



Statistics of the Swedish Mining Industry 2023

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Page 46, table 19, sixth column. Numbers exchanged.

New text: Original text:

<u>Total</u>	<u>Total</u>
<u>Number</u>	<u>Number</u>
103	87
47	40
35	12
10	5
9	2
180	138
4	15
4	2
3	3
9	9
15	11
204	186
29	14
37	20
21	9
32	26
9	8
751	587

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Cover image: Drilling in the Kankberg mine.

Photo: Carolina Liljenstolpe (SGU)

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FOREWORD

This report is a statistical summary of Swedish mining industry and a translated version of the report *Bergverksstatistik 2023* (in Swedish). Reports like this have been published regularly since 1833. The statistics were originally published by the Swedish Board of Mines, then by the National Board of Trade and Statistics Sweden, and, since 1985, by the Geological Survey of Sweden (SGU).

The statistics include data on the extraction of metals and minerals in Sweden, an international overview of global production, a summary of mineral deposits of national importance under the Environmental Code, data on mining and mineral permits applied for and granted, mining waste, environmental statistics, exports and imports, and economic statistics on the mining industry.

Statistics on metal prices are based on *Bergverksstatistik*. Annual and quarterly summaries of metal prices are presented under the heading *Metal prices* on the SGU website. Statistics on other mineral production in Sweden, such as production of rock, gravel, natural stone, industrial minerals, as well as energy peat, are included in a publication entitled *Grus, sand och krossberg* (“Gravel, sand and crushed rock”).

2023 was a year of global challenges for the mining sector. The global economy weakened, with periods of lower demand for iron and base metals; the Swedish mining sector was no exception. The statistics show that ore production in 2023 totalled just over 84 million tonnes, down 4 per cent compared to 2022. The mining industry’s total sales (not including smelters) totalled SEK 65 billion, a drop of 6 per cent.

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Loading waste rock in Aitik's open pit. Photo: Carolina Liljenstolpe/SGU.

The Swedish mining industry

Sweden's mineral resources and mineral reserves mostly occur in the three main ore districts of Norrbotten and Skelleftefältet, both in northern Sweden, and Bergslagen in south-central Sweden. In addition to and outside of these areas, there are deposits in northern Sweden and in the provinces of Småland and Dalsland.

In 2023, there were 12 operating metal mines and 14 operating processing facilities in Sweden (Fig. 1). In addition to those situated at mines, statistics on the number of operating facilities include the Svartliden

and the Boliden concentrators. No mining currently takes place at Svartliden; operations are confined to enrichment of gold ore concentrate from Finland.

Ore production in Sweden has risen markedly in recent decades (Fig. 2). The increase is due to improved efficiency and higher volumes produced at all mines. The increased quantity of non-ferrous ore in the early 2010s can be ascribed to Boliden's Aitik mine. Ore production in 2023 totalled 84 million tonnes, down almost 4 per cent compared to the previous year (Table 1).

