 | 3 | 667 | 1 893 | 2 560 | 14 | 264 | 1 461 | 1 725 | 17 | 4 285 |
| 2002 | 3 | 642 | 1 847 | 2 489 | 12 | 260 | 1 339 | 1 599 | 15 | 4 088 |
| 2003 | 3 | 640 | 1 862 | 2 502 | 12 | 263 | 1 401 | 1 664 | 15 | 4 166 |
| 2004 | 3 | 618 | 1 897 | 2 515 | 14 | 294 | 1 493 | 1 787 | 17 | 4 302 |
| 2005 | 3 | 665 | 1 950 | 2 615 | 13 | 286 | 1 453 | 1 739 | 16 | 4 354 |
| 2006 | 3 | 706 | 2 046 | 2 752 | 14 | 324 | 1 651 | 1 975 | 17 | 4 727 |
| 2007 | 3 | 742 | 2 123 | 2 865 | 14 | 342 | 1 684 | 2 026 | 17 | 4 891 |
| 2008 | 3 | 779 | 2 279 | 3 058 | 13 | 328 | 1 599 | 1 927 | 16 | 4 985 |
| 2009 | 3 | 756 | 2 044 | 2 800 | 11 | 239 | 1 617 | 1 856 | 14 | 4 656 |
| 2010 | 3 | 763 | 2 235 | 2 998 | 11 | 361 | 1 821 | 2 182 | 14 | 5 180 |
| 2011 | 3 | 815 | 2 351 | 3 166 | 11 | 408 | 2 019 | 2 427 | 14 | 5 593 |
| 2012 | 5 | 1 004 | 2 518 | 3 522 | 12 | 430 | 1 970 | 2 400 | 17 | 5 922 |
| 2013 | 5 | 1 035 | 2 839 | 3 874 | 12 | 462 | 1 959 | 2 421 | 17 | 6 295 |
| 2014 | 5 | 1 016 | 2 814 | 3 830 | 12 | 489 | 2 339 | 2 828 | 17 | 6 658 |
| 2015 | 5 | 1 030 | 2 344 | 3 374 | 12 | 528 | 2 974 | 3 502 | 17 | 6 876 |
| 2016 | 4 | 929 | 2 277 | 3 206 | 11 | 532 | 2 946 | 3 478 | 15 | 6 684 |
| 2017 | 4 | 904 | 2 255 | 3 159 | 11 | 546 | 2 991 | 3 537 | 15 | 6 696 |
| 2018 | 5 | 962 | 2 412 | 3 374 | 11 | 569 | 3 053 | 3 622 | 16 | 6 996 |
| 2019 | 4 | 1 021 | 2 473 | 3 494 | 10 | 656 | 3 174 | 3 830 | 15 | 7 324 |
| 2020 | 4 | 1 152 | 2 468 | 3 620 | 10 | 681 | 3 033 | 3 714 | 14 | 7 334 |
| 2021 | 4 | 1 193 | 2 353 | 3 546 | 10 | 719 | 3 122 | 3841 | 14 | 7387 |
| **2022** | **4** | **1 422** | **2 551** | **3 973** | **10** | **746** | **3 054** | **3 800** | **14** | **7 773** |

* All employees of subcontractors are not included. From 2017, employees of non-ferrous ore subcontractors are included.

**Table 3.** Number of workers by county in the mining industry (2022). Source: SGU survey.

| County | Number of facilities 2022 | Employed | | | |
|---|---|---|---|---|---|
| | | 2021 | 2022 | Iron ore mines | Non-ferrous ore mines |
| Örebro | 2 | 381 | 311 | | 311 |
| Dalarna | 1 | 557 | 577 | | 577 |
| Västerbotten | 6 | 841 | 1241 | | 1 241 |
| Norrbotten | 5 | 3 696 | 3 476 | 2 551 | 925 |
| **Whole Sweden 2022** | **14** | | **5 605** | **2 551** | **3 054** |
| Whole Sweden 2021 | 14 | 5 475 | | 2 353 | 3 122 |

The proportion of women in the mining industry now exceeds the proportion in manufacturing industry. Photo: Zinkgruvan mining

**Table 4.** Number of female workers in the mining industry, 2002–2022. Source: SGU survey.

| | Workers, all mines | | | White-collar workers, all mines | | |
|---|---|---|---|---|---|---|
| **Year** | **Women** | **Total** | **%** | **Women** | **Total** | **%** |
| 2002 | 182 | 3 186 | 6 | | | |
| 2003 | 199 | 3 263 | 6 | | | |
| 2004 | 171 | 3 690 | 5 | | | |
| 2005 | 197 | 3 403 | 6 | | | |
| 2006 | 229 | 3 447 | 7 | | | |
| 2007 | 284 | 3 807 | 7 | | | |
| 2008 | 387 | 3 878 | 10 | 270 | 1 071 | 25 |
| 2009 | 329 | 3 661 | 9 | 270 | 1 075 | 25 |
| 2010 | 481 | 4 056 | 12 | 281 | 1 111 | 25 |
| 2011 | 590 | 4 370 | 14 | 328 | 1 212 | 27 |
| 2012 | 648 | 4 462 | 15 | 372 | 1 399 | 27 |
| 2013 | 703 | 4 721 | 15 | 403 | 1 497 | 27 |
| 2014 | 731 | 5 153 | 14 | 424 | 1 505 | 28 |
| 2015 | 814 | 5 318 | 15 | 448 | 1 558 | 29 |
| 2016 | 832 | 5 223 | 16 | 418 | 1 461 | 29 |
| 2017 | 865 | 5 246 | 16 | 426 | 1 450 | 29 |
| 2018 | 911 | 5 465 | 17 | 466 | 1 533 | 30 |
| 2019 | 980 | 5 647 | 17 | 526 | 1 677 | 31 |
| 2020 | 1 017 | 5 501 | 18 | 590 | 1 833 | 32 |
| 2021 | 1 209 | 5 475 | 22 | 643 | 1912 | 34 |
| **2022** | **1225** | **5 605** | **22** | **768** | **2 168** | **35** |

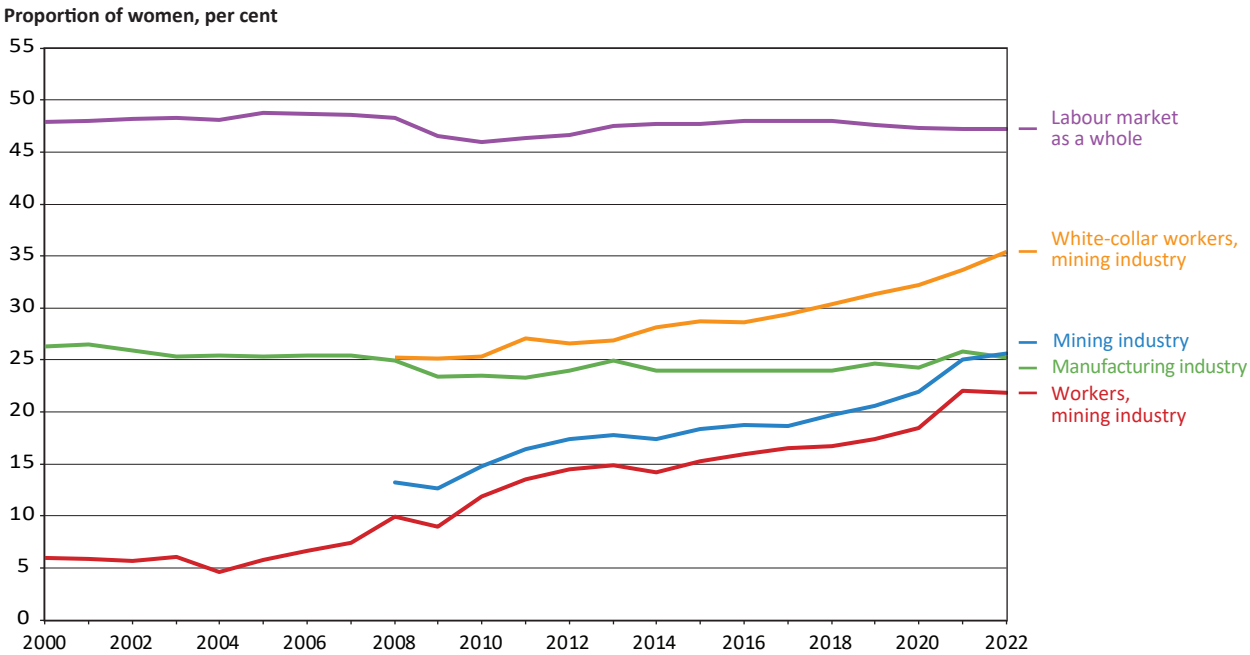



**Figure 8.** Proportion of women in the mining industry, manufacturing industry and labour market as a whole 2000–2021.

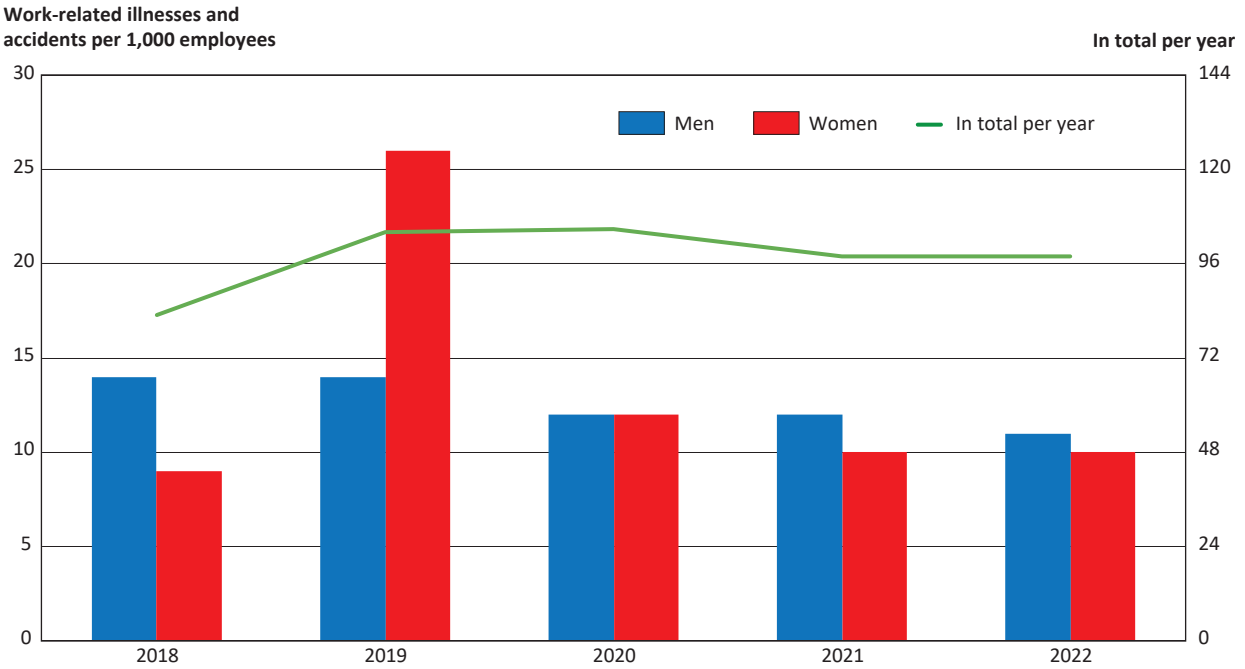



**Figure 9.** Number of work-related illnesses and accidents with resulting absence due to illness at Swedish mines, 2018–2022. Number per 1,000 employees by gender and total. Source: Swedish Work Environment Authority

The pelletising plant KK4 in Kiruna. Photo: Fredric Alm/LKAB

# Iron ore

At the beginning of every year the Geological Survey of Sweden (SGU) sends a questionnaire to companies operating in the Swedish mining industry. The survey includes questions about production volumes, sales and employment. The sections below on LKAB and Kaunis Iron AB present results from SGU's survey for iron ore mines in production year 2022. The results are also summarised in Tables 5–10. Other information has been obtained from the companies' annual reports or websites.

## LKAB

LKAB's iron ore mines are located in the environs of Malmberget, Kiruna and Leveäniemi (in Svappavaara) in Norrbotten County in northern Sweden. Most of the iron ore extracted is high-quality magnetite, which is naturally magnetic. This facilitates concentration and requires less energy for pellet production. The iron content after concentration is over 70 per cent, rendering the product sought after in the market.

According to SGU's questionnaire survey, delivery volumes from the iron ore mines in the form of processed iron ore totalled just over 26 million tonnes in 2022, down just over 1.5 million tonnes on 2021. According to LKAB's annual report, the fall was due to production disruptions at the processing plants in Kiruna, and also to some extent at Svappavaara. Production at Malmberget was stable, however.

**Table 5.** Extraction from iron ore mines in 2022. Source: SGU survey.

| County<br>*Municipality*<br>Mining company | Name of the mine | Waste rock and ore<br>Underground (tonnes) | Open-pit (tonnes) | Total (tonnes) | Average content of<br>Iron (%) | Phosphorus (%) | Enrichment ore obtained after sorting, total (tonnes) | Lump ore and limonite ore for direct sale, total (tonnes) |
|---|---|---|---|---|---|---|---|---|
| **Norrbotten county** | | | | | | | | |
| *Gällivare* | | | | | | | | |
| LKAB | Malmberget | 18 266 192 | | 18 266 192 | 38.3 | 0.55 | 10 026 191 | |
| *Kiruna* | | | | | | | | |
| LKAB | Kiirunavaara | 22 011 200 | | 22 011 200 | 38.9 | 0.32 | 13 999 811 | 565 303 |
| *Svappavaara* | | | | | | | | |
| LKAB | Leveäniemi | | 8 539 643 | 8 539 643 | 43.7 | 0.64 | 5 771 350 | |
| LKAB | Gruvberget | | | | | | | |
| *Pajala* | | | | | | | | |
| Kaunis Iron | Kaunisvaara | | 22 156 863 | | 27.8 | | 5 837 801 | |
| **Whole Sweden 2022** | | **40 277 392** | **30 696 506** | **48 817 035** | | | **35 635 153** | **565 303** |
| Whole Sweden 2021 | | 44 839 400 | 32 875 237 | 53 757 112 | | | 40 037 047 | 595 076 |

* After sorting

### Kiirunavaara Mine

When industrial ore mining started at Kiirunavaara in the early 1900s the ore was mined in open-pit mines, but since the early 1960s the ore has been mined underground. The iron ore is processed after sorting above ground at three processing and pelletising plants.

According to data from SGU's annual questionnaire survey for 2022, approximately 22 million tonnes of ore was extracted from the mine. After sorting, nearly 0.6 million tonnes of lump ore and about 14 million tonnes of refined ore were obtained. Unrefined ore had a 63.0 per cent iron content and a phosphorus content of 0.47 per cent. After processing the concentrate contained 71.3 per cent iron and 0.024 per cent phosphorus. Kiirunavaara mainly produces blast furnace and direct reduction pellets (DR pellets).

### Leveäniemi Mine

Mining takes place in the Leveäniemi open pit, which is located south of the town of Svappavaara and adjacent to the concentrator on the site. According to SGU's survey, 8.5 million tonnes of ore was mined in 2022 and after sorting, 5.8 million tonnes of refined ore was obtained. Unrefined ore entering the concentrator had a 59.4 per cent iron content and a 0.46 per cent phosphorus content. The concentrator's output level was 71.0 per cent iron and 0.02 per cent phosphorus. Svappavaara mainly produces blast furnace and direct reduction pellets (DR pellets).

### Malmberget Mine

At the Malmberget Mine, iron ore is mined underground. After sorting, the iron ore is processed above ground in a concentrator and two pelletising plants. According to SGU's survey, 18.3 million tonnes of ore was mined in 2022. After sorting, just over 10 million tonnes of ore for concentrating containing between 57.4 and 61.4 per cent iron and between 0.29 and 0.50 per cent phosphorus were obtained. The processed ore contained 70.7–71.6 per cent iron and 0.004–0.03 per cent phosphorus. In addition to blast furnace pellets, fines are produced at Malmberget.

**Table 6.** Extraction of ore and waste rock at iron ore mines, 1986–2022. Source: SGU survey.

| Year | Total quantity of mined ore and waste rock | Waste rock | | Enrichment ore | | Lump ore and fines for direct use | |
|---|---|---|---|---|---|---|---|
| | 1 000 tonnes | 1 000 tonnes | % of total quantity | 1 000 tonnes | % of total quantity | 1 000 tonnes | % of total quantity |
| 1986 | 32 795 | 9 250 | 28 | 16 568 | 51 | 6 977 | 21.0 |
| 1987 | 30 335 | 7 861 | 26 | 16 768 | 55 | 5 706 | 19.0 |
| 1988 | 30 363 | 8 321 | 28 | 15 872 | 52 | 6 170 | 20.0 |
| 1989 | 31 958 | 8 051 | 25 | 16 300 | 51 | 7 607 | 24.0 |
| 1990 | 28 375 | 7 153 | 25 | 14 343 | 51 | 6 879 | 24.0 |
| 1991 | 28 693 | 7 731 | 27 | 14 469 | 50 | 6 493 | 23.0 |
| 1992 | 29 430 | 8 196 | 28 | 15 675 | 53 | 5 559 | 19.0 |
| 1993 | 29 129 | 8 524 | 29 | 15 607 | 54 | 4 998 | 17.0 |
| 1994 | 32 352 | 10 203 | 31 | 16 609 | 51 | 5 540 | 17.0 |
| 1995 | 33 460 | 9 778 | 29 | 19 058 | 57 | 4 624 | 14.0 |
| 1996 | 33 605 | 9 839 | 29 | 20 273 | 60 | 3 493 | 10.0 |
| 1997 | 33 488 | 9 470 | 28 | 20 441 | 61 | 3 577 | 10.7 |
| 1998 | 34 894 | 10 842 | 31 | 21 034 | 60 | 3 017 | 8.7 |
| 1999 | 32 512 | 10 925 | 34 | 18 832 | 58 | 2 755 | 8.5 |
| 2000 | 34 629 | 10 505 | 30 | 21 437 | 62 | 2 687 | 7.8 |
| 2001 | 34 020 | 11 853 | 35 | 19 575 | 58 | 2 592 | 7.6 |
| 2002 | 32 136 | 9 079 | 28 | 20 530 | 64 | 2 527 | 7.9 |
| 2003 | 34 906 | 10 060 | 29 | 22 116 | 63 | 2 730 | 7.8 |
| 2004 | 35 988 | 9 841 | 29 | 23 314 | 65 | 2 833 | 7.9 |
| 2005 | 37 465 | 10 387 | 28 | 24 502 | 65 | 2 576 | 6.9 |
| 2006 | 40 692 | 14 163 | 35 | 23 622 | 58 | 2 907 | 7.1 |
| 2007 | 41 420 | 13 568 | 33 | 24 988 | 60 | 2 864 | 6.9 |
| 2008 | 43 487 | 14 540 | 33 | 27 713 | 64 | 1 234 | 2.8 |
| 2009 | 30 420 | 9 774 | 32 | 20 389 | 67 | 257 | 0.8 |
| 2010 | 43 846 | 14 170 | 32 | 28 797 | 66 | 880 | 2.0 |
| 2011 | 45 325 | 14 485 | 32 | 29 849 | 66 | 991 | 2.2 |
| 2012 | 46 894 | 16 622 | 33 | 30 272 | 65 | 822 | 1.8 |
| 2013 | 53 044 | 15 633 | 29 | 36 568 | 69 | 843 | 1.6 |
| 2014 | 54 417 | 17 518 | 32 | 34 002 | 62 | 570 | 1.0 |
| 2015 | 49 506 | 19 645 | 40 | 29 391 | 59 | 470 | 0.9 |
| 2016 | 52 587 | 20 744 | 39 | 31 343 | 60 | 500 | 1.0 |
| 2017 | 52 405 | 20 641 | 39 | 31 077 | 59 | 687 | 1.3 |
| 2018 | 57 574 | 21 800 | 38 | 34 876 | 61 | 898 | 1.6 |
| 2019 | 58 418 | 19 505 | 33 | 38 235 | 65 | 678 | 1.2 |
| 2020 | 58 726 | 19 498 | 33 | 38 619 | 66 | 609 | 1.0 |
| 2021 | 62 066 | 20 753 | 33 | 40 718 | 66 | 595 | 1.0 |
| **2022** | **56 449** | **19 691** | **45** | **36 192** | **64** | **565** | **1.0** |

**Table 7.** Production of direct saleable products (lump ore, fines, concentrates and pellets), 2009–2022. Source: SGU survey.