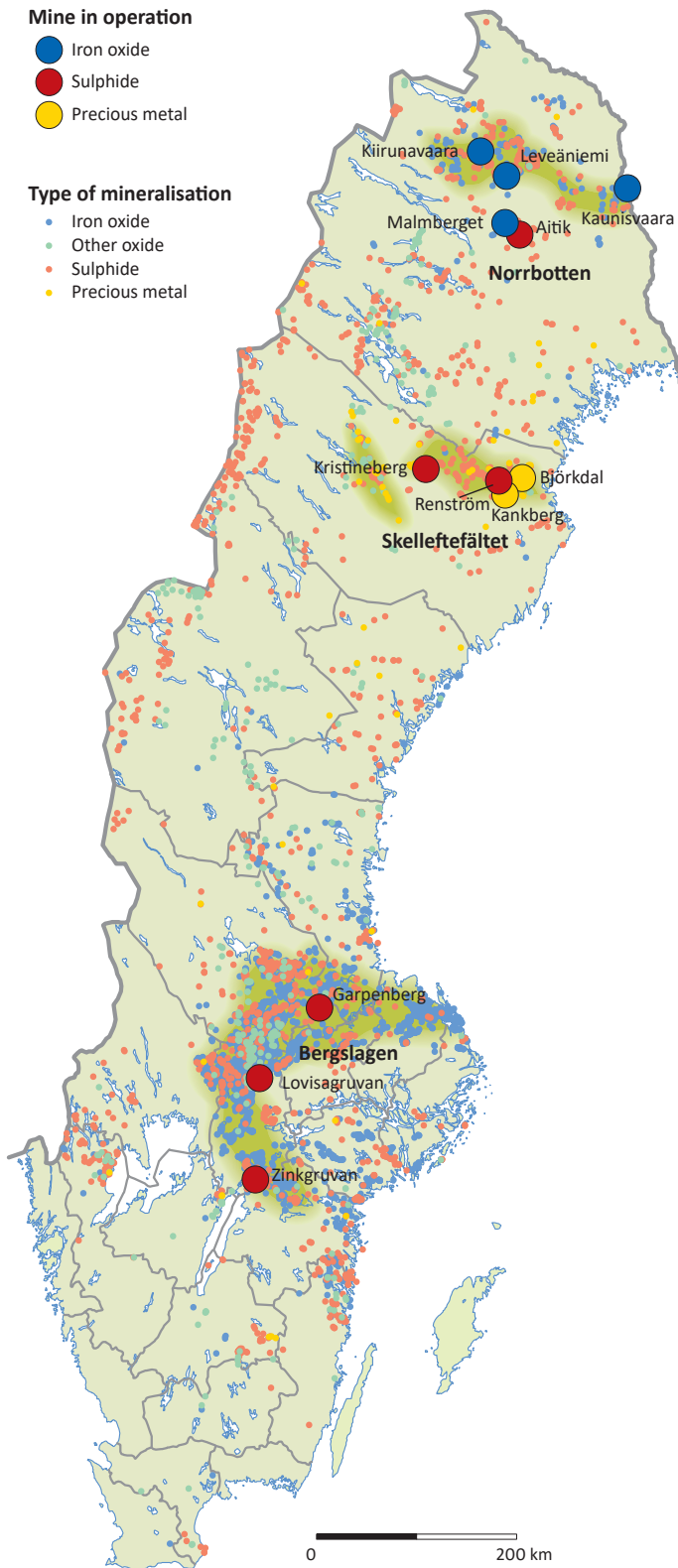


Figure 1. Sweden's mines and mineralisations 2023.

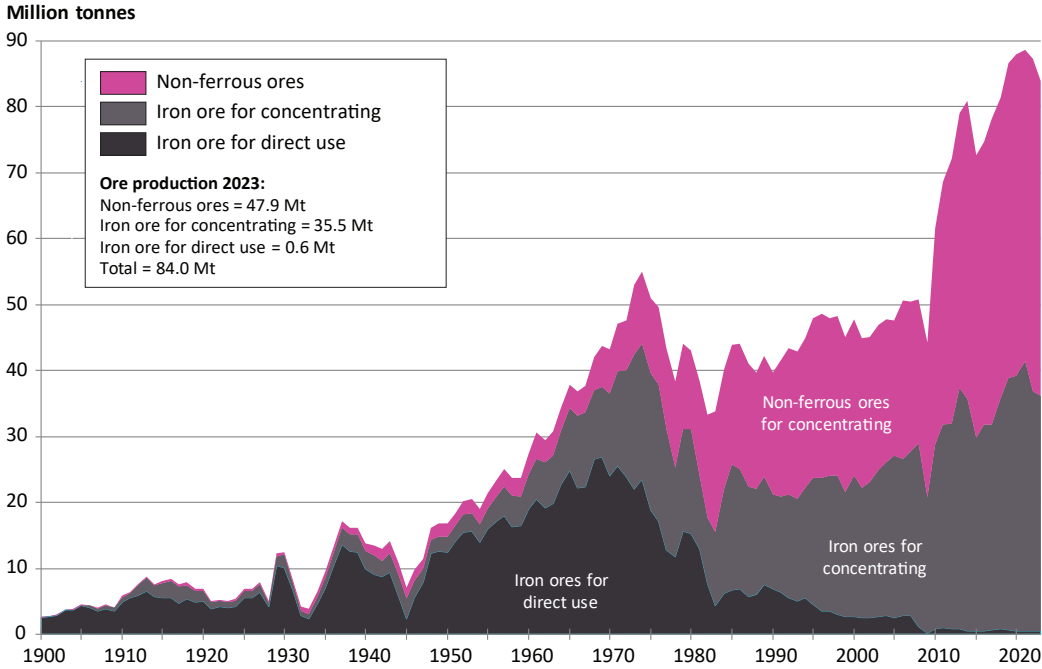


Figure 2. Production of ore in Sweden, 1900–2023.

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
1975	18 847	20 732	39 579	0	11 407	11 407	50 986

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	
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	47 303	88 616
2022	565	36 192	36 757	0	50 474	50 474	87 231
2023	608	35 522	36 130	0	47 888	47 888	84 018

NUMBER OF MINES 1900–2023

In the early 20th century, there were between 100 and 200 operating mines and ore fields in Sweden, and by the end of World War I, there were up to 260 mines (Fig. 3). However, it must be considered that 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 every individual mine within an ore field, whereas later figures refer to entire ore fields. For example, production from 12 separate mines in the Dannemora field was reported during the period 1910–1920 but since 1940 the statistics have been aggregated as “Dannemora”.

Mining are often long-term operations; eight of the twelve mines currently operating are more than fifty years old (Fig. 4).