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Whole Sweden, 1,000 tonnes | 17 677 | 25 292 | 26 113 | 26 540 | 27 285 | 28 181 | 24 823 | 26 900 | 27 200 | 27 526 | 28 980 | 30 584 | 29 603 | 28 124 |

**Table 8.** Processing of iron ore in 2022. Source: SGU survey.

| County<br>*Municipality*<br>Mining company<br>Enrichment plant | Enrich-ment method* | Incoming raw material | | | | | | Received concentrates | | | | | | Tailings | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | From | Total (tonnes) | Average content | | | | Quality | Total (tonnes) | Average content | | | | Average content | | |
| | | | | Fe (%) | P (%) | S (%) | Mn (%) | | | Fe (%) | P (%) | S (%) | Mn (%) | Fe (%) | P (%) | Mn (%) |
| **Norrbotten** | | | | | | | | | | | | | | | | |
| *Gällivare* | | | | | | | | | | | | | | | | |
| LKAB | | | | | | | | | | | | | | | | |
| Malmberget | mv | FAR | 2 813 063 | 61.42 | 0.294 | | 0.044 | MPC | 7 698 000 | 71.19 | 0.009 | | 0.042 | 8.828 | 1.651 | 0.074 |
| | mv | PAR | 6 684 264 | 61.42 | 0.294 | | 0.044 | MAF | 1 769 428 | 70.74 | 0.026 | | 0.041 | | | |
| | mv | AMD | | | | | | Spec. prod. | 402 802 | 71.62 | 0.004 | | 0.038 | | | |
| | mv | AMGB | | | | | | MHF | **9 870 230** | | | | | | | |
| | mv | AMLB | 2 232 458 | 57.48 | 0.501 | | 0.051 | **Total:** | | | | | | | | |
| | mv | HPAR | 278 388 | 61.42 | 0.294 | | 0.044 | | | | | | | | | |
| | | **Total:** | **12 008 173** | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| *Kiruna* | | | | | | | | | | | | | | | | |
| LKAB | | | | | | | | | | | | | | | | |
| Kirunavaara | mv. f | Kiirunavaara | 15 320 513 | 63.00 | 0.470 | | | KA1+KA2+KA3 | 11 318 171 | 71.30 | 0.024 | | | 9.20 | 2.80 | |
| Svappavaara | mv. f | | 4 013 977 | 59.40 | 0.460 | | | Svappavara | 3 176 290 | 71.00 | 0.020 | | | | | |
| | | **Total:** | **19 334 490** | | | | | **Total:** | **14 494 461** | | | | | | | |
| | | | | | | | | | | | | | | | | |
| *Pajala* | | | | | | | | | | | | | | | | |
| Kaunis Iron AB | | | | | | | | | | | | | | | | |
| Kaunisvaara | | Kaunisvaara | **5 720 079** | 27.82 | | 0.064 | | Kaunisvaara | **2 112 726** | 67.58 | | 0.069 | | 4.537 | | |
| | | | | | | | | | | | | | | | | |
| **Whole Sweden 2022** | | | **37 062 741** | | | | | | **26 477 417** | | | | | | | |
| **Whole Sweden 2021** | | | 39 076 731 | | | | | | 28 118 541 | | | | | | | |

* Enrichment method: mv = combined magnetic and wet enrichment. f = flotation

## KAUNIS IRON AB

### Kaunisvaara Mine

Kaunis Iron AB produced approximately 2.1 million tonnes of refined iron ore products in 2022 (2.0 million tonnes in 2021) at Kaunisvaara Mine near the town of Pajala in Norrbotten County. According to SGU's survey, almost 22 million tonnes of ore was extracted from the mine and just under 5.8 million tonnes of ore for concentrating was obtained after sorting. The unrefined ore contained 27.8 per cent iron and 0.05 per cent sulphur. Outgoing concentrate comprised 67.1 per cent iron and 0.06 per cent sulphur. The concentrate is transported about 150 km to a transhipment station at Pitkäjärvi (near Svappavaara) for onward shipment on the Ore Railway to the port of Narvik in Norway.

In December 2022 the Land and Environment Court granted Kaunis Iron AB a permit for existing and expanded operations at Tapuli, Sahavaara and Palotieva mines and Kaunisvaara concentrator. The permit is valid for 35 years and covers extraction of a maximum of 10 million tonnes of iron ore each year, representing approximately 4 million tonnes of iron ore concentrate.

**Table 9.** Sintering of iron ore concentrates n 2022.

| **County**<br>*Municipality*<br>Mining company | **Sinter plant** | **Incoming raw material**<br>**Total (tonnes)** | **Average content (%)**<br>**Iron** | **Phosphorus** | **Sulphur** | **Received product**<br>**Total (tonnes)*** |
|---|---|---|---|---|---|---|
| **Norrbotten county** | | | | | | |
| *Gällivare* | | | | | | |
| LKAB | Malmberget | **7 698 000** | 71.2 | 0.009 | - | **7 596 909** |
| *Kiruna* | | | | | | |
| LKAB | Kiruna | 15 320 513 | 63.0 | 0.47 | - | 11 349 005 |
| | Svappavaara | 4 013 977 | 59.4 | 0.46 | - | 3 266 025 |
| | **Total:** | **19 334 490** | | | | **14 615 030** |
| | | | | | | |
| **Whole Sweden 2022** | | **27 032 490** | | | | **22 211 939** |
| Whole Sweden 2021 | | 28 098 291 | | | | 23 743 138 |

* Note: LKAB's production consists of pellets.

**Table 10.** Production of iron ore concentrates broken down into phosphorus and sulphur content (1,000 tonnes), 1977–2022 . Source: SGU survey.

| | | **Percentage average content of** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Phosphorus** | | | | | | **Sulphur** | | | | **Manganese** |
| **Year** | **Production of concentrates (tonnes)** | **<0,006** | **0,006 –0,03** | **0,04 –0,09** | **0,1– 0,6** | **>0,6** | **not analysed** | **<0,01** | **0,01 –0,04** | **>0,04** | **not analysed** | **>1,0** |
| 1977 | 11 994 | 1 426 | 8 042 | 1 804 | 469 | 50 | 203 | 1 469 | 346 | 589 | 9 590 | - |
| 1978 | 9 180 | 462 | 3 906 | 3 885 | 233 | 95 | 599 | 1 313 | 338 | 230 | 7 299 | - |
| 1979 | 10 487 | 757 | 6 046 | 3 174 | 251 | 58 | 201 | 378 | 672 | 344 | 9 093 | - |
| 1980 | 11 597 | 727 | 6 187 | 4 600 | - | 83 | - | 59 | 372 | 292 | 10 874 | - |
| 1981 | 10 087 | 472 | 5 135 | 4 216 | - | 113 | 151 | 67 | - | 177 | 9 843 | - |
| 1982 | 8 074 | 372 | 4 810 | 2 784 | - | 87 | 21 | 1 042 | 417 | 371 | 6 244 | - |
| 1983 | 9 336 | 380 | 6 558 | 2 202 | - | 96 | - | 578 | - | 1 320 | 7 438 | - |
| 1984 | 11 647 | 253 | 5 451 | - | - | 111 | 5 832 | 736 | 1 039 | 253 | 9 619 | - |
| 1985 | 13 897 | 242 | 10 353 | 3 108 | - | 194 | - | 752 | 7 154 | 242 | 5 749 | - |
| 1986 | 13 738 | 441 | 13 110 | - | - | 187 | - | 966 | 6 445 | 298 | 6 029 | - |

**Table 10.** Continued.

| Year | Production of concentrates (tonnes) | Percentage average content of | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Phosphorus | | | | | | Sulphur | | | | Manganese |
| | | <0,006 | 0,006 –0,03 | 0,04 –0,09 | 0,1– 0,6 | >0,6 | not analysed | <0,01 | 0,01 –0,04 | >0,04 | not analysed | >1,0 |
| 1987 | 14 051 | 328 | 13 495 | - | - | 228 | - | 966 | 6 645 | 328 | 6 112 | - |
| 1988 | 13 547 | 308 | 13 088 | - | - | 142 | 9 | 183 | 5 803 | 308 | 7 253 | - |
| 1989 | 13 799 | 338 | 13 318 | - | - | 71 | 72 | 135 | 5 517 | 331 | 7 816 | - |
| 1990 | 12 626 | 320 | 12 306 | - | - | - | - | 5 711 | - | 320 | 6 595 | - |
| 1991 | 12 599 | 342 | 12 257 | - | - | - | - | 5 530 | - | 342 | 6 727 | - |
| 1992 | 13 593 | 210 | 13 383 | - | - | - | - | 6 553 | - | 110 | 6 929 | - |
| 1993 | 13 597 | 84 | 13 513 | - | - | - | - | 6 258 | - | - | 7 339 | - |
| 1994 | 14 123 | 103 | 14 020 | - | - | - | - | 6 715 | - | - | 7 408 | - |
| 1995 | 16 686 | 148 | 16 538 | - | - | - | - | 6 686 | - | - | 10 000 | - |
| 1996 | 17 527 | 180 | 17 347 | - | - | - | - | 6 794 | - | - | 10 733 | - |
| 1997 | 18 031 | 215 | 17 516 | - | - | - | - | 6 767 | - | - | 11 264 | - |
| 1998 | 17 922 | 217 | 17 705 | - | - | - | - | 6 584 | - | - | 11 338 | - |
| 1999 | 15 525 | 210 | 11 637 | - | - | - | 3 678 | 6 748 | - | - | 8 777 | - |
| 2000 | 16 688 | 167 | 16 487 | - | 34 | - | - | 167 | - | - | 16 521 | - |
| 2001 | 16 467 | 232 | 16 235 | - | - | - | - | - | - | - | 16 467 | - |
| 2002 | 17 266 | 86 | 17 180 | - | - | - | - | - | - | - | 17 266 | - |
| 2003 | 18 575 | 245 | 18 330 | - | - | - | - | - | - | - | 18 575 | - |
| 2004 | 19 002 | 282 | 18 720 | - | - | - | - | 7 172 | 282 | - | 11 548 | - |
| 2005 | 20 329 | - | 20 329 | - | - | - | - | 7 814 | - | - | 12 515 | - |
| 2006 | 20 943 | - | 20 943 | - | - | - | - | 7 612 | - | - | 13 331 | - |
| 2007 | 22 372 | - | 22 372 | - | - | - | - | 9 199 | - | - | 13 173 | - |
| 2008 | 23 620 | 348 | 23 620 | - | - | - | - | 3 029 | 5 560 | - | 15 031 | - |
| 2009 | 17 863 | 179 | 17 863 | - | - | - | - | 2 630 | 3 936 | - | 11 297 | - |
| 2010 | 24 438 | - | 24 438 | - | - | - | - | 6 129 | 2 279 | - | 16 030 | - |
| 2011 | 25 400 | 286 | 25 400 | - | - | - | - | 6 797 | 2 167 | - | 16 437 | - |
| 2012 | 26 038 | 254 | 26 038 | - | - | - | - | 7 073 | 1 547 | 273 | 17 146 | 273 |
| 2013 | 26 692 | 297 | 26 692 | - | - | - | - | 7 158 | 2 424 | 948 | 16 162 | 948 |
| 2014 | 27 391 | 247 | 24 910 | - | - | - | - | 8 081 | 1 577 | 1 187 | 16 546 | 1 187 |
| 2015 | 24 300 | 273 | 24 080 | - | - | - | - | 1 927 | 6 308 | - | 16 065 | - |
| 2016 | 25 643 | 267 | 25 376 | - | - | - | - | 1 846 | 6 082 | - | 17 715 | - |
| 2017 | 26 396 | 485 | 25 911 | - | - | - | - | 485 | 8 448 | - | 17 463 | - |
| 2018 | 25 296 | 379 | 17 945 | 6 803 | 169 | - | - | 1 981 | 6 803 | 626 | 16 512 | - |
| 2019 | 27 278 | - | 22 517 | - | 2 558 | 47 | 2 156 | | 6 049 | 1 770 | 19 459 | - |
| 2020 | 28 327 | 399 | 25 987 | - | - | - | 1 940 | 2 352 | 6 779 | 1 940 | 17 256 | - |
| 2021 | 28 119 | - | 26 106 | - | - | - | 2 013 | - | 7 331 | 2 013 | 18 775 | - |
| **2022** | **26 477** | **403** | **23961** | - | - | - | **2113** | - | - | **2 113** | **24 364** | - |

Production of lead bars. Lead saw the largest percentage increase both of ore concentrate and of metal content in 2022. Photo: Boliden

# Non-ferrous ores

The information in this section is based on SGU's annual survey of companies operating in the Swedish mining industry. Survey results for non-iron ore mines in production year 2022 are presented below. The results are also summarised in Tables 11–14 and in Figures 10 and 11. Other information about the mining companies comes from their annual reports or websites.

Approximately 50.5 million tonnes of ore was produced at non-iron ore mines in Sweden in 2022, up almost 7 per cent on the previous year (Table 11). The mines produced 896,980 tonnes of concentrates (Table 12), up nearly 2 per cent on the previous year. Tables 13 and 14 show that the largest percentage increase for concentrate and metal content was recorded for lead. As shown in Figure 10, the metal content of copper and zinc was roughly the same as the previous year. The metal content of both gold and silver fell (Figure 11).

## MANDALAY RESOURCES

### Björkdal Mine

Björkdal Mine, 40 km northwest of the town of Skellefteå in Västerbotten County, is a gold mine in which the ore consists of gold-bearing quartz veins. The mine has been in production under several owners since 1988, with a lengthy production stoppage between 2000 and 2001. The mine and concentrator have been operated by the Canadian mining company Mandalay Resources since 2014.

For the first few years the ore was mined only in open-pit mines, but open-pit and underground mining took place from 2005 to 2018. Since 2019 all mining has taken place underground. Mining waste containing gold is also processed from time to time. The gold ore is enriched using shaking tables, which exploit the high density of gold, as well as flotation.

**Table 11.** Extraction of waste rock and ore at non-ferrous mines in 2022 (tonnes). Source: SGU survey

| County<br>*Municipality*<br>Mining company | Name of the mining field (mine) | Type of ore | Production method* | Waste rock and ore | | Enrichment ore | Waste rock |
|---|---|---|---|---|---|---|---|
| | | | | Under-ground | Open-pit | | |
| **Örebro County** | | | | | | | |
| *Askersunds kommun* | | | | | | | |
| Zinkgruvan Mining AB | Zinkgruvan | zinc, lead, copper | 1 | 1 884 406 | | 1 401 105 | 483 301 |
| *Lindesbergs kommun* | | | | | | | |
| Lovisagruvan AB | Lovisagruvan | zinc, lead, silver | 3 | 58 692 | | 32 822 | 25 870 |
| **Dalarnas County** | | | | | | | |
| *Hedemora kommun* | | | | | | | |
| Boliden Mineral AB | Garpenberg | zinc, lead, copper | 1, 2, 3, 4 | 3 441 567 | | 3 040 941 | 400 626 |
| **Västerbottens County** | | | | | | | |
| *Lycksele kommun* | | | | | | | |
| Boliden Mineral AB | Kristineberg | copper, lead, zinc | 3 | 1 139 735 | | 625 325 | 514 410 |
| *Skellefteå kommun* | | | | | | | |
| Boliden Mineral AB | Renström | copper, lead, zinc | 3 | 710 292 | | 504 018 | 206 274 |
| Boliden Mineral AB | Kankberg | gold, tellurium | 3 | 646 999 | | 472 789 | 174 210 |
| Björkdalsgruvan AB | Björkdalsgruvan | gold | 1, 2 | 1 500 220 | | 1 100 242 | 399 978 |
| **Norrbottens County** | | | | | | | |
| *Gällivare kommun* | | | | | | | |
| Boliden Mineral AB | Aitik | copper, gold | 1 | | 73 768 675 | 43 296 675 | 30 472 000 |
| **Whole Sweden 2022** | | | | **9 381 911** | **73 768 675** | **50 473 917** | **32 676 669** |
| Whole Sweden 2021 | | | | 9 208 876 | 71 602 000 | 47 302 975 | 33 507 901 |

* 1 = open-pit mining, 2 = sublevel caving, 3 = cut-and-fill mining, 4 = rill-mining

In 2022 1.1 million tonnes of ore was mined, but 1.25 million tonnes of ore were processed (see Tables 11 and 12). Gold mineralised waste rock accounted for the difference. Production of concentrate and the gold content of the ore were lower than the previous year. The metal content was approximately 1,300 kg, almost 100 kg less than the preceding year.

## BOLIDEN MINERAL AB

The Boliden mining company originates from Boliden mine in Västerbotten County in northern Sweden, where a deposit was found in 1924 and which came into production two years later. Boliden mine was closed in 1967, but the processing plant built next to the mine is still in operation and now processes ore from several mines in the Skellefteå field in Västerbotten. In addition to the Skellefteå field, Boliden conducts mining operations in two other mines in Sweden, Garpenberg in Dalarna and Aitik in Norrbotten, as well as mines in Ireland and Finland.

### Aitik Mine

When Aitik Mine started in 1968 it had an estimated lifespan of fifteen years. Initial annual production was 2 million tonnes of ore, which was enriched at the mine. In 2022, 54 years later, ore production was 43.3 million tonnes (Table 13), up about 8 per cent on 2021. The reserves and assets present in the mine and nearby deposits are likely to suffice for many decades of ore production.

Aitik is a porphyry copper deposit, an ore type characterised by low metal content but very large tonnages s. Most of the world's copper production originates from ores of this kind in America and south-east Asia. Silver and gold are also mined at Aitik. The ore at Aitik is mined in an open-pit mine (Aitik) and processed by flotation at a concentrator near the mine. The Salmijärvi open-pit mine just south of the main Aitik mine is exhausted. There are plans to launch a new satellite open-pit mine at Liikavaara.

Concentrate production totalled 313,775 tonnes in 2022 (Table 12). This was roughly on a par with the

**Table 12.** Processing in non-ferrous ore mines in 2022 (tonnes). Source: SGU survey

| County<br>*Municipality*<br>Mining company<br>Enrichment plant | Enrich-ment met-hod* | Incoming raw material | | | | | | Recieved concentrates | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Average content | | | | | | | Average content | | | | |
| | | Total (tonnes) | Cu (%) | Pb (%) | Zn (%) | Ag (g/ tonnes) | Au (g/ tonnes) | Type | Total (tonnes) | Cu (%) | Pb (%) | Zn (%) | Ag (g/tonnes) | Au (g/tonnes) |
| **Örebro County** | | | | | | | | | | | | | | |
| *Örebro* | | | | | | | | | | | | | | |
| Zinkgruvan Mining | | | | | | | | | | | | | | |
| Zinkgruvan | f | 1 459 066 | 2.08 | 3.00 | 7.01 | | | Copper | 15 550 | 26.22 | | | 312 | |
| | | | | | | | | Lead | 42 276 | | 72.18 | 6.28 | 1 466 | |
| | | | | | | | | Zinc | 145 633 | | 2.24 | 52.53 | 101 | |
| **Dalarna County** | | | | | | | | | | | | | | |
| *Hedemora* | | | | | | | | | | | | | | |
| Boliden AB | | | | | | | | | | | | | | |
| Garpenberg | f | 2 988 963 | 0.05 | 1.43 | 3.58 | 116.66 | 0.27 | Copper 1 | 4 698 | 15.37 | 17.86 | 4.32 | 33 627 | 90.92 |
| | | | | | | | | Lead 1 | 49 512 | 0.60 | 71.74 | 4.51 | 2 303 | 2.21 |
| | | | | | | | | Zinc 1 | 185 227 | 0.11 | 0.95 | 54.08 | 116 | 0.22 |
| | | | | | | | | Lead 2 | 430 | 0.21 | 13.13 | 3.36 | 2 924 | 216.20 |
| **Västerbotten County** | | | | | | | | | | | | | | |
| *Skellefteå* | | | | | | | | | | | | | | |
| Boliden AB | | | | | | | | | | | | | | |
| Boliden | f | 1 621 011 | 0.35 | 0.47 | 3.83 | 55.5 | 2.16 | Copper 1 | 421 | 0.62 | 4.08 | 4.80 | 1 558.60 | 1147.41 |
| | | | | | | | | Lead 1 | 10 217 | 4.71 | 41.59 | 9.24 | 2 569.78 | 7.81 |
| | | | | | | | | Zinc 1 | 51 910 | 0.41 | 0.68 | 56.26 | 85.43 | 1.00 |
| | | | | | | | | Copper 2 | 18 788 | 23.76 | 4.85 | 4.43 | 1 668.70 | 35.39 |
| | | | | | | | | Zinc 2 | 52 842 | 0.33 | 1.80 | 53.15 | 158.78 | 2.13 |
| | | | | | | | | Gold 1 | 5.9 | | | | 462966.08 | 262125.13 |
| Björkdalsgruvan AB | | | | | | | | | | | | | | |
| Björkdal | fv | 1 249 349 | | | | | 1.20 | Gold 1 | 1.2 | | | | | 519 142 |
| | | | | | | | | Gold 2 | 289 | | | | | 1 184 |
| | | | | | | | | Gold 3 | 116 | | | | | 293 |
| | | | | | | | | Gold 4 | 5 289 | | | | | 56.6 |
| **Norrbotten County** | | | | | | | | | | | | | | |
| *Gällivare* | | | | | | | | | | | | | | |
| Boliden AB | | | | | | | | | | | | | | |
| Aitik | f | 43 296 675 | 0.20 | | | 0.87 | 0.09 | Copper 1 | 313 775 | 25.2 | | | 90.0 | 7.68 |
| **Whole Sweden 2022** | | **50 615 064** | | | | | | | **896 980** | | | | | |

* Enrichment method: fv = flotation and wet concentration. f = flotation. c = cyanide leaching.

previous year. Metal concentrations in the ore were lower than the preceding year, which led to a lower metal content in the outgoing concentrate.

## Boliden area

In the Boliden area within the Skellefteå field in Västerbotten, Boliden has production at three mines: Kristineberg, Renström and Kankberg. Preparations are under way to begin mining the mineralisation at Rävliden, near Kristineberg. The ores in Renström and Kristineberg are massive sulphide ores with copper, zinc and lead as well as considerable levels of gold and silver. The ore in Kankberg mine is of a different type, the economically viable elements being gold and tellurium (Table 11).

Ore from the mines in the Skellefteå field is transported to the concentrator in Boliden for processing. As shown in Table 12, 1.62 million tonnes was processed in 2022, roughly on a par with 2021. However, the average metal content was relatively high, resulting in increased production of copper, lead and zinc. Tellurium production, which started at the Boliden concentrator in 2012 using ore from Kankberg mine, was 32.7 tonnes, down almost 21 per cent on the previous year.

**Table 13.** Production of non-ferrous ores 1978–2022 (tonnes of concentrates). Source: SGU survey

| Year | Pyrite | Copper | Lead | Zinc | Tungsten | Gold | Graphite | Total |
|---|---|---|---|---|---|---|---|---|
| 1978 | 484 202 | 196 572 | 119 842 | 299 963 | 683 | - | - | 1 101 262 |
| 1979 | 447 681 | 191 960 | 115 073 | 302 866 | 687 | - | - | 1 058 267 |
| 1980 | 395 878 | 180 910 | 102 267 | 304 600 | 606 | - | - | 984 261 |
| 1981 | 419 028 | 221 384 | 123 872 | 340 507 | 676 | - | - | 1 105 467 |
| 1982 | 426 222 | 234 644 | 118 664 | 344 335 | 646 | - | - | 1 124 511 |
| 1983 | 430 393 | 303 597 | 115 949 | 374 985 | 774 | - | - | 1 225 698 |
| 1984 | 417 781 | 361 138 | 118 540 | 382 725 | 819 | 3 528 | - | 1 284 531 |
| 1985 | 407 122 | 368 213 | 112 372 | 387 546 | 804 | 7 003 | - | 1 283 060 |
| 1986 | 448 253 | 352 232 | 129 265 | 394 374 | 645 | 5 804 | - | 1 330 573 |
| 1987 | 428 555 | 352 983 | 133 074 | 392 494 | 574 | - | - | 1 307 680 |
| 1988 | 355 103 | 306 939 | 122 148 | 344 346 | 584 | - | - | 1 129 120 |
| 1989 | 301 286 | 277 257 | 120 103 | 303 146 | 310 | 1 210 | - | 1 003 312 |
| 1990 | 251 822 | 296 331 | 120 076 | 285 980 | - | 1 849 | - | 956 058 |
| 1991 | 89 145 | 332 825 | 123 145 | 285 365 | - | 2 350 | - | 832 830 |
| 1992 | 37 140 | 339 330 | 144 371 | 313 333 | - | 2 444 | - | 836 618 |
| 1993 | - | 334 384 | 150 988 | 303 116 | - | 2 468 | - | 790 956 |
| 1994 | - | 293 147 | 152 692 | 287 052 | - | 3 285 | - | 736 176 |
| 1995 | - | 311 495 | 137 151 | 303 831 | - | 4 736 | - | 757 213 |
| 1996 | - | 269 031 | 136 243 | 291 509 | - | 5 841 | 500 | 703 124 |
| 1997 | 30 | 315 044 | 146 004 | 284 379 | - | 4 784 | 1 581 | 751 792 |
| 1998 | - | 270 358 | 155 140 | 297 394 | - | 4 412 | 3 277 | 730 581 |
| 1999 | - | 261 947 | 157 088 | 316 189 | - | 1 674 | 4 504 | 741 402 |
| 2000 | - | 282 202 | 147 353 | 319 586 | - | 186 | 5 602 | 754 929 |
| 2001 | - | 267 848 | 123 200 | 284 816 | - | 1 281 | 1 035 | 678 180 |
| 2002 | - | 263 151 | 68 425 | 270 925 | - | 3 800 | - | 606 301 |
| 2003 | - | 304 617 | 77 855 | 341 198 | - | 3 641 | - | 727 311 |
| 2004 | - | 297 139 | 82 456 | 362 622 | - | 3 052 | - | 745 269 |
| 2005 | - | 315 667 | 88 462 | 383 949 | - | 2 405 | - | 790 483 |
| 2006 | - | 315 001 | 79 807 | 381 720 | - | 2 228 | - | 778 755 |
| 2007 | - | 230 653 | 92 641 | 397 910 | - | 1 944 | - | 723 148 |
| 2008 | - | 209 208 | 118 213 | 322 490 | - | 2 230 | - | 652 141 |
| 2009 | - | 202 385 | 96 733 | 359 879 | - | 2 607 | - | 661 604 |
| 2010 | - | 299 584 | 94 054 | 371 312 | - | 4 928 | - | 769 878 |
| 2011 | - | 336 928 | 85 661 | 358 919 | - | 3 500 | - | 785 008 |
| 2012 | - | 331 520 | 88 255 | 345 713 | - | 2 500 | - | 767 988 |
| 2013 | - | 339 802 | 83 846 | 322 180 | - | 3 977 | - | 749 805 |
| 2014 | - | 325 358 | 107 198 | 409 062 | - | 3 109 | - | 844 727 |
| 2015 | - | 339 357 | 115 698 | 456 609 | - | 3 208 | 295 | 915 167 |
| 2016 | - | 354 967 | 110 884 | 477 892 | - | 3 708 | - | 947 451 |
| 2017 | - | 422 872 | 108 341 | 477 664 | - | 4 924 | - | 1 013 801 |
| 2018 | - | 434 276 | 93 700 | 441 502 | - | 4 421 | - | 973 899 |
| 2019 | - | 411 089 | 99 948 | 462 944 | - | 4 406 | - | 978 387 |
| 2020 | - | 404 545 | 93 079 | 438 906 | - | 5 520 | - | 942 050 |
| 2021 | - | 348 426 | 92 710 | 436 160 | - | 6 105 | - | 883 401 |
| **2022** | - | **353 232** | **102 435** | **435 612** | - | **5 701** | - | **896 980** |

**Table 14.** Metal content in non-ferrous ores (concentrates, tonnes or kg) 1978–2022.

| Year | Copper (tonnes) | Lead (tonnes) | Zinc (tonnes) | Sulphur (tonnes) | Tungsten (tonnes) | Gold (kg) | Silver (kg) | Tellurium (kg) | Graphite (tonnes) |
|---|---|---|---|---|---|---|---|---|---|
| 1978 | 47 229 | 84 224 | 167 319 | 225 931 | 381 | 2 377 | 168 892 | - | - |
| 1979 | 45 811 | 81 627 | 169 854 | 282 209 | 402 | 2 135 | 168 736 | - | - |
| 1980 | 42 790 | 72 393 | 179 772 | 276 996 | 364 | 2 037 | 183 429 | - | - |
| 1981 | 51 979 | 91 103 | 177 404 | 273 451 | 394 | 2 041 | 183 493 | - | - |
| 1982 | 56 293 | 83 012 | 192 727 | 307 542 | 338 | 2 446 | 187 499 | - | - |
| 1983 | 76 540 | 85 762 | 216 605 | 338 998 | 386 | 3 369 | 206 978 | - | - |
| 1984 | 89 381 | 82 845 | 215 589 | 288 974 | 388 | 4 405 | 238 771 | - | - |
| 1985 | 91 867 | 80 604 | 221 298 | 287 468 | 402 | 4 631 | 231 483 | - | - |
| 1986 | 87 871 | 91 729 | 227 648 | 310 519 | 360 | 4 514 | 262 708 | - | - |
| 1987 | 86 113 | 95 141 | 229 353 | 215 678 | 336 | 4 108 | 254 107 | - | - |
| 1988 | 75 032 | 91 579 | 200 393 | 286 387 | 352 | 3 590 | 207 804 | - | - |
| 1989 | 71 238 | 88 967 | 173 515 | 232 812 | 80 | 5 120 | 227 715 | - | - |
| 1990 | 74 283 | 98 259 | 164 128 | 230 833 | - | 6 326 | 242 685 | - | - |
| 1991 | 81 650 | 91 127 | 161 170 | 83 373 | - | 6 247 | 239 321 | - | - |
| 1992 | 89 145 | 105 295 | 171 539 | 18 199 | - | 6 164 | 311 059 | - | - |
| 1993 | 88 909 | 111 709 | 168 617 | - | - | 6 548 | 298 772 | - | - |
| 1994 | 79 384 | 112 787 | 159 858 | - | - | 6 364 | 275 224 | - | - |
| 1995 | 83 603 | 100 070 | 167 962 | - | - | 6 528 | 268 200 | - | - |
| 1996 | 71 659 | 98 812 | 160 133 | - | - | 6 145 | 271 866 | - | 463 |
| 1997 | 86 610 | 108 624 | 155 385 | - | - | 6 777 | 304 048 | - | 1 470 |
| 1998 | 73 685 | 114 430 | 164 711 | - | - | 5 944 | 299 051 | - | 3 011 |
| 1999 | 71 160 | 116 393 | 174 448 | - | - | 4 202 | 341 584 | - | 4 144 |
| 2000 | 77 765 | 106 584 | 176 788 | - | - | 3 570 | 328 737 | - | 5 108 |
| 2001 | 74 269 | 85 975 | 156 334 | - | - | 4 986 | 306 029 | - | 963 |
| 2002 | 71 991 | 42 954 | 148 620 | - | - | 5 757 | 320 823 | - | - |
| 2003 | 83 143 | 50 962 | 185 884 | - | - | 5 900 | 340 701 | - | - |
| 2004 | 82 415 | 54 347 | 197 034 | - | - | 6 564 | 319 563 | - | - |
| 2005 | 87 068 | 60 445 | 215 691 | - | - | 6 564 | 309 933 | - | - |
| 2006 | 86 746 | 55 644 | 210 029 | - | - | 6 848 | 292 255 | - | - |
| 2007 | 62 905 | 63 224 | 214 576 | - | - | 5 159 | 323 171 | - | - |
| 2008 | 57 688 | 63 489 | 187 987 | - | - | 4 943 | 293 068 | - | - |
| 2009 | 55 414 | 69 293 | 192 502 | - | - | 5 542 | 288 590 | - | - |
| 2010 | 76 514 | 67 697 | 198 687 | - | - | 6 285 | 302 145 | - | - |
| 2011 | 82 967 | 62 028 | 194 021 | - | - | 5 994 | 301 959 | - | - |
| 2012 | 82 422 | 63 551 | 188 325 | - | - | 6 015 | 309 337 | 6 791 | - |
| 2013 | 82 904 | 59 556 | 176 582 | - | - | 6 530 | 341 346 | 24 457 | - |
| 2014 | 79 681 | 70 848 | 221 841 | - | - | 6 849 | 382 611 | 30 917 | - |
| 2015 | 75 113 | 79 354 | 246 983 | - | - | 6 028 | 479 686 | 33 000 | 254* |
| 2016 | 79 247 | 75 830 | 258 264 | - | - | 6 463 | 498 686 | 38 680 | - |
| 2017 | 104 594 | 71 112 | 251 244 | - | - | 7 858 | 467 500 | 34 979 | - |
| 2018 | 106 140 | 64 751 | 237 715 | - | - | 7 866 | 443 624 | 44 641 | - |
| 2019 | 99 332 | 68 635 | 247 657 | - | - | 7 972 | 419 926 | 40 953 | - |
| 2020 | 100 065 | 65 402 | 234 811 | - | - | 8 249 | 400 929 | 41 742 | - |
| 2021 | 88 108 | 65 404 | 236 416 | - | - | 8 805 | 428 585 | 41 367 | - |
| **2022** | **88 337** | **70 339** | **233 958** | - | - | **8 054** | **422 086** | **32 708** | - |

* Estimated quantity

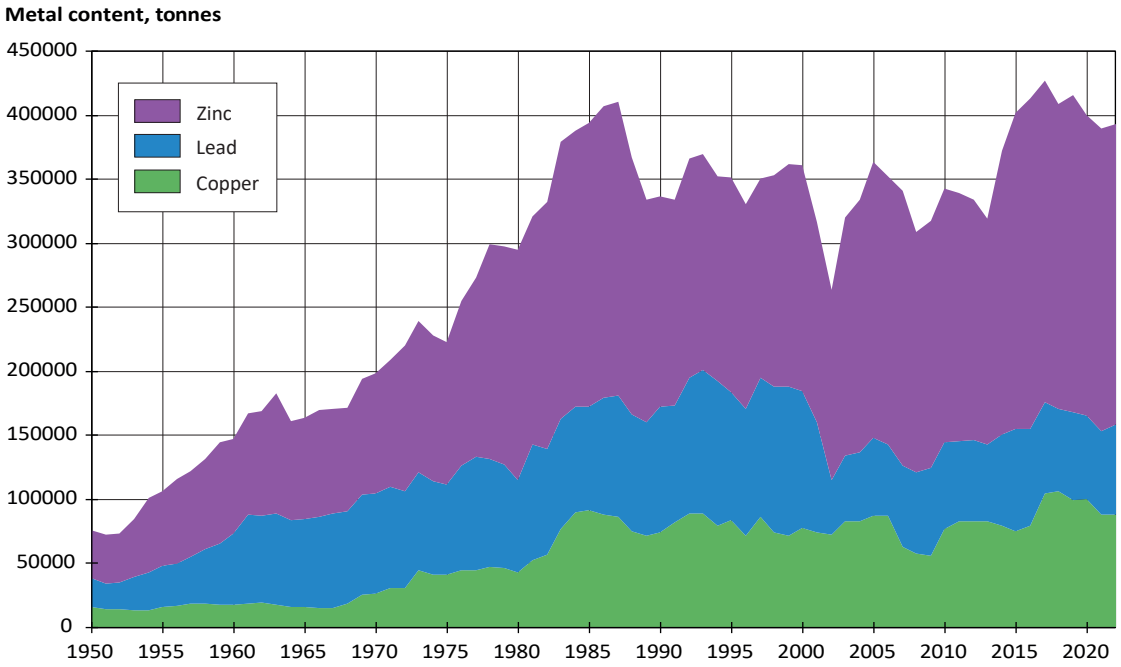



**Figure 10.** Metal content in copper, lead and zinc ores mined in Sweden, 1950–2022.

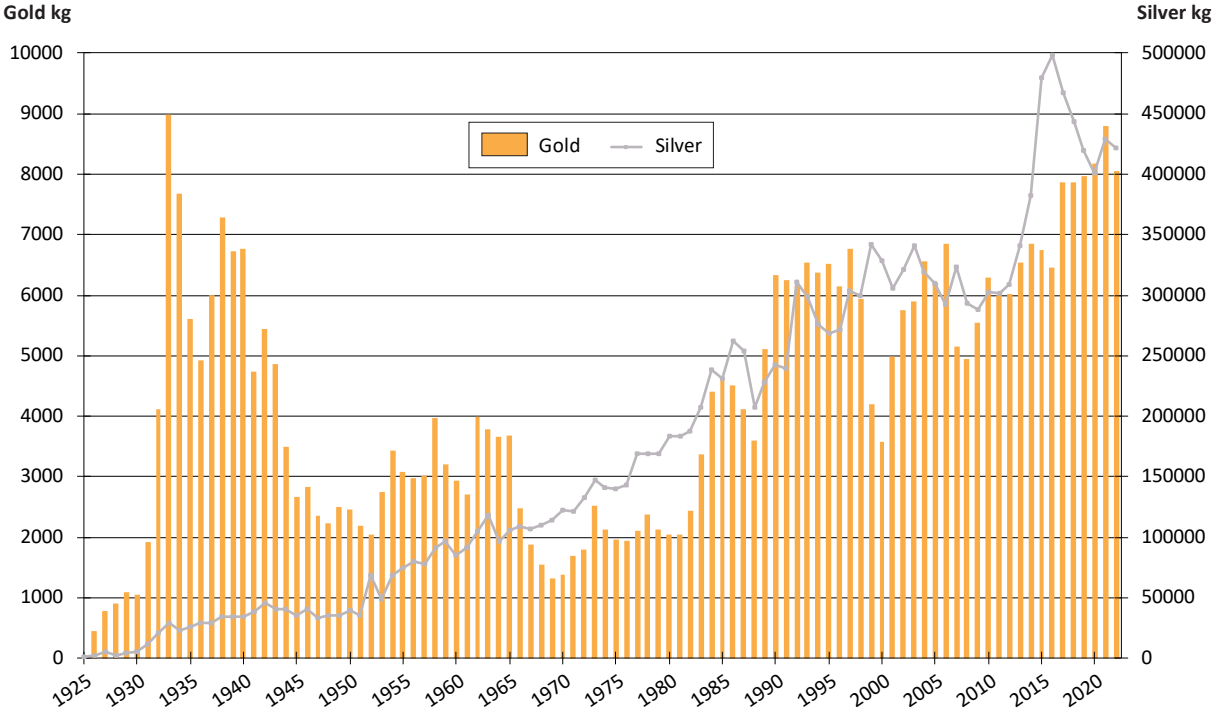



**Figure 11**. Production of gold and silver (metal content) in Swedish mines, 1925–2021.

### Garpenberg Mine

The ore at Garpenberg in Hedemora Municipality, Dalarna County consists of several ore bodies in a converted, folded and faulted limestone horizon. The ore bodies are thought to have been formed by impregnation of the limestone by mineralising fluids. The ore bodies at Garpenberg are zinc- and lead-rich and also contain a little copper. Silver concentrations are high. Lappberget is the largest ore body. Boliden conducts active exploration and during the year discovered a mineralisation called Stationen in the mine area.