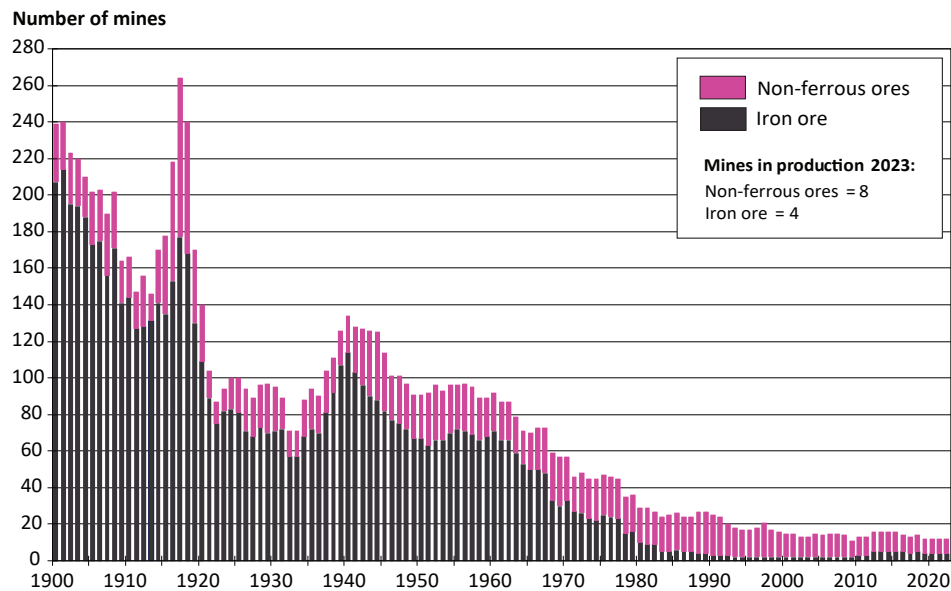


Figure 3. Number of mines in operation in Sweden, 1900–2023.

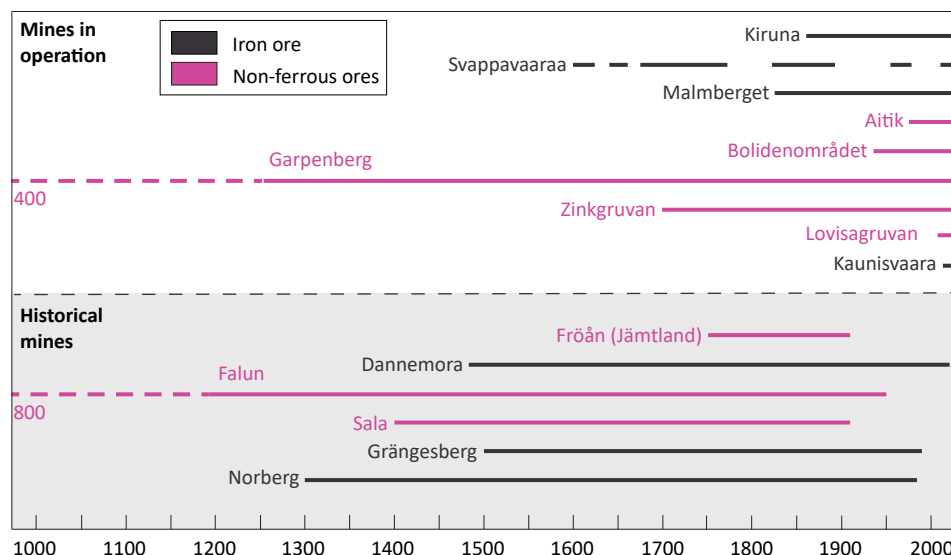


Figure 4. Swedish mines often have had a long history. The upper part of the diagram shows age and production period for mines in operation, the lower part shows the same for some major historical mines. Several of these date back to the Middle Ages. Dark grey shows iron ore mines, pink represents non-ferrous ore mines.

EMPLOYMENT IN THE MINING INDUSTRY

In 2023, 10,610 persons were employed by the Swedish mining industry (Fig. 5). The figure for 2022 was 8,045. The large increase is partly because figures for 2023 include more reliable estimates of the number of sub-contractors. Figures published by Statistics Sweden (SCB) on the number of people employed in the mining and minerals industry can provide supplementary information, however, their figures are always reported with a one-year delay, so their latest figures are for 2022 (Fig. 5). According to SCB, the Swedish mining and minerals industry employed 10,185 people in 2022 (SNI05-09).

Iron ore mines employ slightly more persons, but the non-ferrous ore mines have more operating facilities (Table 2). 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).

Female workers employed by mining companies totalled 2,719 in 2023 (Table 4). The proportion of women employed in the mining industry is higher than for manufacturing industry as a whole. In 2023, 26 per cent of all employees in the mining industry were women, compared to 25 per cent in manufacturing industry as a whole (Fig. 6).

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 in the mining sector leading to absence and work-related illness has remained relatively stable, at about 100, over the past five years (Fig. 7). The year 2021, with a figure of 151, was an exception. The increase was probably due to Covid-19, which is accepted as a work-related illness if contracted at work. The frequency of accidents at work per 1,000 employees was 12 for men and 14 for women.

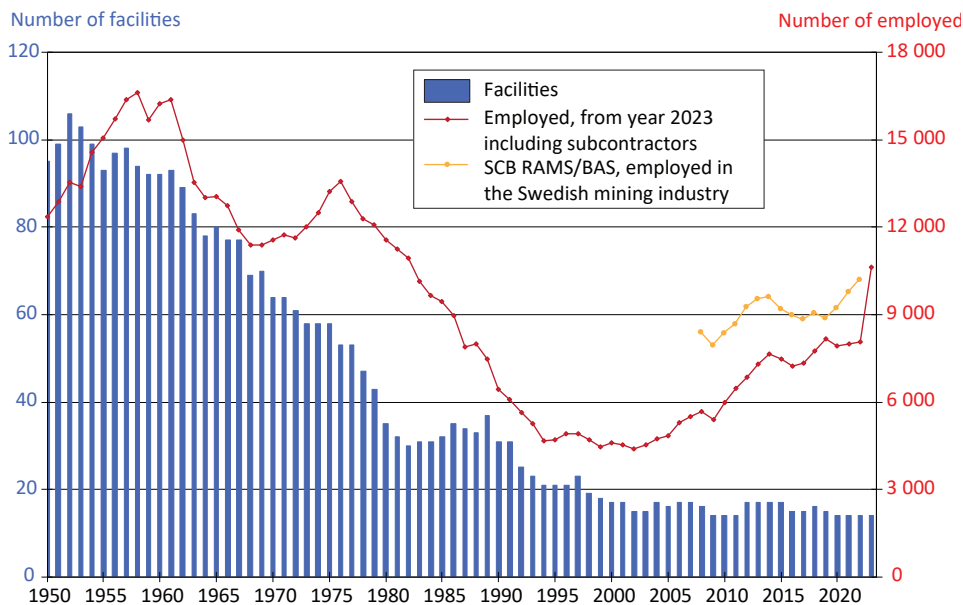


Figure 5. Number of operating facilities and people working in the mining industry, 1950–2023*. SCB:s figures are lagging behind.