Table 11 shows that 3.04 million tonnes of ore was produced at Garpenberg in 2022, marginally down on the previous year. Metal content was lower than in 2021, resulting in lower production volumes. In 2022 just over 185,000 tonnes of zinc concentrate, 50,000 tonnes of lead concentrate and 4,700 tonnes of copper concentrate were produced (Table 12).

## DRAGON MINING SWEDEN AB

### Svartliden Mine

Dragon Mining's gold mine at Svartliden is located about 70 km west of Lycksele in Västerbotten County. Dragon Mining is an Australian mining and exploration company whose shares are listed on the Hong Kong stock exchange. In addition to Svartliden, the Fäboliden mining project and the Svartliden processing plant, the company owns three mines and one processing plant in Finland. Mining at Svartliden ceased in 2013, but the Svartliden concentrator has continued to process gold concentrates from the company's mines in Finland. According to SFU's questionnaire survey for 2022, the gold content in outgoing concentrate from the enrichment plant was 642 kg.

Test mining at Fäboliden, about 22 km southeast of Svartliden, was completed in September 2020. Approximately 100,000 tonnes of ore with 2.6 grams/tonne of gold was mined and tested at the Svartliden processing plant. The company has applied for an environmental permit to mine gold in the open-pit mine, and process the ore at Svartliden. In 2022 the company submitted a revised application for an environmental permit, under which the planned mining had been reduced from 0.5 million tonnes a year to 0.3 million tonnes a year. The Land and Environmental Court of Appeal dismissed the application on 14 March 2023.

## LOVISAGRUVAN AB

### Lovisa Mine

Lovisa Mine is a small, metal-rich lead and zinc mine located just over twenty kilometres north of Lindesberg in Örebro County. The mine is operated by Lovisagruvan AB. A similar ore is also mined at Zinkgruvan.

Mining takes place at different levels in the mine. The deepest level is currently 235 metres below the surface. Approximately 33,000 tonnes of ore was mined in 2022 (Table 11), 11 per cent down on 2021. The company sells the ore to a processing plant in Poland (ZGH Boleslaw). Shipping ore is expensive, so the company has invested in advanced ore sorting to avoid shipping waste rock. The company is also examining an alternative solution in the form of its own processing plant.

## LUNDIN MINING

### Zinkgruvan Mine

Zinkgruvan mine is located about 18 km southeast of Askersund in Örebro County. The mine has had several owners during its long productive life. It is currently owned by Lundin Mining, a Canadian mining company that also owns or co-owns other mines in Brazil, Portugal, Chile, the US and Sweden.

The zinc and lead ore at Zinkgruvan consists of bands of massive sphalerite and galena in volcanic and sedimentary host rocks. All mining at Zinkgruvan – of zinc, lead and copper ore – takes place underground. The ore is transported to a concentrator next to the mine. The ore is enriched by flotation in one section processing zinc-lead ore, and in another that is capable of processing both copper ore and zinc-lead ore in campaigns (production for limited periods). The concentrates are sold to smelters in Europe.

A total of about 1.4 million tonnes of ore was mined at Zinkgruvan in 2022, consisting of 1.2 million tonnes of zinc-lead ore and 0.2 million tonnes of copper ore. Concentrations of copper and lead were higher in 2022 than in the previous year, resulting in increased production of copper and lead concentrate. Zinc production was roughly on a par with the previous year (Table 12).

Waste rock site at Kristineberg mine, west of Skellefteå. Photo: Carolina Liljenstolpe/SGU

# Environmental statistics

## MINING WASTE

Mining usually generates two solid waste fractions: waste rock and tailings. Waste rock mainly consist of barren rock that must be removed to access the ore body. Waste rock is a heterogeneous material that can have a very variable grain size. It may consist of both fine and coarse material, such as stones and blocks. Piles of waste rock are located close to open pits, primarily to reduce transport costs. Waste rock is also returned to open-pit or underground mining sites when the ore has been mined. Figure 12 shows the location and size of waste rock storage sites in Sweden.

Tailings are a residue from ore processing. After processing, the tailings are transported as slurry (sand and process water) with a high water content via pipelines to ponds (tailings storage facilities), where the solid material is allowed to settle. Figure 13 shows the location and size of tailings deposits in Sweden. Tailings can also be deposited as infill in mined out drifts or be converted into a thickened deposit, where the process water is squeezed out and then reused in the enrichment processes.

Theoretically, higher metal prices cause waste rock quantities to fall and tailings to increase, as the economic break-even point rises. However, local measures greatly impact the amount of mining waste, for example when a mine chooses to expand mining at a new level. Table 15 shows that the amount of waste rock generated decreased to 32.5 million tonnes, and tailings increased to 49.7 million tonnes at non-ferrous mines in 2022.

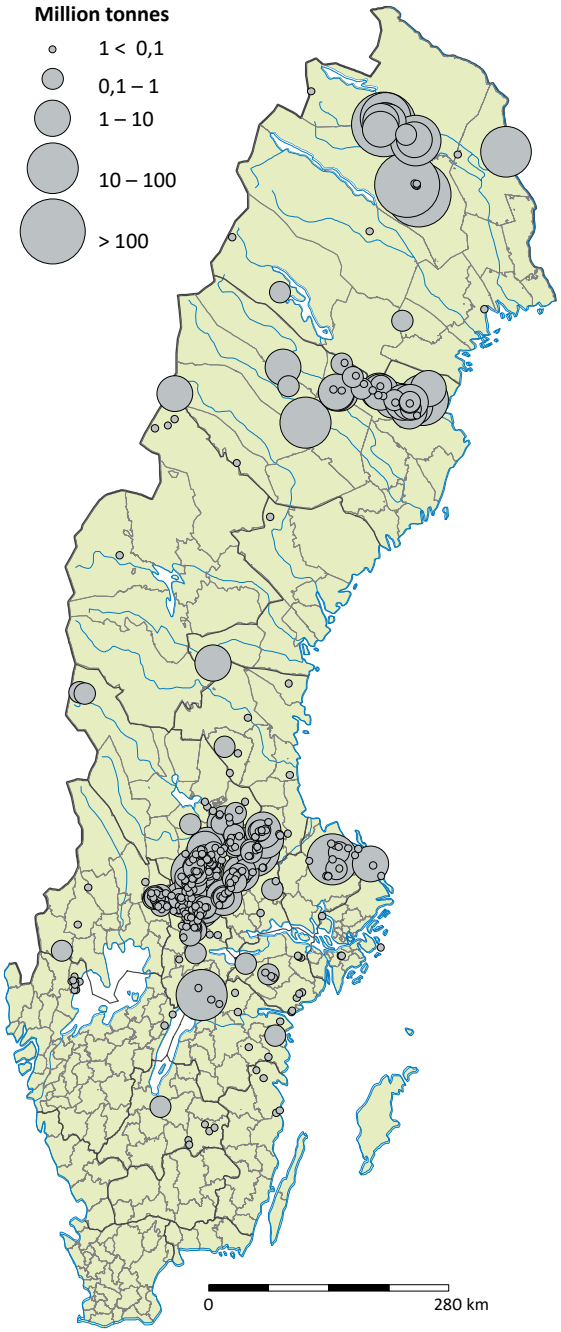



**Figure 12.** Waste rock, million tonnes. Data from SGU database: Ores and Minerals, see MapViewer, www.sgu.se.

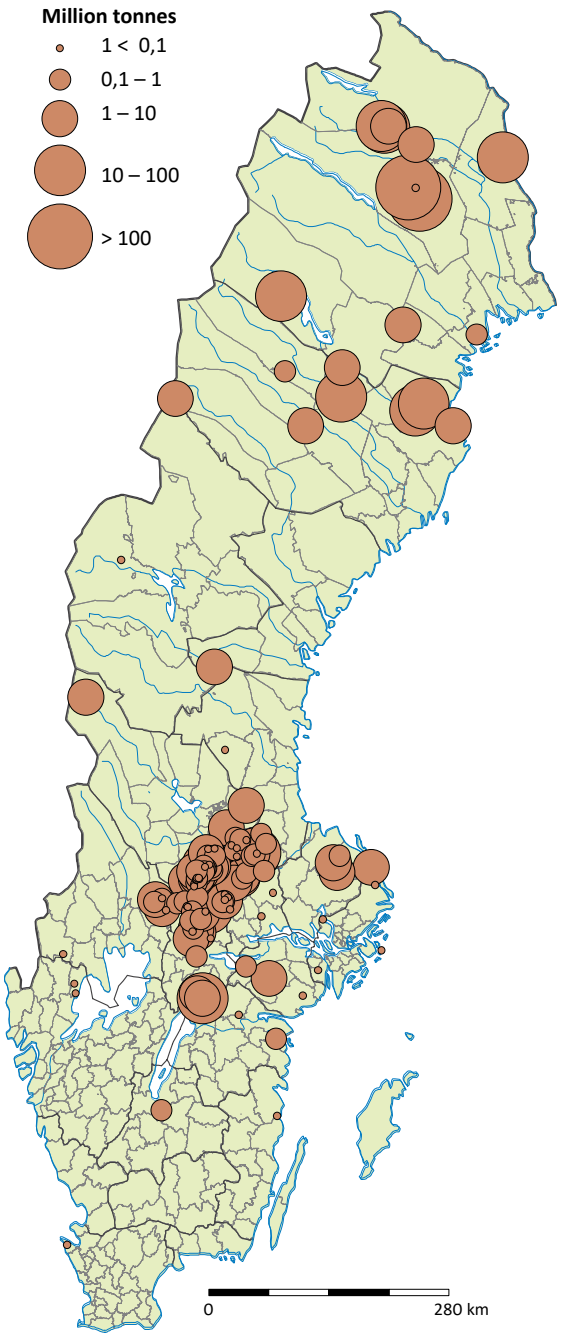



**Figure 13.** Tailings, million tonnes. Data from SGU database: Ores and Minerals, see MapViewer, www.sgu.se.

The amount of waste rock in particular decreased at iron ore mines in 2022 (-2.1 million tonnes).

Mining residues are used for backfilling and can also be used as rock material in roads or sold as aggregates if they do not pose an environmental hazard. However, the vast majority of waste is deposited in surface dumps or in tailing storage facilities. Based on reported data for 2022, 68 per cent was deposited and 26 per cent as backfill. Five percent was used for development of mine infrastructure and one per cent of mining waste was sent to market (Table 16).

The totals in Tables 15 and 16 differ by nearly 0.9 million tonnes. This is because the former refers to estimated quantities based on production statistics and the latter figure represents reported quantities. The difference can mainly be attributed to differences in the calculated quantities of waste rock, and may have arisen because estimated quantities of mining waste do not include waste rock outside the deposits.

## DISCHARGE OF METALS TO RECIPIENTS

Operations at Swedish mines are subject to target levels for metal discharges to surrounding water. Metal discharges have generally decreased over time. This is due to stricter statutory requirements and more efficient water management and water treatment processes. Data on metal discharges from Swedish mines have been obtained from the Swedish environmental reporting portal and are presented in Table 17. Metal discharges fell generally in 2022, particularly in the case of lead, nickel and zinc.

## RESOURCE EFFICIENCY

Resource efficiency is calculated by dividing the total amount of energy (electricity + fossil fuels) in kilowatt hours (KWh) consumed at the mine, by the amount of ore enriched (tonnes). The unit of resource efficiency is kWh/tonne. The calculations in this section are based

**Table 15.** Estimated amount of waste rock and tailings generated between 2021 and 2022 and in total between 1833 and 2022.* Source: SGU survey

| | Estimated amount (million tonnes) | | |
|---|---|---|---|
| | **2021** | **2020** | **1833–2021** |
| **Iron ore mines** | | | |
| Waste rock | 36.0 | 38.1 | 1 098 |
| Tailings | 10.6 | 11.0 | 350 |
| **Non-ferrous ore mines** | | | |
| Waste rock | 32.5 | 34.0 | 989 |
| Tailings | 49.7 | 46.6 | 1 168 |
| **All mines** | | | |
| Waste rock | 68.5 | 72.1 | 2 087 |
| Tailings | 60.3 | 57.6 | 1 517 |
| **Total** | 128.80 | 129.63 | 3 605 |

* Information only indicates how much ore and waste rock has been produced and how much material has been processed in the enrichment plant. A large part of the material may have gone back to the mine as construction of infrastructure, filling, etc.

**Table 16.** Residues from iron ore and non-ferrous ore (2022). Source: SGU survey

| | **Reported amount (million tonnes)** |
|---|---|
| **Iron ore mines** | |
| Waste rock for selling | 1.6 |
| Waste rock for backfilling | 0.0 |
| Waste rock for landfill | 32.0 |
| Waste rock for mine infrastructure | 4.9 |
| Tailings for backfilling | 0.0 |
| Tailings for landfill | 8.5 |
| **Non-ferrous ore mines** | |
| Waste rock selling | 0.0 |
| Waste rock for backfilling | 32.4 |
| Waste rock for landfill | 0.2 |
| Waste rock for mine infrastructure | 0.3 |
| Tailings for backfilling | 1.8 |
| Tailings for landfill | 47.9 |
| **All mines** | |
| Waste rock | 71.4 |
| Tailings | 58.3 |
| **Total** | 129.7 |
| Share for landfill | 68 % |
| Share for backfilling | 26 % |
| Share for selling | 1 % |

on data from the Swedish Environmental Reporting Portal (SMP).

The resource efficiency of non-ferrous ore mines remained fairly constant between 2017 and 2022 (Fig. 14). Resource efficiency is highest at the Aitik mine. Energy consumption per unit of ore produced here was approximately 27 kWh/tonne. The lowest resource efficiency is in the Boliden area and at Zinkgruvan, where energy consumption per tonne of ore produced was just over 143 kWh/tonne and 100 kWh/tonne respectively. Boliden's concentrator processes ore from the mines at Kankberg, Kristineberg and Renström, which are located between 10 and 90 km from the concentrator. Transport is probably a factor contributing to the low resource efficiency at Boliden. The resource efficiency of Björkdal Mine has varied over time. One reason is the operational variation between open-pit and underground mining.

**Table 17.** Discharges of cadmium, copper, nickel, lead and zinc from Swedish mines to receiving water bodies 2014–2022 (kg/year). Source: own processing of data from the Swedish Environmental Reporting Portal (SMP)

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|
| **Cadmium** | 8.91 | 8.00 | 8.09 | 4.60 | 5.13 | 5.29 | 7.23 | 6.56 | 3.34 |
| **Copper** | 1495.83 | 211.52 | 203.04 | 151.97 | 112.20 | 80.76 | 91.24 | 85.52 | 63.17 |
| **Nickel** | 206.75 | 244.89 | 227.34 | 175.82 | 153.14 | 128.31 | 196.53 | 175.39 | 113.87 |
| **Lead** | 121.12 | 70.29 | 61.84 | 43.29 | 148.57 | 119.75 | 109.46 | 79.29 | 44.66 |
| **Zinc** | 3406.74 | 2693.80 | 2470.53 | 1303.61 | 2071.50 | 1851.20 | 2564.98 | 1791.96 | 688.75 |

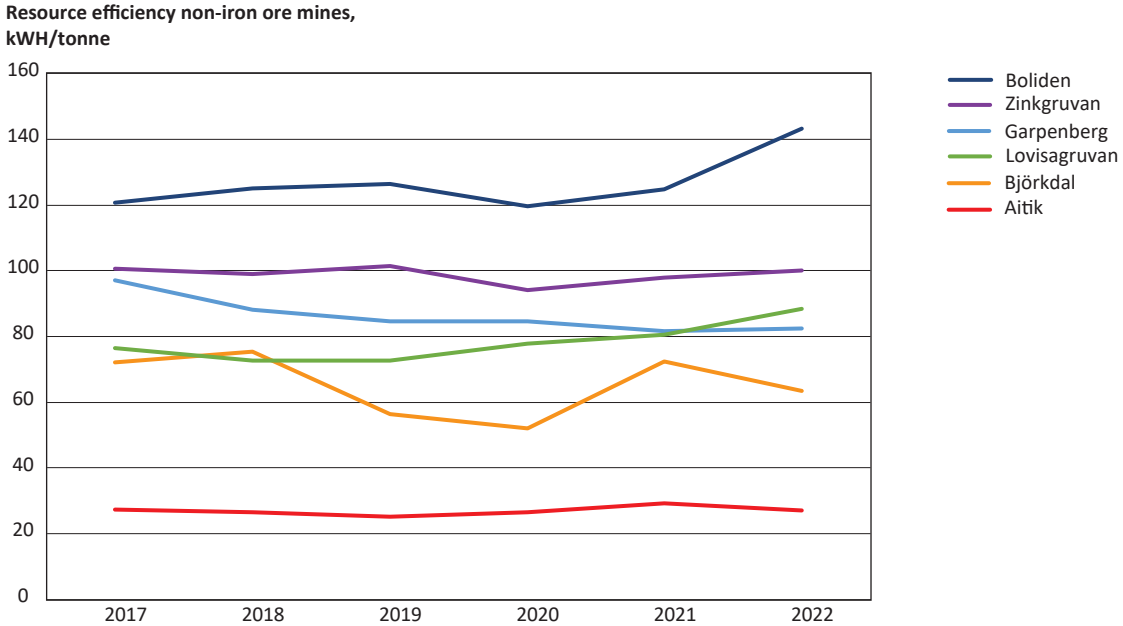



**Figure 14.** Resource efficiency non-iron ore mines 2017–2022. Source: own processing of data from the Swedish Environmental Reporting Portal (SMP)

The resource efficiency of the iron ore mines is not directly comparable, since they produce different products. LKAB mainly produces pellets; Kaunis Iron produces fines (finely crushed iron ore melted into cakes). Pellet production consumes more energy. Resource efficiency at iron ore mines is presented in Figure 15.

## ENERGY CONSUMPTION

Energy consumption at Swedish mines increased between 2017 and 2022, probably due to higher quantities or processed ore, with the same or increased resource efficiency (KWh/tonne). Energy consumption may also be affected by the degree of electrification, which is calculated by dividing total consumption of electricity by total energy consumption. Total energy consumption includes the use of electricity and fossil fuels (e.g., oil, diesel, coal and petrol).

Data from SMP show that the average rate of electrification at Swedish mines remained fairly constant at around 60 per cent between 2017 and 2022 (60 per cent in 2022, Fig. 16). However, the degree of electrification at Björkdal and Tapuli mines has fallen significantly. This may be due to greater processing of waste rock, which has resulted in higher diesel consumption. In the Boliden area, mining at Maurliden has now been discontinued, which has reduced long-distance transport of ore. This is also reflected in the degree of electrification at Boliden's enrichment plant. The electrification rate for all mines supplying ore to the concentrator averaged 70 per cent in 2022. The electrification rate for the concentrator alone was much higher – over 85 per cent.