* From 2023, SGU's survey has been changed so that all subcontractor employees are included.

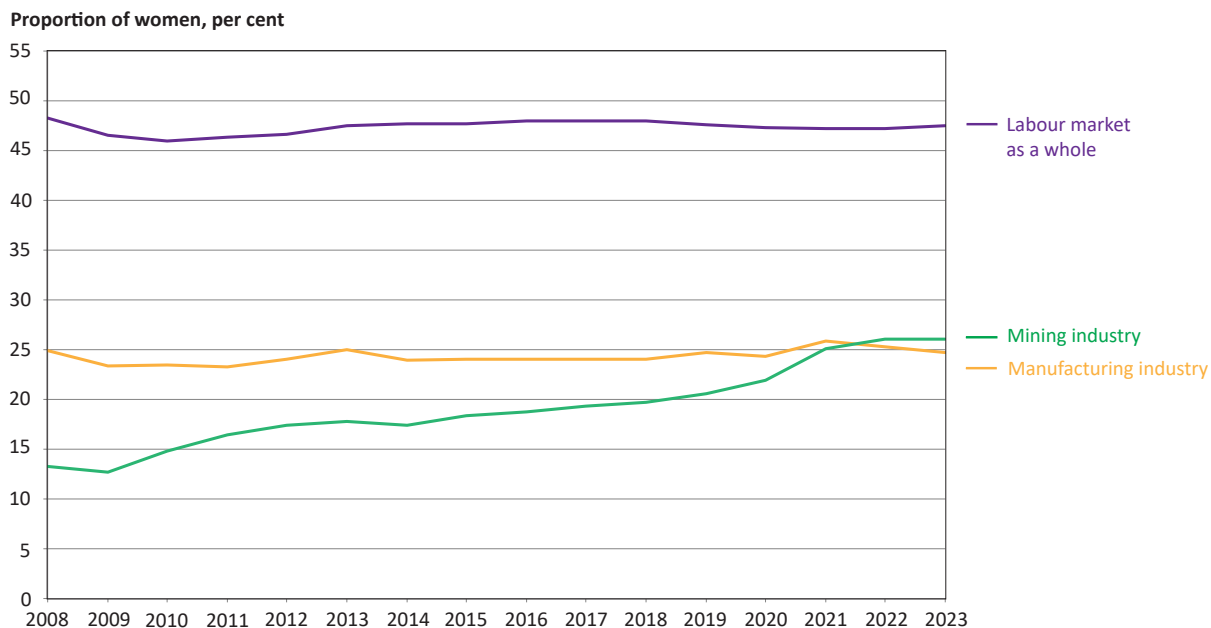


Figure 6. Proportion of women in the mining industry, manufacturing industry and the labour market as a whole, 2008–2023.