## SECONDARY RAW MATERIALS

Sweden has a high recycling rate for most common metals such as iron (steel scrap), base metals and precious metals. Steel scrap containing alloy metals is sorted by alloy metal to produce new alloy steel. Use of rare earth elements has increased in recent years, for

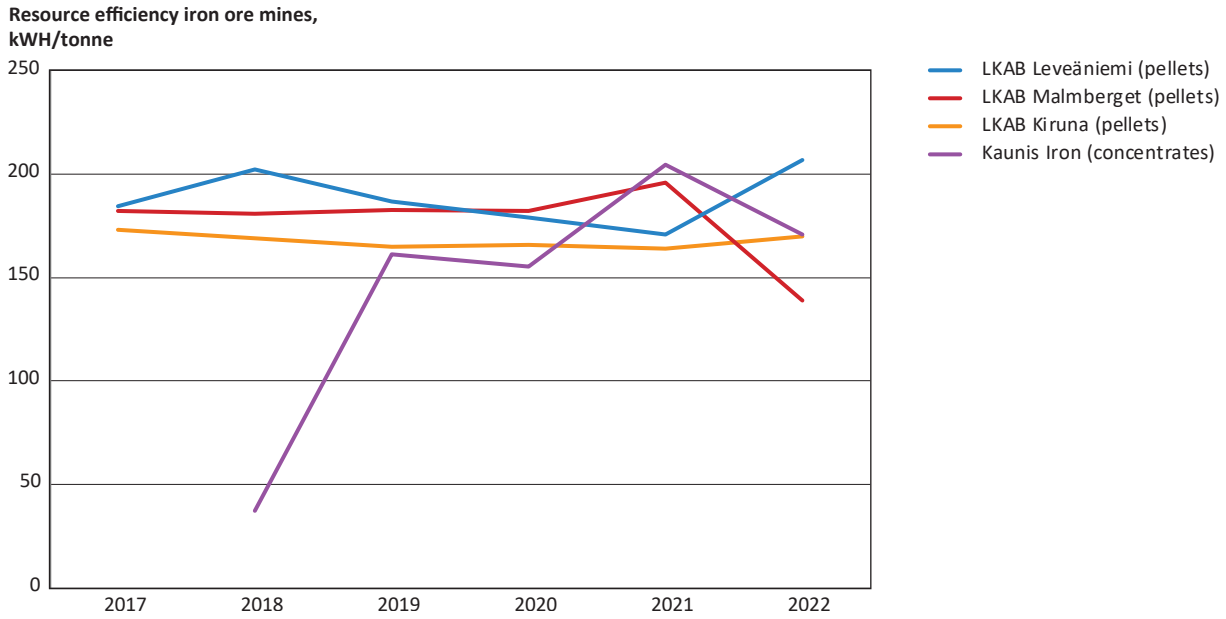



**Figure 15.** Resource efficiency iron ore mines 2017–2022. Source: own processing of data from the Swedish Environmental Reporting Portal (SMP)

example in battery manufacture. Recycling of rare earth elements is significantly lower. This is because there is less metal in circulation and recycling methods are not fully developed.

In the smelters, metals are produced from concentrates or concentrate extracted in the mines ("primary smelting material") or from recycled materials (secondary smelting materials such as scrap, e-scrap, metal ash or steel mill dust). The amount of metals produced in Sweden from recycled materials during 2017–2022 is presented in Table 18.

It is not possible to report the proportion of metals produced from secondary materials of Swedish origin, however. The introduced or imported proportion of the total amount of melting material is unknown and may vary from year to year.

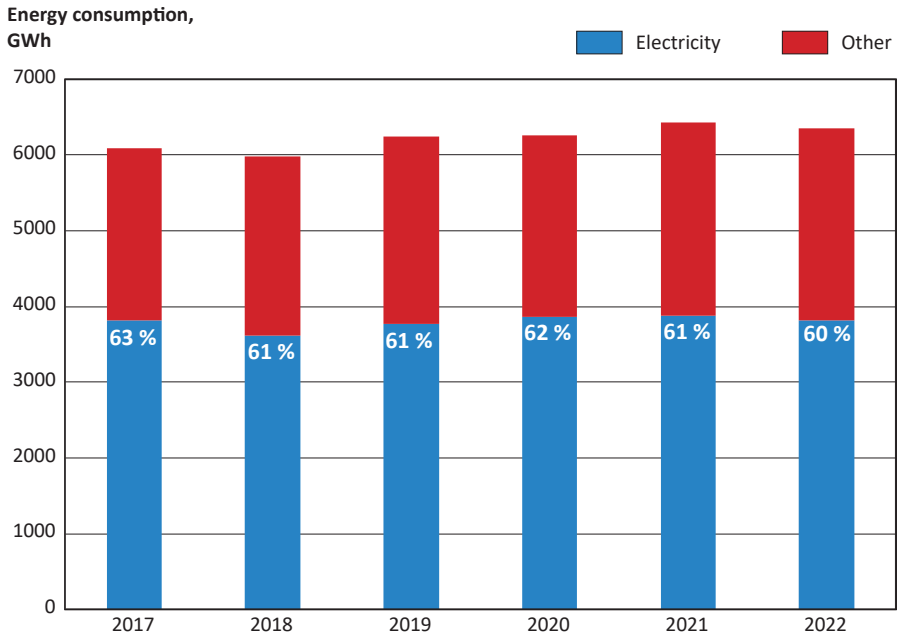



**Figure 16.** Energy consumption and electrification of Swedish mines 2017–2022. Source: own processing of data from the Swedish Environmental Reporting Portal (SMP).

**Table 18.** Metal content in tonnes of secondary raw materials (recycled raw materials) 2017–2022. The metal content has been refined in Sweden, whereas the origin is both domestic and imported.

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|
| **Iron** (steel scrap) | 2 317 000 | | | | | |
| **Copper** | 61 488 | 56 125 | 54 378 | 58 757 | 60220 | 50 089 |
| **Lead** (Boliden Bergsöe)* | 50 000 | 47 000 | 49 000 | 46 000 | 46 000 | 42 000 |
| **Zinc** | 24 696 | 0 | 19 007 | 27 071 | 17935 | 18 547 |
| **Aluminium** | 72 589 | 74 176 | 68 500 | 58 100 | 67 000 | 63 800 |
| **Gold** | 5.6 | 4.7 | 4.1 | 4.5 | 3.19 | 3.48 |
| **Silver** | 97 | 109 | 100 | 131 | 111 | 112 |

* Refers to lead alloys.

# Exploration and exploration permits

Investment in mining exploration in Sweden increased by just over 26 per cent as compared with the previous year. Investments in 2022 totalled SEK 1,525 million (Fig. 17). The main operators in Sweden are the mining companies LKAB and Boliden, which together account for 78 per cent of investment. Almost 85 per cent of exploration was made by companies operating mines in Sweden. Most exploration was in the form of brown-field explorations, i.e. exploration in or near an existing mine, and most took place in Norrbotten and Västerbotten counties.

There were 640 current exploration permits at the end of 2022 (Table 19, Figure 18). This figure was up on the previous year, when 587 permits had been issued. Eighty-six new exploration permits were granted in 2022 (Figure 19, Table 20). Figures 19 and 20 show that exploration permits granted are decreasing over time, both in number and in area covered. 111 permits were granted in 2020; between 100 and 200 permits were granted each year in the preceding years. The number of renewals has also decreased. Twenty-one permits were renewed in 2022, down from 61 in 2021 and 72 in 2020 (Table 21). The permits granted in 2022 were for Västerbotten County, Norrbotten County, Dalarna County and Örebro County.

Valid permits covered 40 metals and minerals (Table 22). Copper and gold dominated with 69 and 65 per cent respectively. Next were silver (45 per cent),

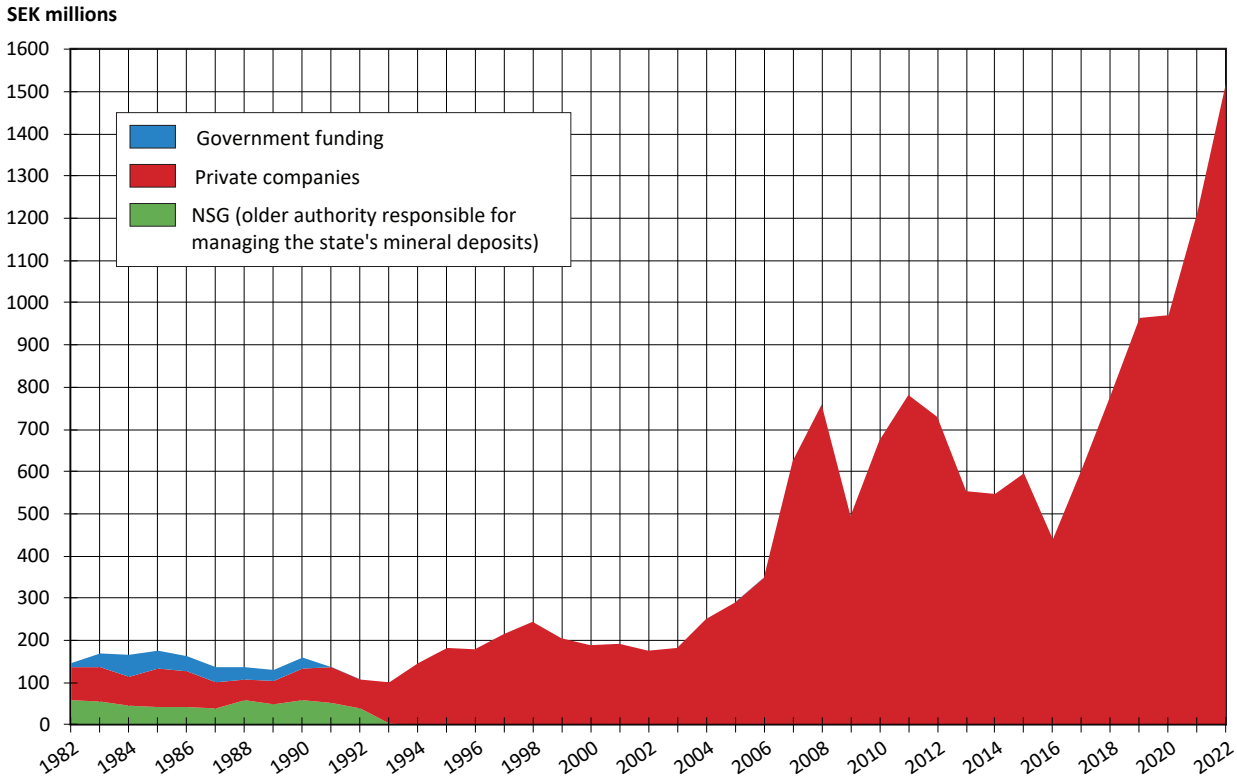



**Figure 17.** Value of exploration in Sweden 1982–2022 (current prices)

zinc (42 per cent), lead (33 per cent), iron (18 per cent), cobalt (16 per cent) and nickel (13 per cent).

There is some correlation between the number of new permits granted and the number of visit days booked at the SGU drill core archive. Figure 21 shows that 274 visit days were booked in 2022; 219 visit days were booked in 2021 and 143 in 2020. A booking may be made for one or more people. Companies usually spend from one day up to a week at the archive. The highest visit frequency was reached in 2007 and 2008: 560 and 400 visits respectively. During that period the number of new permits issued was also fairly high – about 300 a year. The type of companies visiting the archive is confidential information, but according to information received, most of them are mining exploration companies classified as juniors.

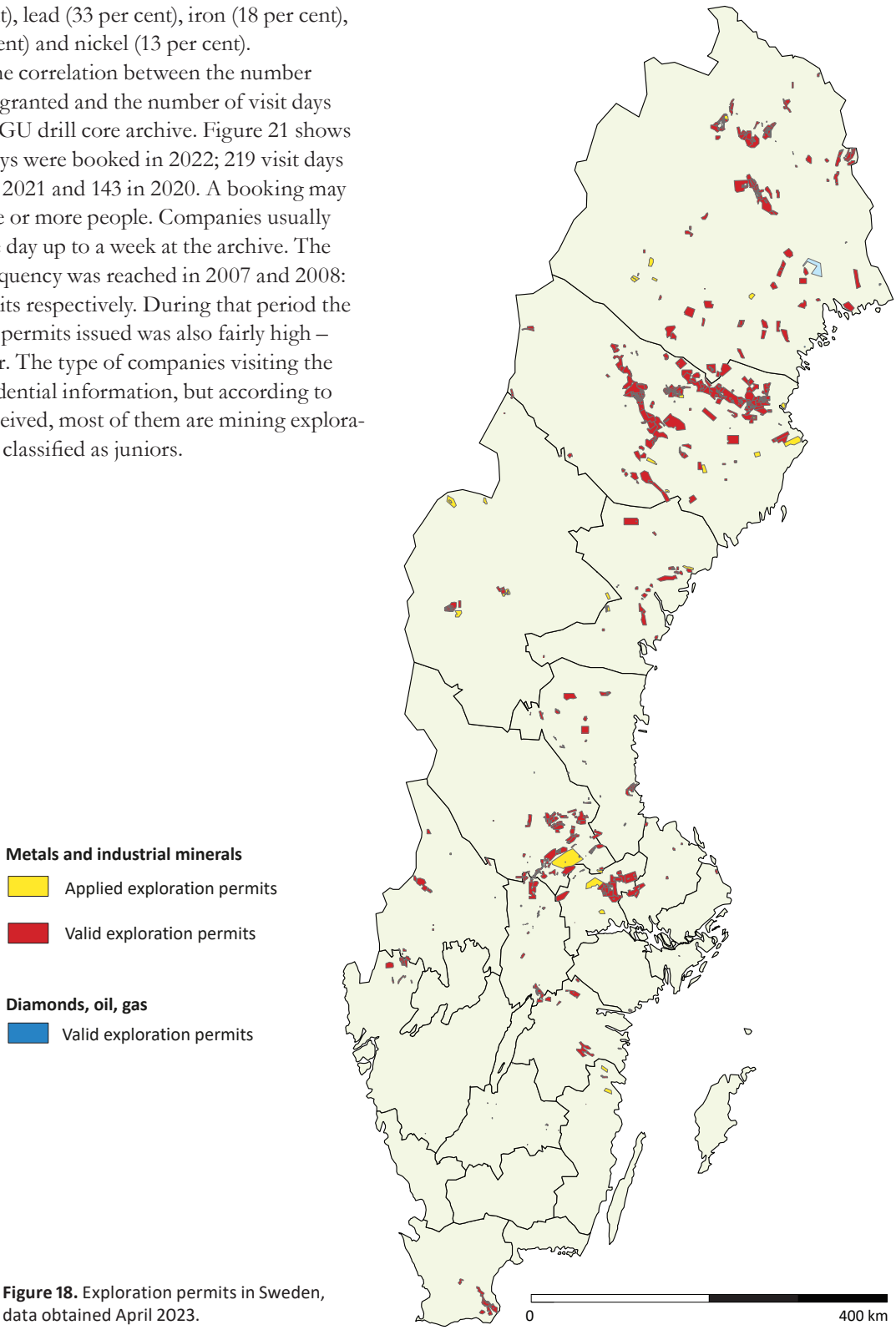



**Figure 18.** Exploration permits in Sweden, data obtained April 2023.

**Table 19.** Valid exploration permits at the end of 2022. Source: Bergsstaten

| County | Mineral Act 1 kap. 1 § 1 och 2 st. [1] | | Mineral Act 1 kap. 1 § 3 st. [2] | | Total | |
|---|---|---|---|---|---|---|
| | Number | Area (ha) | Number | Area (ha) | Number | Area (ha) |
| Dalarna | 90 | 106 895.16 | 1 | 98.94 | 91 | 106 994.10 |
| Gävleborg | 39 | 37 713.78 | | | 39 | 37 713.78 |
| Jämtland | 15 | 17 339.38 | | | 15 | 17 339.38 |
| Jönköping | 11 | 543.22 | | | 11 | 543.22 |
| Kalmar | 3 | 1 373.17 | | | 3 | 1 373.17 |
| Norrbotten | 143 | 290 424.64 | | | 143 | 290 424.64 |
| Skåne | 15 | 21 967.93 | | | 15 | 21 967.93 |
| Stockholm | 2 | 1 088.54 | | | 2 | 1 088.54 |
| Södermanland | 2 | 752.28 | | | 2 | 752.28 |
| Uppsala | 11 | 43 891.32 | | | 11 | 43 891.32 |
| Värmland | 13 | 18 112.89 | | | 13 | 18 112.89 |
| Västerbotten | 187 | 495 288.87 | | | 187 | 495 288.87 |
| Västernorrland | 23 | 54 251.17 | | | 23 | 54 251.17 |
| Västmanland | 25 | 42 873.86 | | | 25 | 42 873.86 |
| Västra Götaland | 19 | 16 113.93 | | | 19 | 16 113.93 |
| Örebro | 30 | 38 769.45 | | | 30 | 38 769.45 |
| Östergötland | 11 | 24 899.46 | | | 11 | 24 899.46 |
| **Total** | **639** | **1 212 299** | **1** | **99** | **640** | **1 212 398** |

[1] The Minerals Act 1 kap. 1 § 1&2 st. includes all mineral substances listed in the Act except oil, gaseous hydrocarbons and diamond.
[2] The Minerals Act 1 kap. 1 § 3 st. includes oil, gaseous hydrocarbons and diamond

**Table 20.** Number of exploration permits granted under the Minerals Act in 2022. Source: Bergsstaten.

| County | Mineral Act 1 kap. 1 § 1 och 2 st. [1] | | Mineral Act 1 kap. 1 § 3 st. [2] | | Total | |
|---|---|---|---|---|---|---|
| | Number | Area (ha) | Number | Area (ha) | Number | Area (ha) |
| Dalarna | 7 | 6 890 | 1 | 99 | 8 | 6 989 |
| Gävleborg | 3 | 381 | | | 3 | 381 |
| Jämtland | 3 | 822 | | | 3 | 822 |
| Jönköping | 6 | 298 | | | 6 | 298 |
| Kalmar | 1 | 2 | | | 1 | 2 |
| Norrbotten | 17 | 33 445 | | | 17 | 33 445 |
| Uppsala | 2 | 14 338 | | | 2 | 14 338 |
| Värmland | 2 | 12 795 | | | 2 | 12 795 |
| Västerbotten | 13 | 28 221 | | | 13 | 28 221 |
| Västernorrland | 9 | 29 031 | | | 9 | 29 031 |
| Västmanland | 5 | 16 768 | | | 5 | 16 768 |
| Västra Götaland | 10 | 7 726 | | | 10 | 7 726 |
| Örebro | 3 | 211 | | | 3 | 211 |
| Östergötland | 4 | 6 176 | | | 4 | 6 176 |
| **Total** | **85** | **157 103** | **1** | **99** | **86** | **157 202** |

[1] The Minerals Act 1 kap. 1 § 1&2 st. includes all mineral substances listed in the Act except oil, gaseous hydrocarbons and diamond.
[2] The Minerals Act 1 kap. 1 § 3 st. includes oil, gaseous hydrocarbons and diamond

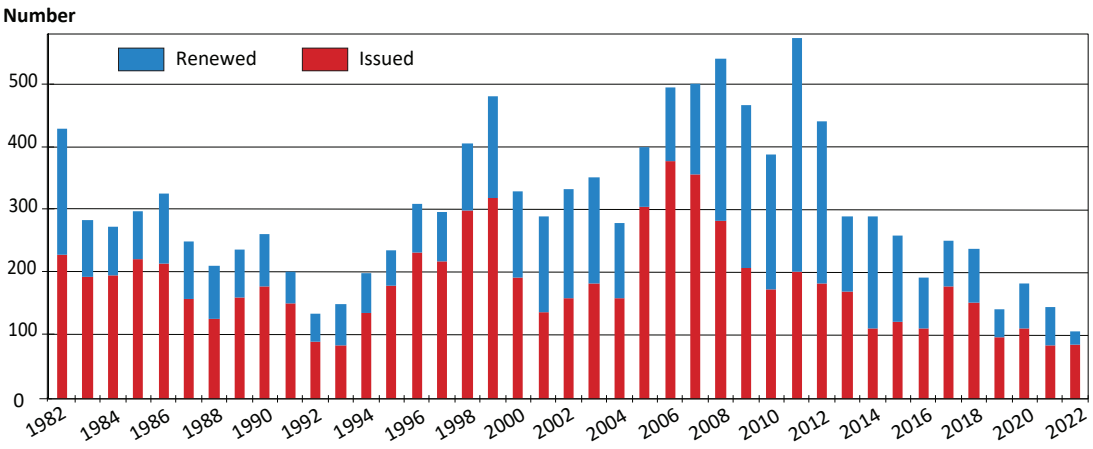



**Figure 19.** Number of claim certificates and exploration permits issued or renewed, 1982–2022.

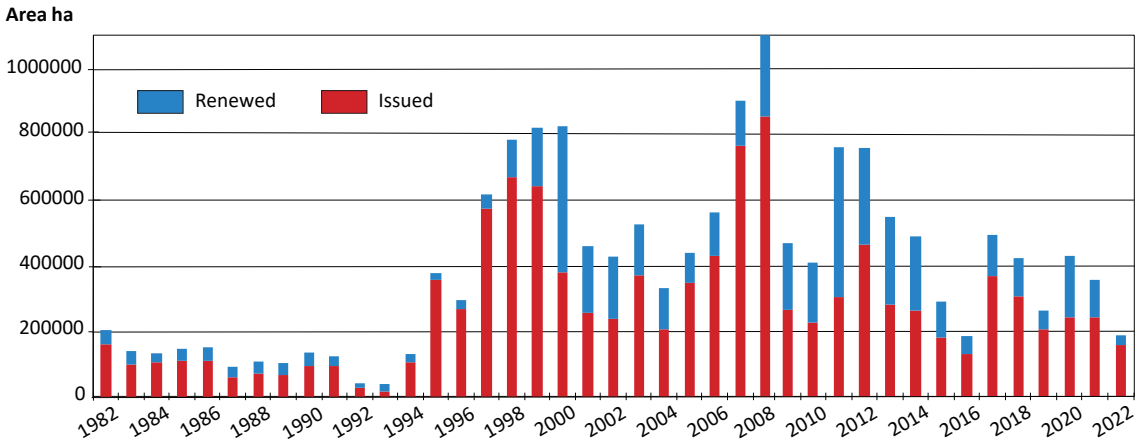



**Figure 20.** Area of claim certificates and exploration permits issued or renewed (not including diamonds), 1982–2022.

**Table 21.** Exploration permits renewed in 2022. Source: Bergsstaten.

| County | Mineral Act 1 kap. 1 § 1 och 2 st. [1]) | |
|---|---|---|
| | Number | Area (ha) |
| Dalarna | 1 | 180.61 |
| Norrbotten | 10 | 19694.03 |
| Västerbotten | 9 | 8224.00 |
| Örebro | 1 | 529.98 |
| **Total** | **21** | **28629** |

[1]) The Minerals Act 1 kap. 1 § 1&2 st. includes all mineral elements listed in the Act except oil, gaseous hydrocarbons and diamond.