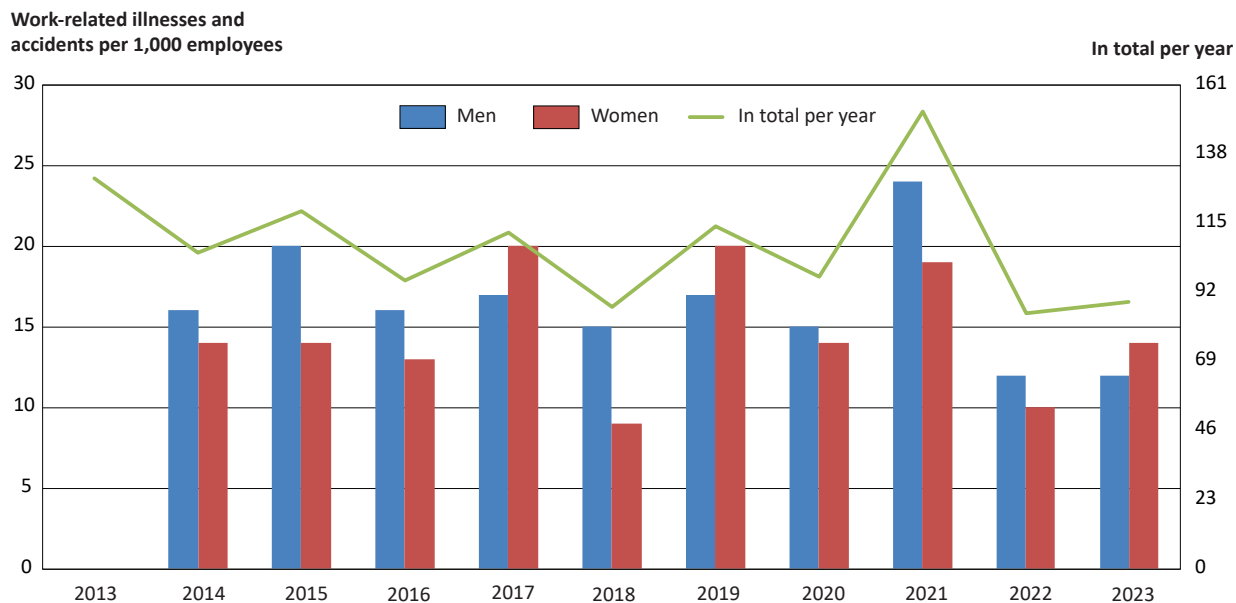


Figure 7. Number of work-related illness and accident with resulting sick-leave at Swedish mines, 2013–2023. Number per 1,000 employees by gender and total. Source: Swedish Work Environment Authority (statistics are continuously updated).

Table 2. Number of operating facilities and people working in the mining industry, 1950–2023. Source: SGU survey.

Year	Iron ore mines		Non-ferrous ore mines		Total	
	Facilities	Employed	Facilities	Employed	Facilities	Employed, including subcontractors
1950	68	9 302	27	3 051	95	12 353
1951	68	9 888	31	2 983	99	12 871
1952	72	10 435	34	3 096	106	13 531
1953	72	10 194	31	3 206	103	13 400
1954	69	10 891	30	3 672	99	14 563
1955	66	11 357	27	3 686	93	15 043
1956	68	11 993	29	3 740	97	15 733
1957	69	12 782	29	3 606	98	16 388
1958	68	13 246	26	3 375	94	16 621
1959	68	12 478	24	3 198	92	15 676
1960	68	12 906	24	3 346	92	16 252
1961	69	13 003	24	3 365	93	16 368
1962	65	11 770	24	3 215	89	14 985
1963	59	10 715	24	2 813	83	13 528
1964	57	10 306	21	2 704	78	13 010
1965	57	10 248	23	2 787	80	13 035
1966	53	9 903	24	2 839	77	12 742
1967	50	9 084	27	2 819	77	11 903
1968	39	8 410	30	2 966	69	11 376
1969	40	8 354	30	3 038	70	11 392
1970	36	8 382	28	3 183	64	11 565
1971	36	8 604	28	3 128	64	11 732
1972	35	8 386	26	3 256	61	11 642
1973	33	8 588	25	3 412	58	12 000
1974	32	8 954	26	3 538	58	12 492
1975	32	9 378	26	3 849	58	13 227
1976	30	9 564	23	3 999	53	13 563
1977	30	8 996	23	3 884	53	12 880
1978	24	8 625	23	3 673	47	12 298
1979	21	8 235	22	3 852	43	12 087
1980	15	7 594	20	3 950	35	11 544
1981	12	7 094	20	4 171	32	11 265
1982	10	6 512	20	4 431	30	10 943
1983	8	5 492	23	4 642	31	10 134
1984	7	4 683	24	4 988	31	9 671
1985	8	4 574	24	4 857	32	9 431
1986	7	4 368	28	4 578	35	8 946
1987	7	3 951	27	3 954	34	7 905
1988	7	4 129	26	3 857	33	7 986
1989	7	3 855	30	3 605	37	7 460
1990	5	3 143	26	3 294	31	6 437
1991	5	2 943	26	3 155	31	6 098
1992	5	2 949	20	2 695	25	5 644
1993	4	2 761	19	2 496	23	5 257
1994	4	2 604	17	2 068	21	4 672
1995	4	2 546	17	2 132	21	4 678

Table 2. Continued.

Year	Iron ore mines		Non-ferrous ore mines		Total	
	Facilities	Employed	Facilities	Employed	Facilities	Employed, including subcontractors
1996	3	2 744	18	2 109	21	4 853
1997	3	2 648	20	2 215	23	4 863
1998	3	2 529	16	2 108	19	4 637
1999	3	2 336	15	2 012	18	4 348
2000	3	2 574	14	1 872	17	4 446
2001	3	2 560	14	1 725	17	4 285
2002	3	2 489	12	1 599	15	4 088
2003	3	2 502	12	1 664	15	4 166
2004	3	2 515	14	1 787	17	4 302
2005	3	2 615	13	1 739	16	4 354
2006	3	2 752	14	1 975	17	4 727
2007	3	2 865	14	2 026	17	4 891
2008	3	3 058	13	1 927	16	4 985
2009	3	2 800	11	1 856	14	4 656
2010	3	2 998	11	2 182	14	5 180
2011	3	3 166	11	2 427	14	5 593
2012	5	3 522	12	2 400	17	5 922
2013	5	3 874	12	2 421	17	6 295
2014	5	3 830	12	2 828	17	6 658
2015	5	3 374	12	3 502	17	6 876
2016	4	3 206	11	3 478	15	6 684
2017	4	3 159	11	3 537	15	6 696
2018	5	3 374	11	3 622	16	6 996
2019	4	3 494	10	3 830	15	7 324
2020	4	3 620	10	3 714	14	7 334
2021	4	3 546	10	3 841	14	7 387
2022	4	3 973	10	3 800	14	7 773
2023*	4	6 119	10	4 491	14	10 610

* From 2023, SGU's survey has been changed so that all subcontractor employees are included.

Table 3. Number of employed by county and sector in the mining industry 2023. Source: SGU survey.

County	Number of facilities 2023	Employed		Iron ore mines	Non-ferrous ore mines
		2022	2023		
Örebro	2	467	564		564
Dalarna	1	706	683		683
Västerbotten	6	970	1 295		1 295
Norrbottn	5	5 102	8 068	6 119	1 949
Whole Sweden 2023*	14		10 610	6 119	4 491
Whole Sweden 2022	14	8 045			

* From 2023, SGU's survey has been changed so that all subcontractor employees are included.

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

Year	Women	Total	Proportion (%)
2008	662	4 985	13
2009	589	4 656	13
2010	764	5 180	15
2011	920	5 593	16
2012	1 031	5 922	17
2013	1 120	6 295	18
2014	1 328	7 658	17
2015	1 372	7 476	18
2016	1 353	7 234	19
2017	1 416	7 346	19
2018	1 524	7 746	20
2019	1 681	8 174	21
2020	1 738	7 934	22
2021	2 005	7 999	25
2022	2 092	8 045	26
2023*	2 719	10 610	26

* From 2023, SGU's survey has been changed so that all subcontractor employees are included.



Cleaning work in the enrichment plant, Björkdalsgruvan. Photo: Carolina Liljenstolpe/SGU

SALES

The global economy cooled in 2023, with intermittently low demand, both for iron ore and for base metals. Several Swedish mines also faced operational challenges. Sales by the Swedish mining industry (metal mines, not including smelters) totalled almost SEK 65 billion. Sales were nearly SEK 4 billion down compared to the previous year (Fig. 8).

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 the 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.

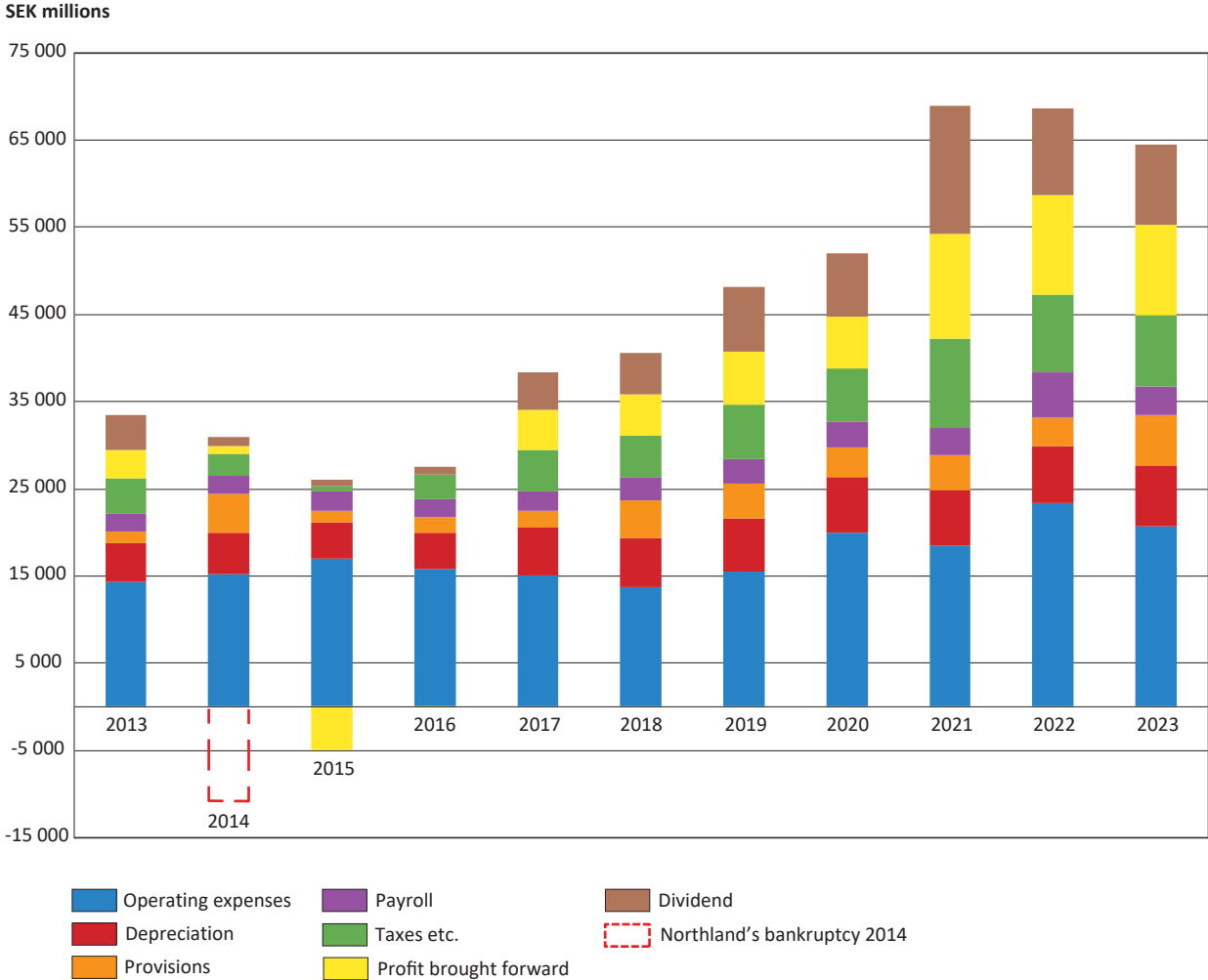


Figure 8. Mining industry sales 2013–2023 with key income items. “Taxes” includes corporation tax, payroll tax and social security contributions. “Balanced profit” (profit brought forward) is profit for the year minus dividends.