**Table 22.** Number of concession minerals applied for in valid exploration permits in 2022, compared with 2021. The percentage shows the proportion of each element in the total number of exploration permits. Difference in number. Source: Bergsstaten.

| Mineral | Number applied for 2022 | | Number applied for 2021 | | Difference 2021–2022 |
|---|---|---|---|---|---|
| Copper | 444 | 69 % | 367 | 63 % | 77 |
| Gold | 417 | 65 % | 354 | 60 % | 63 |
| Silver | 285 | 45 % | 236 | 40 % | 49 |
| Zinc | 270 | 42 % | 231 | 39 % | 39 |
| Lead | 209 | 33 % | 176 | 30 % | 33 |
| Iron | 116 | 18 % | 87 | 15 % | 29 |
| Cobalt | 102 | 16 % | 66 | 11 % | 36 |
| Nickel | 85 | 13 % | 53 | 9 % | 32 |
| Palladium | 58 | 9 % | 34 | 6 % | 24 |
| Platinum | 52 | 8 % | 31 | 5 % | 21 |
| Tungsten | 50 | 8 % | 41 | 7 % | 9 |
| Molybdenum | 44 | 7 % | 39 | 7 % | 5 |
| Vanadium | 38 | 6 % | 27 | 5 % | 11 |
| Lanthanum | 36 | 6 % | 13 | 2 % | 23 |
| Scandium | 35 | 5 % | 13 | 2 % | 22 |
| Yttrium | 34 | 5 % | 12 | 2 % | 22 |
| Graphite | 25 | 4 % | 17 | 3 % | 8 |
| Titanium | 24 | 4 % | 14 | 2 % | 10 |
| Iridium | 23 | 4 % | 16 | 3 % | 7 |
| Osmium | 23 | 4 % | 16 | 3 % | 7 |
| Rhodium | 23 | 4 % | 16 | 3 % | 7 |
| Ruthenium | 23 | 4 % | 16 | 3 % | 7 |
| Lithium | 17 | 3 % | 18 | 3 % | -1 |
| Tin | 15 | 2 % | 12 | 2 % | 3 |
| Tantalum | 13 | 2 % | 11 | 2 % | 2 |
| Apatite | 8 | 1 % | 7 | 1 % | 1 |
| Manganese | 7 | 1 % | 0 | 0 | 7 |
| Beryllium | 5 | 1 % | 1 | < 1 % | 4 |
| Niobium | 5 | 1 % | 1 | < 1 % | 4 |
| Antimony | 5 | 1 % | 1 | < 1 % | 4 |
| Bismuth | 4 | 1 % | 1 | < 1 % | 3 |
| Zirconium | 4 | 1 % | 3 | 1 % | 1 |
| Cesium | 3 | < 1 % | 3 | 1 % | 0 |
| Chromium | 3 | < 1 % | 0 | 0 | 3 |
| Pyrite | 3 | < 1 % | 0 | 0 | 3 |
| Nepheline syenite | 1 | < 1 % | 1 | < 1 % | 0 |
| Wollastonite | 1 | < 1 % | 1 | < 1 % | 0 |
| Diamond | 1 | < 1 % | 0 | 0 | 1 |
| Gaseous hydrocarbons | 1 | < 1 % | 0 | 0 | 1 |
| Thorium | 1 | < 1 % | 0 | 0 | 1 |
| Rubidium | 0 | 0 | 2 | < 1 % | -2 |

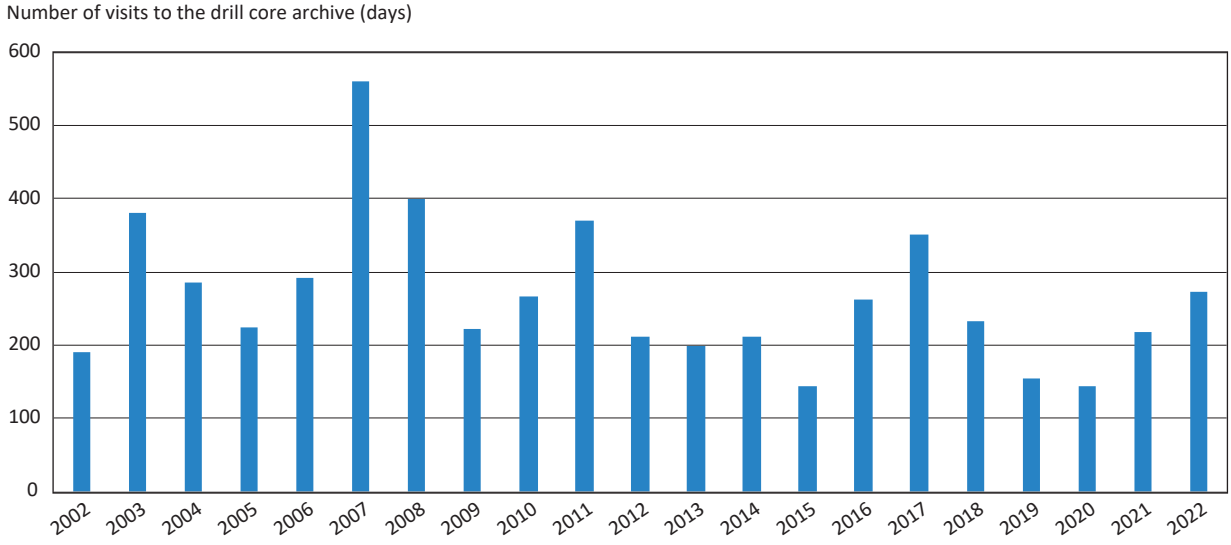



**Figure 21.** Number of booked visit days in SGU's drill core archive, 2002–2022.

Exploration ditch at Kallak K nr 1, in Jokkmokk County, which was granted a mining concession in 2022. Photo: Dick Claeson/SGU

# Mining concessions and mineral fees in Sweden

Four applications for new mining concessions were received by the Mining Inspectorate in 2022. Five concessions remained pending at the end of the year. One application for a concession was granted (Table 23).

The approved mining concession concerned Kallak K nr 1 in Jokkmokk municipality, the applicant being Jokkmokk Iron Mines AB, a subsidiary of Beowulf Mining. The application was for an iron ore project.

There were 165 valid mining concessions at the end of 2022. The concessions covered a total area of almost 12,800 ha (Table 24). The area represents approximately three one-thousandths of Sweden's total area. According to land use statistics from Statistics Sweden, built land represents 3 per cent of Sweden's surface area, whereas land used for agriculture and forestry takes up 7 and 68 per cent respectively. The area covered by current mining concessions was roughly 33 per cent larger than the land area used for winter sports in 2020, or roughly half the combined size of all golf courses in Sweden that year.

Table 24 shows how mining concessions were distributed throughout the country during the year. They were centred around the three ore regions in Sweden: the ore fields in Norrbotten County, the Skellefteå field with the "Gold Line" in Västerbotten County, and Bergslagen (mostly in Dalarna County). At the end of the year, there were 12 active mines with concessions, all metal mines.

Table 25 presents mineral fees (SEK) for the years 2006 till 2022. In 2022 the regulations governing mineral fees payable to the state and landowners applied to 23 mining concessions. The Chief Mining Inspectors set mineral fees for the mining that took place under those concessions. Mining fees totalled SEK 24 million in 2022. The fees were apportioned between the state (about SEK 6 million) and landowners (about SEK 18 million).

Table 26 presents mineral fees paid to the state under the Minerals Act for the years 2006 to 2022. Note that application fees for mining concessions are not specified, since these are included in the fee for mining concessions. The total sum of fees paid to the state in 2022 was just over SEK 6.7 million.

**Table 23.** Approved and rejected mining concession applications, 2002–2022. Source: Bergsstaten.

| Year | Applied | Of wich utmål* | Approved | Of wich utmål* | Rejected | Errends prepared for decision by the government** |
|---|---|---|---|---|---|---|
| 2002 | 9 | 8 | 23 | 20 | 0 | 0 |
| 2003 | 4 | 4 | 17 | 15 | 0 | 0 |
| 2004 | 4 | 2 | 5 | 3 | 0 | 0 |
| 2005 | 3 | 1 | 2 | 1 | 0 | 0 |
| 2006 | 4 | 0 | 2 | 0 | 0 | 0 |
| 2007 | 3 | 1 | 7 | 0 | 0 | 0 |
| 2008 | 8 | 0 | 5 | 0 | 0 | 0 |
| 2009 | 4 | 1 | 4 | 0 | 0 | 0 |
| 2010 | 8 | 1 | 4 | 1 | 0 | 0 |
| 2011 | 7 | 1 | 2 | 0 | 0 | 0 |
| 2012 | 6 | 0 | 7 | 1 | 0 | 0 |
| 2013 | 6 | 1 | 5 | 0 | 1 | 0 |
| 2014 | 6 | 0 | 5 | 2 | 2 | 1 (Eva K nr 1) |
| 2015 | 9 | 1 | 2 | 0 | 0 | 1 (Kallak K nr 1) |
| 2016 | 4 | 0 | 6 | 1 | 1 | 0 |
| 2017 | 4 | 0 | 6 | 0 | 0 | 1 (Kallak K nr 1) |
| 2018 | 2 | 0 | 4 | 0 | 1 | 0 |
| 2019 | 4 | 0 | 2 | 0 | 1 | 0 |
| 2020 | 3 | 0 | 0 | 0 | 0 | 0 |
| 2021 | 3 | 0 | 1 | 0 | 2 | 0 |
| **2022** | **4** | **0** | **1** | **0** | **0** | **0** |

* Conversion to mining concessions of old, expiring permissions (utmål).
** Cases where Bergsstaten has referred the decision to the government.

**Table 24.** Valid mining concessions and their land use at the end of 2022. Source: Bergsstaten.

| County | Number of mining concessions | | | |
|---|---|---|---|---|
| | Expired | New | Valid att the end of 2022 | Area (ha) |
| Uppsala | | | 2 | 193 |
| Östergötland | | | 2 | 563 |
| Kalmar | | | 1 | 8 |
| Skåne | | | 1 | 98 |
| Örebro | | | 5 | 909 |
| Dalarna | | | 30 | 1 384 |
| Gävleborg | | | 8 | 417 |
| Västernorrland | | | 1 | 36 |
| Jämtland | | | 3 | 132 |
| Västerbotten | | 1 | 74 | 4 470 |
| Norrbotten | 1 | | 38 | 4 559 |
| **Summa** | **1** | **1** | **165** | **12769** |

**Table 25.** Mineral fees (SEK) under the Minerals Act, 2006–2022. The fee was introduced in 2005 and applies only to concessions granted after that. Source: Bergsstaten.

| Year | Contributing concessions | Mineral fees, total | Mineral fees, to the state | Mineral fees, to landowners |
|---|---|---|---|---|
| 2006 | 1 | 30 241 | 7 560 | 22 681 |
| 2007 | 1 | 21 392 | 5 348 | 16 044 |
| 2008 | 3 | 234 475 | 58 221 | 175 856 |
| 2009 | 4 | 682 217 | 170 952 | 511 663 |
| 2010 | 5 | 2 280 263 | 570 095 | 1 710 197 |
| 2011 | 7 | 4 559 742 | 1 139 936 | 3 419 807 |
| 2012 | 11 | 5 150 918 | 1 287 730 | 3 863 180 |
| 2013 | 13 | 6 886 013 | 1 721 503 | 5 164 511 |
| 2014 | 13 | 7 372 452 | 1 843 113 | 5 529 339 |
| 2015 | 11 | 6 381 449 | 1 585 085 | 4 796 364 |
| 2016 | 11 | 6 375 762 | 1 583 127 | 4 792 635 |
| 2017 | 13 | 12 104 285 | 3 026 070 | 9 078 216 |
| 2018 | 18 | 13 468 117 | 3 367 029 | 10 101 088 |
| 2019 | 18 | 16 545 231 | 4 136 308 | 12 408 924 |
| 2020 | 21 | 19 264 020 | 4 816 005 | 14 448 014 |
| 2021 | 21 | 20 650 662 | 5 162 666 | 15 487 996 |
| **2022** | **23** | **24 244 828** | **6 126 467** | **18 379 395** |

**Table 26.** Fees paid to the state (SEK) under the Minerals Act, 2006–2022. Source: Bergsstaten.

| Year | Application fee* | Exploration fee | Renewal fees | Defense fees | Land designation fee | Withdrawal, refund | Total |
|---|---|---|---|---|---|---|---|
| 2006 | 773 500 | 8 639 612 | 4 967 148 | 49 100 | 40 000 | −181 059 | 14 288 301 |
| 2007 | 1 317 060 | 14 096 778 | 6 712 326 | 31 900 | 0 | −760 881 | 21 397 183 |
| 2008 | 1 342 993 | 12 373 854 | 13 114 100 | 30 000 | 120 000 | −1 396 926 | 25 584 021 |
| 2009 | 787 500 | 4 319 513 | 8 505 679 | 30 000 | 40 000 | −2 015 602 | 11 667 090 |
| 2010 | 1 050 500 | 4 735 136 | 9 032 238 | 27 200 | 80 000 | −205 018 | 14 720 056 |
| 2011 | 1 153 000 | 6 018 463 | 26 756 238 | 24 700 | 0 | −251 021 | 33 701 380 |
| 2012 | 833 500 | 8 602 966 | 17 441 850 | 15 900 | 40 000 | −1 164 523 | 25 769 693 |
| 2013 | 769 015 | 4 550 790 | 16 574 107 | 7 300 | 40 000 | −4 052 077 | 17 889 135 |
| 2014 | 771 500 | 3 392 570 | 19 689 995 | 2 800 | 0 | −2 609 790 | 21 247 075 |
| 2015 | 906 500 | 3 582 934 | 11 079 681 | 12 100 | 160 000 | −1 331 454 | 14 409 761 |
| 2016 | 513 500 | 2 583 098 | 6 048 248 | 2 800 | 40 000 | -816 025 | 8 371 621 |
| 2017 | 585 000 | 6 991 905 | 11 752 762 | 0 | 40 000 | -235 700 | 19 133 967 |
| 2018 | 412 000 | 5 814 840 | 12 912 928 | 0 | 80 000 | -1 481 824 | 17 737 944 |
| 2019 | 478 000 | 4 101 860 | 5 613 261 | 0 | 40 000 | -4 476 567 | 5 756 554 |
| 2020 | 456 500 | 4 797 763 | 13 917 387 | 0 | 40 000 | -639 452 | 18 572 198 |
| 2021 | 395 000 | 4 829 440 | 7 140 025 | 0 | 80 000 | -37 335 | 12 407 130 |
| **2022** | **468 500** | **3 308 118** | **2 929 137** | **0** | **280 000** | **-291 253** | **6 694 502** |

* This also includes application fees for exploration concession.

Svartliden is a site of national interest. Gold ore was mined here between 2005 and 2014. Photo: Gudrun Norstedt/CC BY-SA 4.0

## National interests

Chapters 3 and 4 of the Environmental Code contain fundamental provisions governing the management of land and water areas. Both preservation interests and land use opportunities are accommodated. These land and water areas have different protection needs, for example because they are particularly important for reindeer husbandry, contain valuable substances or materials, are particularly suitable for communications or industrial production, or are particularly important because of their natural or cultural value.

National interests comprise areas of particular national importance that can therefore take precedence over other interests when changes in land use are being considered. Precedence over local and public interests also means that the value or importance of national interests may not be substantially harmed or altered. National interests comprise a basis for planning that must be considered by county administrative boards and municipalities in the long-term planning process. SGU is the government agency responsible for identifying deposits of valuable minerals or materials of national important. This means that SGU assesses and prioritises mineral deposits of national interest under Chapter 3, section 7 (ii) of the Environmental Code.

National interests at the end of 2022 were the same as the previous year. There were 149 national interests (Fig. 22). Of these, 94 had been demarcated and delimited. The rest have been given a centre coordinate.

Table 27 shows that these interests are located in 19 of Sweden's 21 counties. There are no national mineral interests in Stockholm County or Kronoberg County.

SGU uses three criteria for a particular deposit to be identified as a national interest. These are (i) that the substance or material is of great importance for society's needs; (ii) that the substance or material has particularly valuable properties; and (iii) that the area of the deposit of the substance or material is well delimited, investigated and documented (in accordance with Chapter 3, section 7 of the Environmental Code). For deposits assessed to be of national importance, detailed delimitations are provided on an ongoing basis. These may concern deposits so far only identified using centre coordinates or "new" deposits simultaneously identified as being of national interest.

An instance of detailed demarcation begins with obtaining geological information about the deposit from the SGU databases and publications. A site visit is normally also made, and contact is established with any operator present on the site. Factors taken into account are the same as those considered when identifying areas of national importance, i.e. the three criteria mentioned in the preceding paragraph. After demarcation with coordinates and shape area calculation, a proposal for detailed delimitation is sent to the relevant county administrative board and municipality, the National Board of Housing, Building and Planning, as well as other public agencies. Depending on the comments made by the consultation bodies, the proposal may be further amended. SGU then makes a decision and submits the information to the relevant county administrative board.