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 mainly 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 9 shows exports and imports of mineral raw materials and finished mineral products, such as metals, for the years 2019 to 2023. In the diagram, construction minerals consist of import and export of minerals used in the construction industry. Energy minerals 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 2023 was 2 per cent up compared to 2022, while quantities rose by 28 per cent. In quantity terms, export of ores, specifically iron ore, increased the most. Import quantities were 10 per cent down compared to the previous year. The overall value of imports fell by 12 per cent.



Copper cathodes. Photo: Boliden

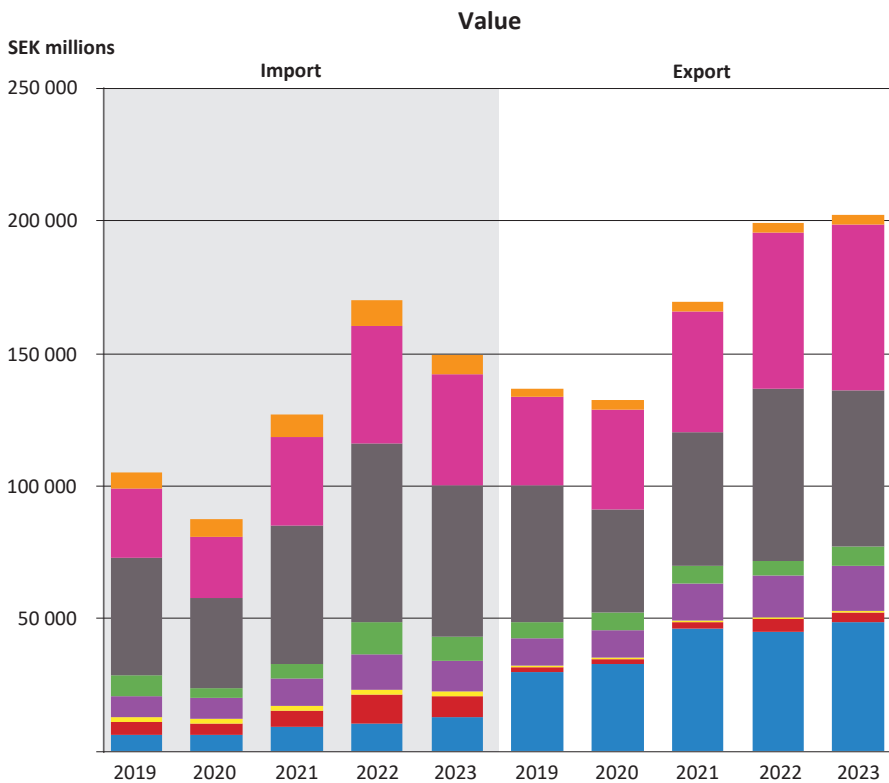
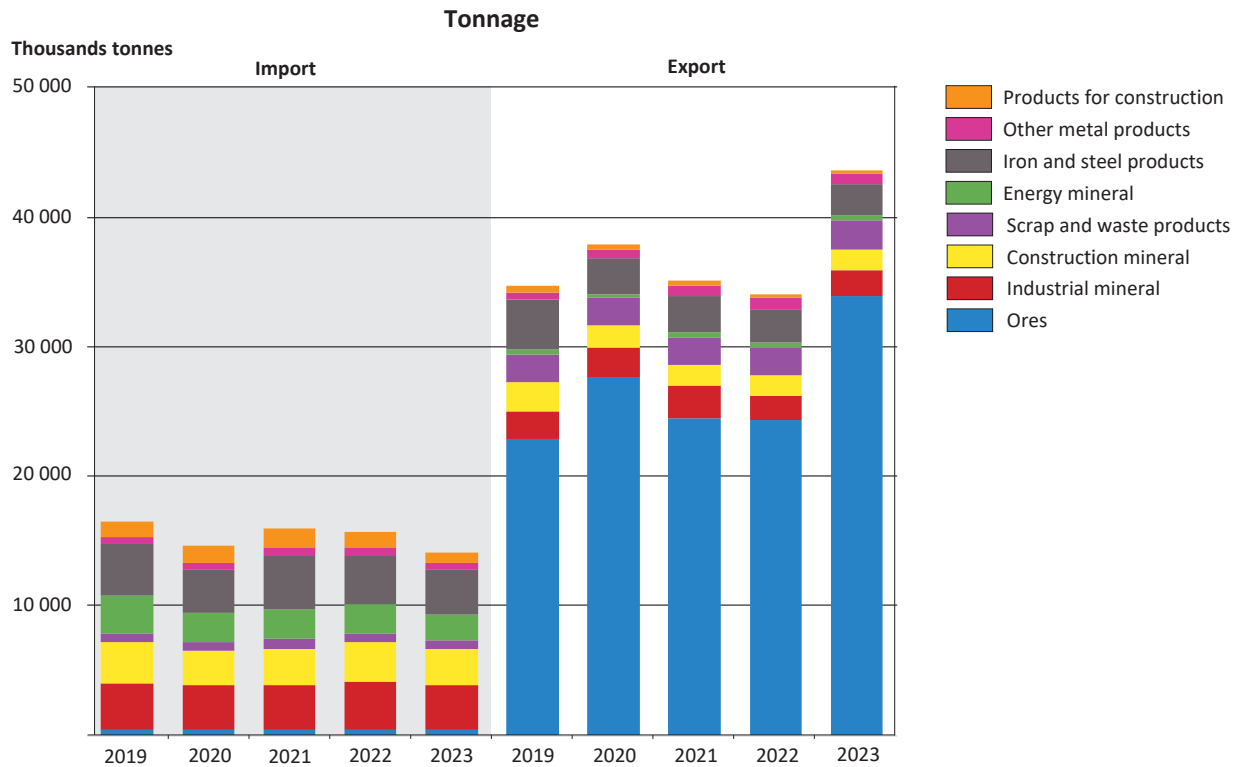