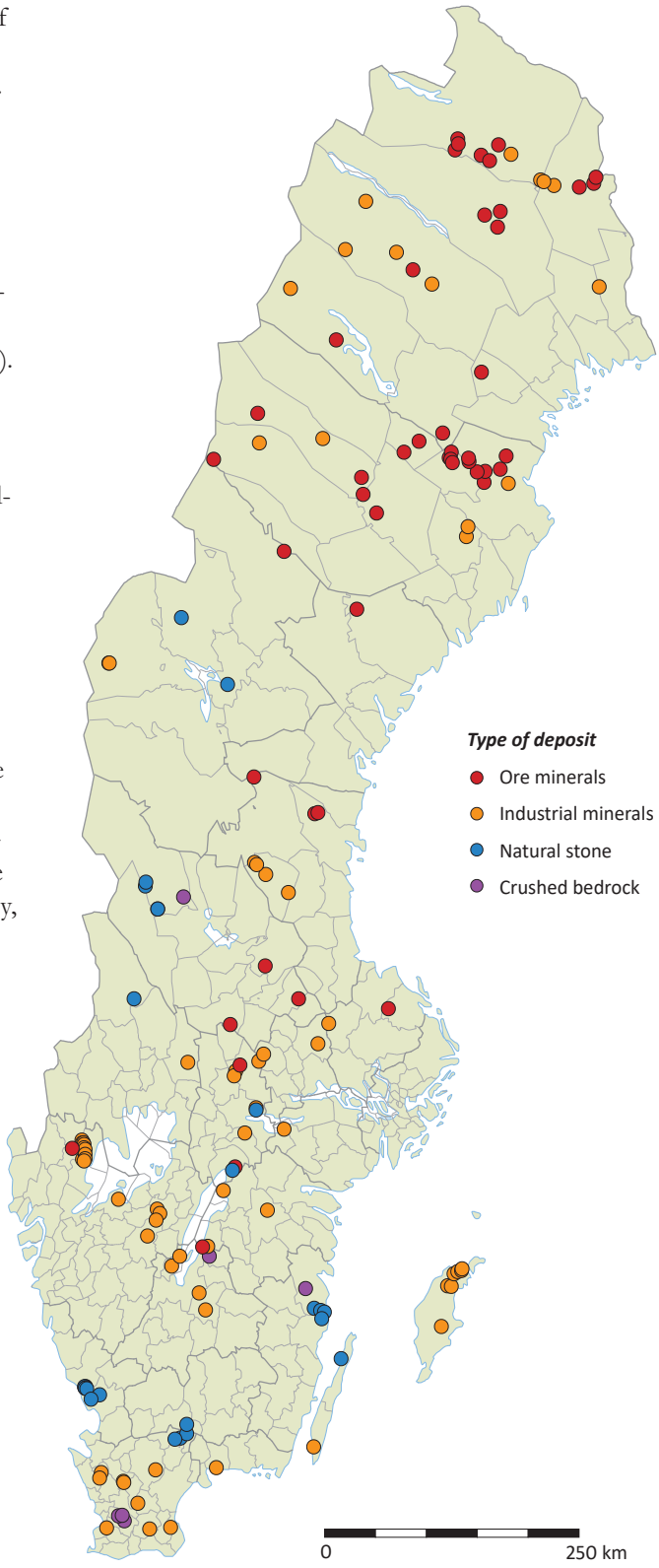



**Figure 22.** Mineral deposits of national interest under the Environmental Code

**Table 27.** Nationally important mineral deposits by county.

| Name of the deposit | Municipality | Type of material | X-coord. | Y-coord. |
|---|---|---|---|---|
| **Uppsala County** | | | | |
| Dannemora* | Östhammar | Iron ore | 6 677 845 | 658 254 |
| Banmossen | Heby | Wollastonite | 6 662 492 | 598 461 |
| **Södermanland County** | | | | |
| Forsby* | Vingåker | Limestone | 6 557 436 | 554 399 |
| **Östergötland County** | | | | |
| Lemunda | Motala | Sandstone | 6 496 181 | 494 207 |
| Gärstad | Linköping | Clay | 6 477 225 | 539 019 |
| **Jönköping County** | | | | |
| Norra Kärr* | Jönköping | Alkaline rocks | 6 440 965 | 474 476 |
| Adelöv-Nostorp* | Tranäs | Porphyry | 6 430 844 | 480 795 |
| Karsbo-Fåglarp* | Nässjö | Quartzite | 6 394 445 | 471 233 |
| Hjärtsöla-Almesåkra-Norrgård* | Nässjö | Quartzite | 6 378 030 | 477 825 |
| Brogården* | Habo | Special sand | 6 420 600 | 443 232 |
| Baskarp* | Habo | Special sand | 6 430 892 | 451 306 |
| **Kalmar County** | | | | |
| Stormandebo | Västervik | Porphyry | 6 400 368 | 578 376 |
| Tribbhult | Västervik | Granite | 6 380 928 | 587 155 |
| Flivik | Oskarshamn | Granite | 6 378 707 | 593 830 |
| Hökhult | Oskarshamn | Granite | 6 376 949 | 597 300 |
| Götebo | Oskarshamn | Granite | 6 370 671 | 594 775 |
| Gillberga* | Borgholm | Limestone | 6 331 097 | 614 779 |
| Albrunna* | Mörbylånga | Limestone | 6 243 976 | 588 271 |
| **Gotland County** | | | | |
| Filehajdar* | Gotland | Limestone | 6 404 793 | 720 827 |
| Västra brottet* | Gotland | Limestone | 6 403 914 | 725 067 |
| Storugns-Klinthagen* | Gotland | Limestone | 6 416 818 | 727 203 |
| Fleringe* | Gotland | Limestone | 6 419 025 | 731 126 |
| Rute* | Gotland | Limestone | 6 420 137 | 734 713 |
| Stucks* | Gotland | Limestone | 6 421 625 | 735 600 |
| Buttle* | Gotland | Limestone | 6 366 454 | 715 741 |
| **Blekinge County** | | | | |
| Stärnö* | Karlshamn | Diabase | 6 222 391 | 490 540 |
| **Skåne County** | | | | |
| Hägghult* | Osby | Diabase | 6 250 799 | 453 887 |
| Duvhult* | Osby | Diabase | 6 255 470 | 460 129 |
| Boalt | Östra Göinge | Diabase | 6 249 634 | 448 353 |
| Vånga* | Kristianstad | Granite | 6 264 565 | 460 023 |
| Ignaberga* | Hässleholm | Limestone | 6 219 023 | 429 120 |
| Måsalycke* | Tomelilla | Anatase | 6 162 687 | 445 369 |
| Billinge* | Eslöv, Klippan. Svalöv | Kaolin | 6 207 451 | 396 870 |
| Kvarnby* | Malmö | Chalk limestone | 6 161 488 | 380 814 |
| Bjuv | Bjuv | Clay | 6 215 687 | 374 635 |
| Önnemo* | Lund | Gneiss | 6 168 692 | 398 721 |
| Hardeberga /Rögle* | Lund | Quartzitic sandstone | 6 173 619 | 392 667 |
| Lyby | Hörby | Quartzitic sandstone | 6 185 839 | 412 015 |
| Bjuv/Åstorp | Bjuv/Åstorp | Clay | 6 210 374 | 373 248 |
| Eriksdal* | Sjöbo | Quartz sand | 6 160 491 | 424 104 |
| Skrylle* | Lund | Quartzitic sandstone | 6 173 960 | 396 161 |

**Table 27.** Continued.

| Name of the deposit | Municipality | Type of material | X-coord. | Y-coord. |
|---|---|---|---|---|
| **Halland County** | | | | |
| Vreda | Falkenberg | Hallandia gneiss | 6 300 900 | 358 244 |
| Svenstorp | Falkenberg | Hallandia gneiss | 6 299 937 | 357 105 |
| Vastad* | Falkenberg | Hallandia gneiss | 6 300 897 | 357 124 |
| Äskered | Falkenberg | Hallandia gneiss | 6 299 700 | 358 208 |
| Äskered | Falkenberg | Hallandia gneiss | 6 299 043 | 357 616 |
| Bårarp | Halmstad | Hallandia gneiss | 6 298 360 | 358 973 |
| Nannarp | Halmstad | Hallandia gneiss | 6 292 519 | 372 235 |
| **Västra Götaland County** | | | | |
| Dalen | Bengtsfors/Åmål | Quartzite | 6 544 116 | 351 154 |
| Tansjön | Bengtsfors/Åmål | –"– | 6 541 566 | 351 894 |
| Fengerfors | Åmål | –"– | 6 541 577 | 352 803 |
| Fröskog | Åmål | –"– | 6 540 127 | 353 541 |
| Korpeknatten | Bengtsfors/Åmål | –"– | 6 536 745 | 353 282 |
| Norra KuvetIronet | Åmål | –"– | 6 534 903 | 354 683 |
| Fjällen-Dalberget | Åmål | –"– | 6 530 073 | 354 501 |
| Kilane | Åmål | –"– | 6 526 030 | 354 850 |
| Valön | Åmål | –"– | 6 523 659 | 353 889 |
| Livarebo-Ulerud* | Mellerud/Åmål | –"– | 6 525 077 | 352 123 |
| Dingelvik | Bengtsfors | Copper, silver | 6 535 827 | 341 799 |
| Ryd* (Billingsyd) | Skövde | Diabase | 6 476 894 | 428 066 |
| Våmb* | Skövde | Limestone | 6 472 427 | 430 618 |
| Råda* | Lidköping | Special sand | 6 485 917 | 388 676 |
| Rådene | Skövde | Limestone | 6 466 089 | 427 196 |
| Uddagården* | Falköping | Limestone | 6 450 390 | 418 388 |
| Näshult | Tranemo | Quartz | 6 362 286 | 406 239 |
| **Värmland County** | | | | |
| Gåsgruvan* | Filipstad | Limestone | 6 621 818 | 456 714 |
| Hålsjöberg* | Torsby | Kyanite | 6 684 185 | 402 066 |
| **Örebro County** | | | | |
| Zinkgruvan* | Askersund | Sphalerite, galena, | 6 519 414 | 506 023 |
| Forshammar | Lindesberg | Feldspar, quartz | 6 624 048 | 528 249 |
| Hällabrottet | Kumla | Sandstone | 6 553 214 | 515 212 |
| Björkaverken/Glanshammar* | Örebro | Dolomite marble | 6 578 336 | 526 005 |
| Brännlyckan | Askersund | Marble | 6 515 982 | 503 266 |
| Lillkyrka* | Örebro | Marble | 6 576 239 | 526 230 |
| Smedsjön and Dyrkatorp* | Lindesberg | Limestone, dolomite | 6 612 940 | 504 392 |
| Larsbo* | Lindesberg | Limestone, dolomite | 6 614 071 | 505 179 |
| Lovisa* | Lindesberg | Zinc and lead ore | 6 620 487 | 509 479 |
| Skrikarhyttan* | Nora | Metavolcanite | 6 591 225 | 495 051 |
| **Västmanland County** | | | | |
| Höjderna | Skinnskatteberg | Feldspar | 6 631 405 | 533 158 |
| Tistbrottet* | Sala | Dolomite | 6 642 215 | 587 611 |
| **Dalarna County** | | | | |
| Garpenberg* | Hedemora | Sphalerite, galena, silver | 6 686 512 | 567 826 |
| Falu gruva | Falun | Chalcopyrite | 6 718 362 | 533 584 |
| Mjågen | Älvdalen | Porphyry | 6 785 635 | 450 398 |
| Grängesberg | Ludvika | Iron ore | 6 660 186 | 499 519 |
| Mångsbodarna* | Älvdalen | Dala sandstone | 6 773 584 | 424 894 |
| Billingsåsen* | Älvdalen | Dala sandstone | 6 796 007 | 411 992 |

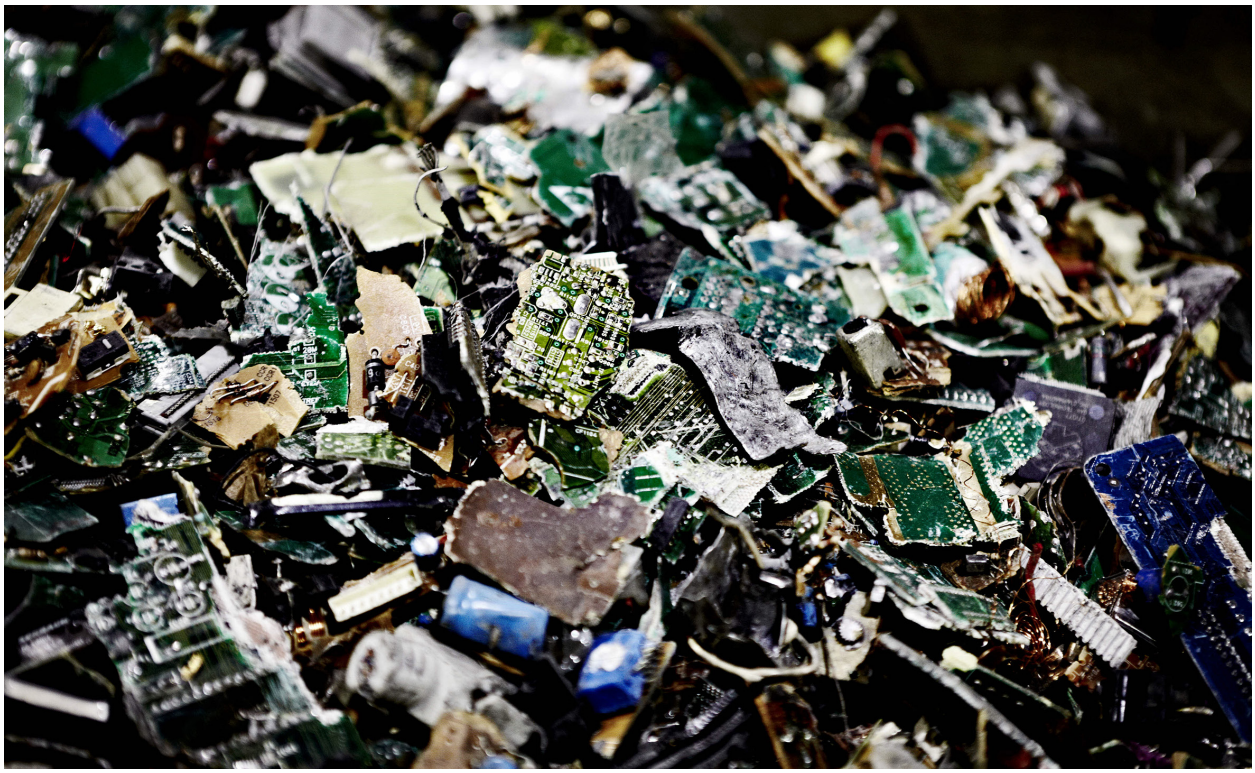
**Table 27.** Continued.

| Name of the deposit | Municipality | Type of material | X-coord. | Y-coord. |
|---|---|---|---|---|
| Vanfjället (Lövnäs)* | Älvdalen | Dala sandstone | 6 799 620 | 412 700 |
| Håksberg-Blötberget* | Ludvika | Iron ore | 6 666 009 | 505 444 |
| **Gävleborg County** | | | | |
| Enåsen | Ljusdal | Gold | 6 905 258 | 520 289 |
| Kringelgruvan* | Ovanåker | Graphite | 6 808 683 | 532 954 |
| Gropabo* | Ovanåker | Graphite | 6 820 622 | 521 761 |
| Månsberg* | Ovanåker | Graphite | 6 791 524 | 556 155 |
| Mattsmyra* | Ovanåker | Graphite | 6 818 393 | 523 954 |
| Brickagruvan* | Hudiksvall | Iron , vanadium | 6 869 738 | 581 915 |
| Bläckmyran* | Hudiksvall | Iron , vanadium | 6 870 457 | 584 788 |
| **Jämtland County** | | | | |
| Handöl | Åre | Soapstone | 7 015 963 | 372 463 |
| Brunflo | Östersund | Limestone | 6 996 481 | 492 658 |
| Rönnöfors* | Krokom | Slate | 7 061 855 | 444 853 |
| Granberget* | Strömsund | Sulphide ore | 7 128 446 | 547 573 |
| **Västernorrland County** | | | | |
| Rockliden* | Örnsköldsvik | Sulphide ore | 7 072 946 | 618 658 |
| **Västerbotten County** | | | | |
| Långdal | Skellefteå | Sphalerite, galena, gold and silver | 7 199 265 | 747 933 |
| Åkulla-Kankberg* | Skellefteå | Sphalerite, galena, chalcopyrite, gold and silver | 7 209 245 | 748 807 |
| Björkdal* | Skellefteå | Gold | 7 213 261 | 764 402 |
| Renström | Skellefteå | Chalcopyrite, sphalerite | 7 209 671 | 740 651 |
| Åkerberg | Skellefteå | Gold | 7 225 446 | 770 197 |
| HolmtIron | Norsjö | Sphalerite, chalcopyrite | 7 228 662 | 714 692 |
| Kristineberg* | Lycksele | Sphalerite, chalcopyrite, galena, gold and silver | 7 228 056 | 667 278 |
| Kittelfjäll | Vilhelmina | Olivine | 7 235 117 | 521 574 |
| Granlidknösen* | Storuman | Fluorspar | 7 240 577 | 585 036 |
| Varuträsk | Skellefteå | Pegmatite | 7 198 617 | 772 449 |
| Repsjömyran | Vindeln | Diatomite | 7 145 452 | 730 720 |
| GåstIron | Vindeln | Diatomite | 7 155 023 | 732 473 |
| Maurliden* | Norsjö | Sphalerite, chalcopyrite, gold and silver | 7 222 898 | 712 406 |
| Maurliden Östra* | Norsjö | Sphalerite, chalcopyrite, galena, gold and silver | 7 221 594 | 714 037 |
| Norrliden* | Norsjö | Chalcopyrite, sphalerite | 7 218 332 | 716 160 |
| Storliden* | Malå | Sphalerite, chalcopyrite, gold and silver | 7 239 127 | 682 043 |
| Svartliden* | Storuman and Lycksele | Gold | 7 185 935 | 626 203 |
| Fäboliden* | Lycksele | Gold | 7 167 708 | 640 256 |
| StortIronhobben* | Storuman | Gold | 7 202 540 | 624 506 |
| Älgträsk* | Skellefteå | Chalcopyrite, gold | 7 219 384 | 732 938 |
| Älgliden* | Skellefteå | Chalcopyrite, gold | 7 222 984 | 731 892 |
| Rönnbäcken* | Storuman | Nickel, cobalt | 7 264 510 | 519 514 |
| Stekenjokk* | Vilhelmina | Sphalerite, chalcopyrite, galena, gold and silver | 7 217 717 | 473 056 |
| Barsele* | Storuman | Gold | 7 215 488 | 617 457 |
| **Norrbotten County** | | | | |
| Laisvall | Arjeplog | Galena, silver | 7 338 214 | 597 680 |
| Aitik* | Gällivare | Chalcopyrite, gold | 7 451 772 | 758 482 |
| Malmberget* | Gällivare | Iron ore | 7 463 198 | 745 186 |

**Table 27.** Continued.

| Name of the deposit | Municipality | Type of material | X-coord. | Y-coord. |
|---|---|---|---|---|
| Kiruna* | Kiruna | Iron ore | 7 533 282 | 717 827 |
| Pahtohavare* (part of the national interest Kiruna) | Kiruna | Chalcopyrite | 7 533 282 | 717 827 |
| Viscaria* (part of the national interest Kiruna) | Kiruna | Chalcopyrite | 7 533 282 | 717 827 |
| Mertainen* | Kiruna | Iron ore | 7 526 617 | 742 167 |
| Svappavaara* (Gruvberget and Leveäniemi) | Kiruna | Iron ore | 7 517 577 | 752 178 |
| Nunasvaara* | Kiruna | Graphite | 7 523 675 | 770 845 |
| Masugnsbyn* | Kiruna | Dolomite | 7 498 822 | 801 166 |
| Masugnsbyn | Pajala | Graphite | 7 497 362 | 804 185 |
| Lautakoski | Pajala | Soapstone | 7 493 599 | 814 733 |
| Äpartjåkka | Jokkmokk | Magnesite | 7 475 642 | 625 595 |
| Rakas | Jokkmokk | Magnesite | 7 427 292 | 605 427 |
| Lantanjarkka | Jokkmokk | Wollastonite | 7 425 458 | 656 840 |
| Norvijaur | Jokkmokk | Limestone | 7 394 431 | 692 934 |
| Raitajärvi | Övertorneå | Graphite | 7 394 111 | 861 522 |
| Pajeb* | Arjeplog | Quartz | 7 388 598 | 551 013 |
| Eva-Svartliden* | Arvidsjaur | Sulphide ore | 7 247 447 | 706 005 |
| Pellivuoma* | Pajala | Iron ore | 7 492 534 | 840 058 |
| Sahavaara* | Pajala | Iron ore | 7 496 539 | 854 819 |
| Tapuli* | Pajala | Iron ore | 7 502 155 | 856 707 |
| Kallak* | Jokkmokk | Iron ore | 7 412 765 | 680 300 |
| Laver* | Älvsbyn | Copper ore | 7 303 479 | 739 940 |
| Kiskamavaara* | Kiruna | Cobalt, copper, gold | 7 535 285 | 758 902 |
| Nautanen* | Gällivare | Copper ore | 7 464 783 | 753 999 |

* Demarcated in detail.



Sweden exports scrap and waste products. Photo: Boliden

## Export and import of mineral ore and metal and mineral products

Sweden's exports of mineral ores and products made from them exceed imports, in both quantity and value. Ores, mainly iron ore, accounts for the largest share of Swedish mineral exports in terms of quantity. Next come iron and steel products, scrap and waste products, industrial minerals and construction minerals. Iron and steel products, other metal products and ores have the highest export value.

Volumes imported are about half of those exported. Imports mostly comprise iron and steel products, industrial minerals, construction minerals and energy minerals. Iron and steel products and other metal products have the highest import value.

Figure 23 shows exports and imports of mineral raw materials and finished mineral products, such as metals, for the years 2018 to 2022. Construction minerals in the diagram consist of import and export of minerals used in the construction industry. Energy minerals in the diagram include carbon, peat and similar minerals. Other metal products include metal raw materials for industry; finished metal products such as nails are not included because finished products are farther down the processing chain.

The total value of exports in 2022 was 17 per cent up on 2021, although quantities actually fell by 3 per cent. In quantity terms, export of industrial minerals was down 22 per cent on the previous year. Iron ore exports were roughly on a par with 2021. In value terms, the main growth in exports has been for iron and steel products. The value of imports rose by 34 per cent, the principal value increase being for iron and steel products. Import quantities were in line with the preceding year, falling by around 2 per cent.

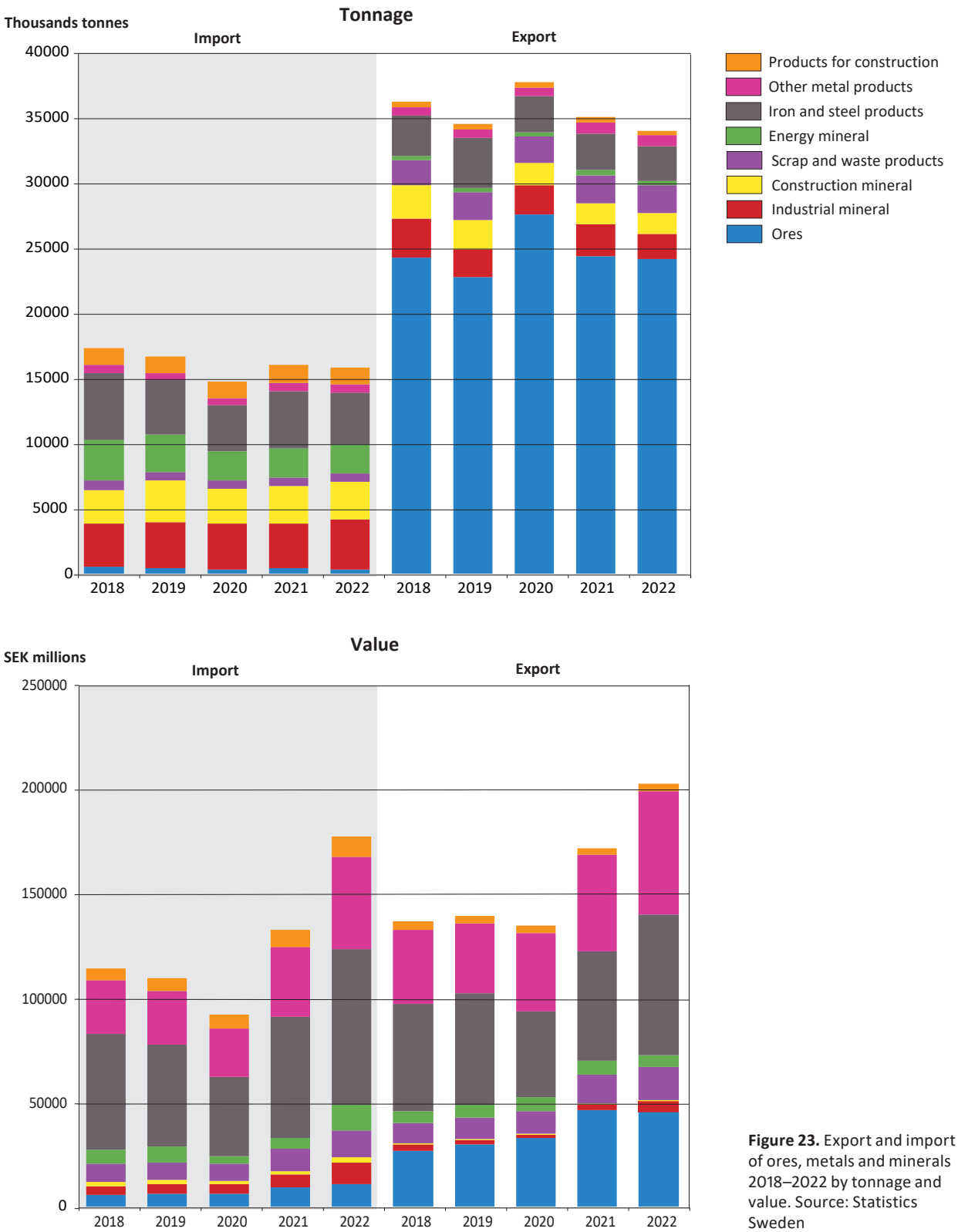



**Figure 23.** Export and import of ores, metals and minerals 2018–2022 by tonnage and value. Source: Statistics Sweden

# Swedish mining industry economics

## PRODUCTIVITY

Iron ore and non-ferrous ore extraction productivity increased over time until the 2000s (Fig. 24). Iron ore productivity levelled off in 1995, whereas non-ferrous ore productivity peaked in 2005. Iron ore mining productivity then continued to increase until 2022, when it fell by 16 per cent as compared with 2021. The decline is probably due to production disruptions at LKAB's plants at Kiirunavara.

Non-iron ore mining productivity rose sharply between 2008 and 2013. In 2013 productivity was close to 17,000 tonnes per person employed. By 2015, productivity was back at the initial level for the period, as illustrated by the pink curve in Figure 24. The change can be attributable to increased production at the Aitik mine.

As may be seen from the green curve and right axis in Figure 24, base metal productivity has fallen since 2005. This is probably due to lower metal content in the ores.

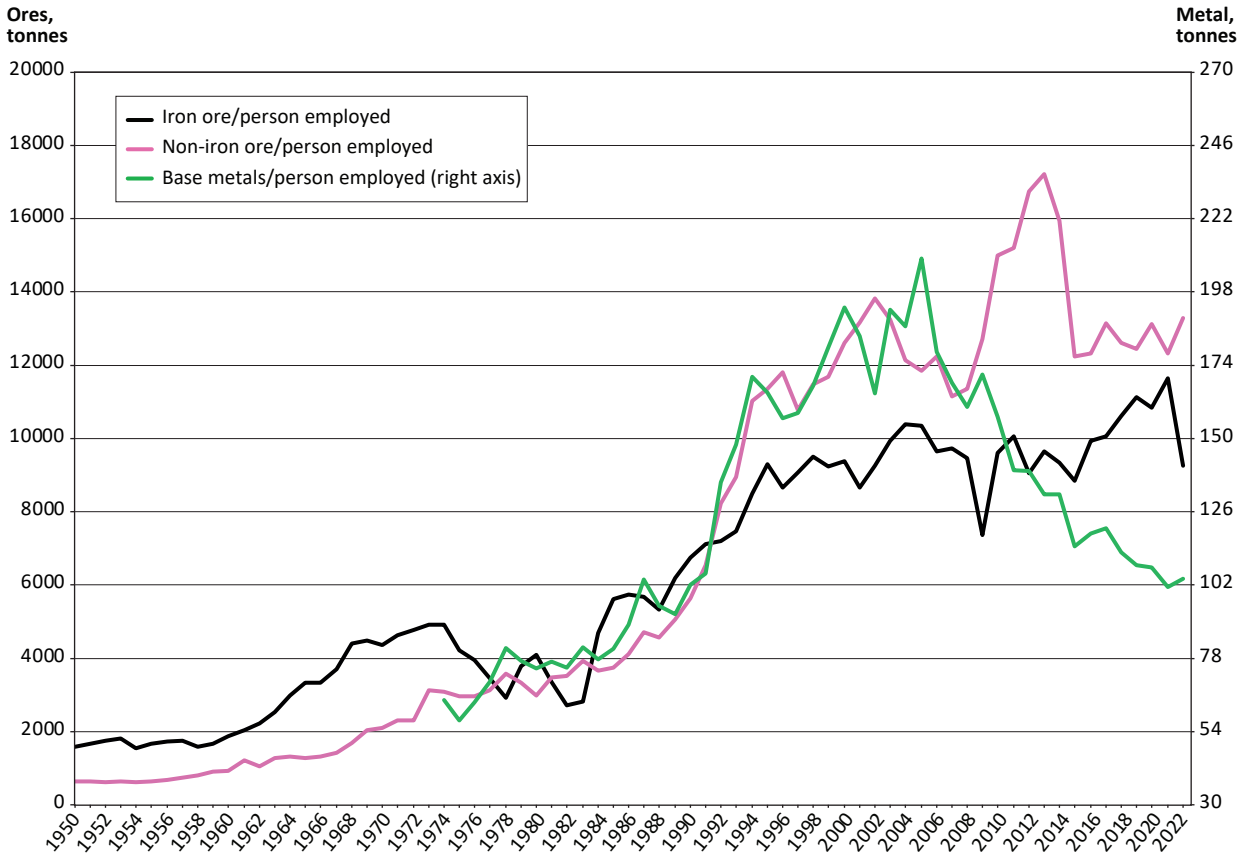



**Figure 24.** Productivity based on person employed per mined tonne of ore and recovered amount of metals 1950–2021.

## SALES

Sales by the Swedish mining industry (metal mines, not including smelters) totalled almost SEK 69 billion in 2022, on a par with the previous year. A troubled economic climate, with rising energy and commodity prices, and high inflation have driven wages as well as operating costs in general (Fig. 25).

Sales have varied over time. The lowest level was during the financial crisis in 2009 when sales were less than SEK 20 billion, and during the crisis years 2014–2016, with similar annual sales. The Swedish mining industry as a whole made a loss in 2014 and 2015, mainly due to the bankruptcies of some newly started mines at Dannemora and Tapuli (Pajala). Note that these figures only refer to mining operations and enrichment plants; metal and steel mills are not included.

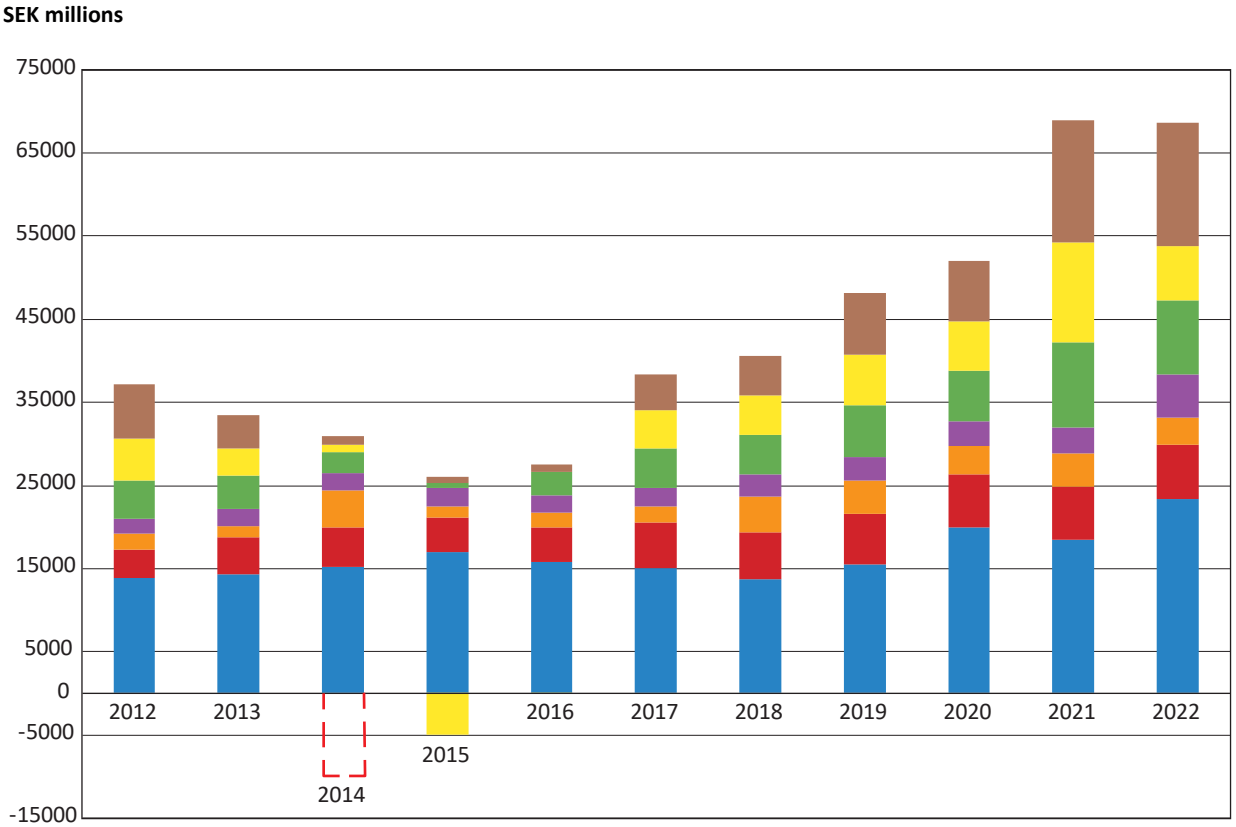



**Figure 25.** Mining industry sales 2012–2022 with key income items. "Taxes" includes corporation tax, payroll tax and social security contributions. "Profit brought forward" is profit for the year minus dividends.

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2004:1 Bergverksstatistik 2003
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2004:3 Grus, sand och krossberg. Produktion och tillgångar 2003
2004:4 Mineralmarknaden, oktober 2004
2004:5 Mineralmarknaden, december 2004 (Tema: Zink)
2005:1 Mineralmarknaden, april 2005 (Tema: Aluminium)
2005:2 Bergverksstatistik 2004
2005:3 Grus, sand och krossberg. Produktion och tillgångar 2004
2005:4 Mineralmarknaden, oktober 2005 (Tema: Arsenik)
2006:1 Mineralmarknaden, maj 2006 (Tema: Bly)
2006:2 Bergverksstatistik 2005
2006:3 Grus, sand och krossberg. Produktion och tillgångar 2005
2006:4 Mineralmarknaden, dec 2006 (Tema: Niob och tantal)
2007:1 Mineralmarknaden, april 2007 (Tema: Nickel)
2007:2 Bergverksstatistik 2006
2008:1 Mineralmarknaden, mars 2008 (Tema: Wolfram)
2008:2 Bergverksstatistik 2007
2008:3 Grus, sand och krossberg. Produktion och tillgångar 2007
2008:4 Mineralmarknaden, december 2008 (Tema: Molybden)
2009:1 Bergverksstatistik 2008
2009:2 Mineralmarknaden, juni 2009 (Tema: Litium)
2009:3 Grus, sand och krossberg. Produktion och tillgångar 2008
2009:4 Mineralmarknaden, december 2009 (Tema: Guld)
2010:1 Bergverksstatistik 2009
2010:2 Grus, sand och krossberg 2009
2011:1 Mineralmarknaden, april 2011 (Tema: Specialmetaller)
2011:2 Bergverksstatistik 2010
2012:2 Bergverksstatistik 2011
2013:1 Grus, sand och krossberg 2011
2013:2 Bergverksstatistik 2012
2014:1 Grus, sand och krossberg 2012
2014:2 Bergverksstatistik 2013
2014:3 Grus, sand och krossberg 2013
2015:1 Bergverksstatistik 2014
2015:2 Grus, sand och krossberg 2014
2016:1 Bergverksstatistik 2015
2016:2 Mineralmarknaden 2015 (Tema: Energimetaller)
2016:3 Grus, sand och krossberg 2015
2017:1 Bergverksstatistik 2016
2017:2 Grus, sand och krossberg 2016
2018:1 Bergverksstatistik 2017
2018:2 Grus, sand och krossberg 2017
2019:1 Mineralmarknaden 2018 (Tema: Järn och stål)
2019:2 Bergverksstatistik 2018
2019:3 Grus, sand och krossberg 2018
2020:1 Bergverksstatistik 2019
2020:2 Grus, sand och krossberg 2019
2021:1 Mineralmarknaden 2020 (Tema: Kobolt)
2021:2 Bergverksstatistik 2020
2021:3 Grus, sand och krossberg 2020
2022:1 Bergverksstatistik 2021
2022:2 Statistics of the Swedish Mining Industry 2021
2022:3 Grus, sand och krossberg 2021

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The number of visits to the SGU drill core archive in Malå is increasing. The drill cores provide important information about the Swedish bedrock. Photo: Fredrik Karlsson/SGU

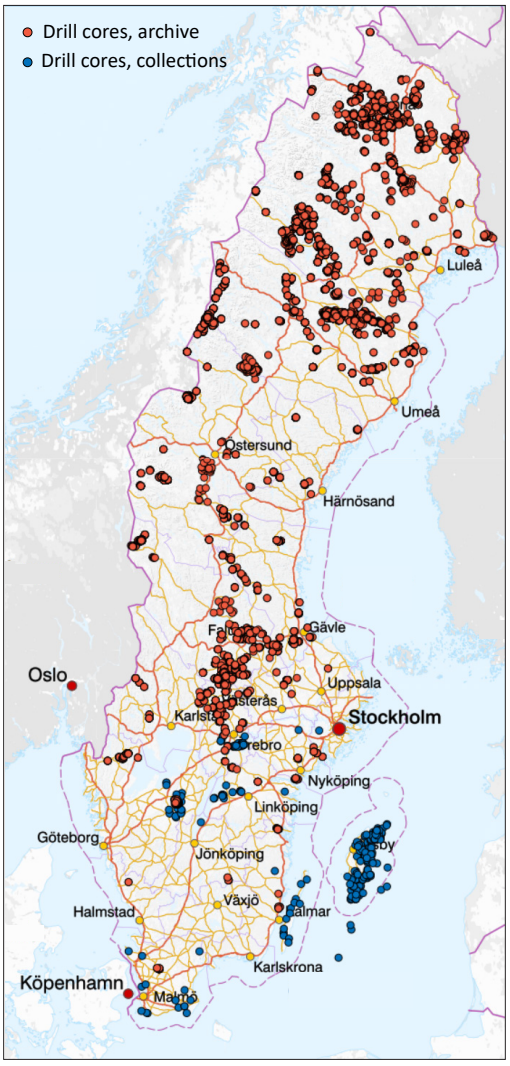
## Growing number of visits to the SGU drill core archive

Some 3.5 million drill cores from more than 18,000 boreholes throughout Sweden are stored at SGU's Mineral Information Office at Malå. Each year the office is visited by mining and exploration companies and researchers from around the world to examine the Swedish bedrock.

The drill cores have been collected from more than a hundred years of drilling and come from mineral exploration, scientific surveys, road construction projects and other context. They enable visitors to obtain in-depth information about Sweden's geology.

The number of visits to the drill core archive virtually doubled between 2020 and 2022 – from 143 visits to 274, although this was from a fairly low level due to the Covid-19 pandemic. The highest frequency of visits occurred during 2007 and 2008, when there were 560 and 400 visits respectively.

SGU's collection of drill cores is one of the largest of its kind in the world. Many of the samples are accompanied by mapping reports with observations and geological interpretations, results from geophysical borehole measurements and chemical analyses. More than 230,000 meters have been scanned using hyperspectral techniques. This enables users to more quickly gain an idea of an area's potential for construction or mining exploration, for example – or to expand our understanding of Sweden's geological development.




The map viewer *Borrkärnor* ("Drill cores") shows coordinates information about the drill cores and boreholes that SGU manages.

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