Figure 9. Export and import of ores, metals and minerals 2019–2023 by tonnage and value. Source: Statistics Sweden



The Björkdal mine in Västerbotten is one of northern Europe's largest mines for the extraction of gold. The majority is mined underground. In 2023, Sweden produced approximately 7.4 tons of gold, which corresponds to approximately 2 per thousand of world production. Photo: Carolina Liljenstolpe/SGU.

International overview

Mines in Sweden currently produce iron ore, base metals and certain precious metals. Compared with the rest of the EU, Sweden is a relatively large producer of iron ore in particular, as well as of lead and zinc. However, in global terms Sweden is a fairly minor producer, both of iron ore and base metals (Fig. 10). Figure 11 shows an international summary, with Sweden's production of iron ore in a global perspective. The statistics in this section have been obtained from

S&P Capital IUQ, ICSG (International Copper Study Group), ILZSG (International Lead & Zinc Study Group) and USGS (U.S. Geological Survey).

GLOBAL PRODUCTION OF IRON ORE

In the global market Sweden is a relatively minor producer of iron ore, accounting for about 1 per cent of the global production. Sweden accounts for 93 per cent

of iron ore production in the EU, and is therefore a leading player (Fig. 12). Sweden’s production, from LKAB and Kaunis Iron AB, totalled 28.7 million tonnes in 2023. In 2022, Swedish production of finished iron ore products was 28.1 million tonnes (see also Table 9 in the Iron Ore section).

As of May 2024, statistics on global iron ore production in 2023 are not available. Accordingly, the figures presented here are for 2022. According to estimates by S&P Capital IQ, global production of iron ore in 2022 totalled 2,367 million tonnes, down just over 4 per cent compared to 2021. The figure refers to “saleable product”.

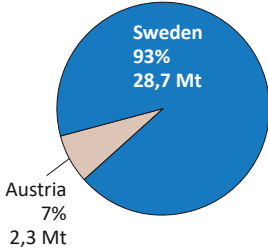
Figure 11 shows that Australia and Brazil were the two largest iron ore producers in the world in 2022.

These countries are estimated to have produced 980 and 387 million tonnes, respectively, together accounting for about 58 per cent of global production. In third place was China, with 202 million tonnes, followed by India (143 Mt) and Russia (123 Mt) (converted to the international standard of approximately 60 per cent iron).

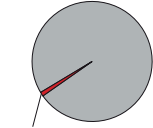
Twelve of the 40 largest iron ore mines are in Australia. These are operated by five companies. As Figure 13 shows, the Australian iron ore mines are concentrated in the western part of the country. Most mining operations in Brazil are in the south-eastern part. However, the country’s largest mines – Serra Norte and Serra Sul, operated by Vale – are in the northern state of Pará. Many mines in Russia are located in the iron-rich region centred on Kursk.

Iron

EU production: 31,0 million tonnes



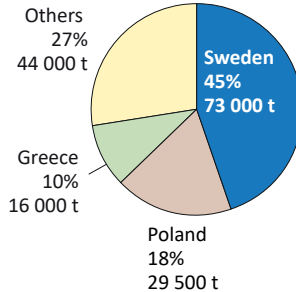
World production: 2 400 million tonnes



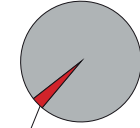
EU share of world production: 1,3%

Lead

EU production: 162 000 tonnes



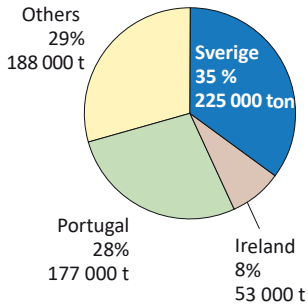
World production: 4,5 million tonnes



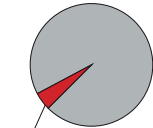
EU share of world production: 3,6%

Zinc

EU production: 643 000 tonnes



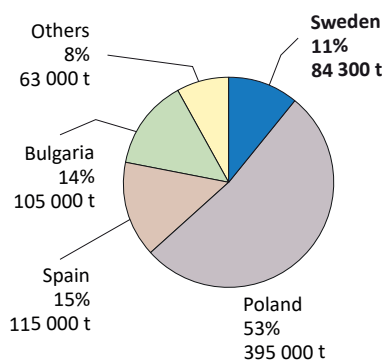
World production: 12,26 million tonnes



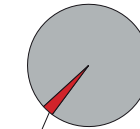
EU share of world production: 5,2%

Copper

EU production: 752 400 tonnes



World production: 22,1 million tonnes



EU share of world production: 3,4%

Figure 10. Sweden’s mining production 2023 in relation to the EU and the rest of the world.

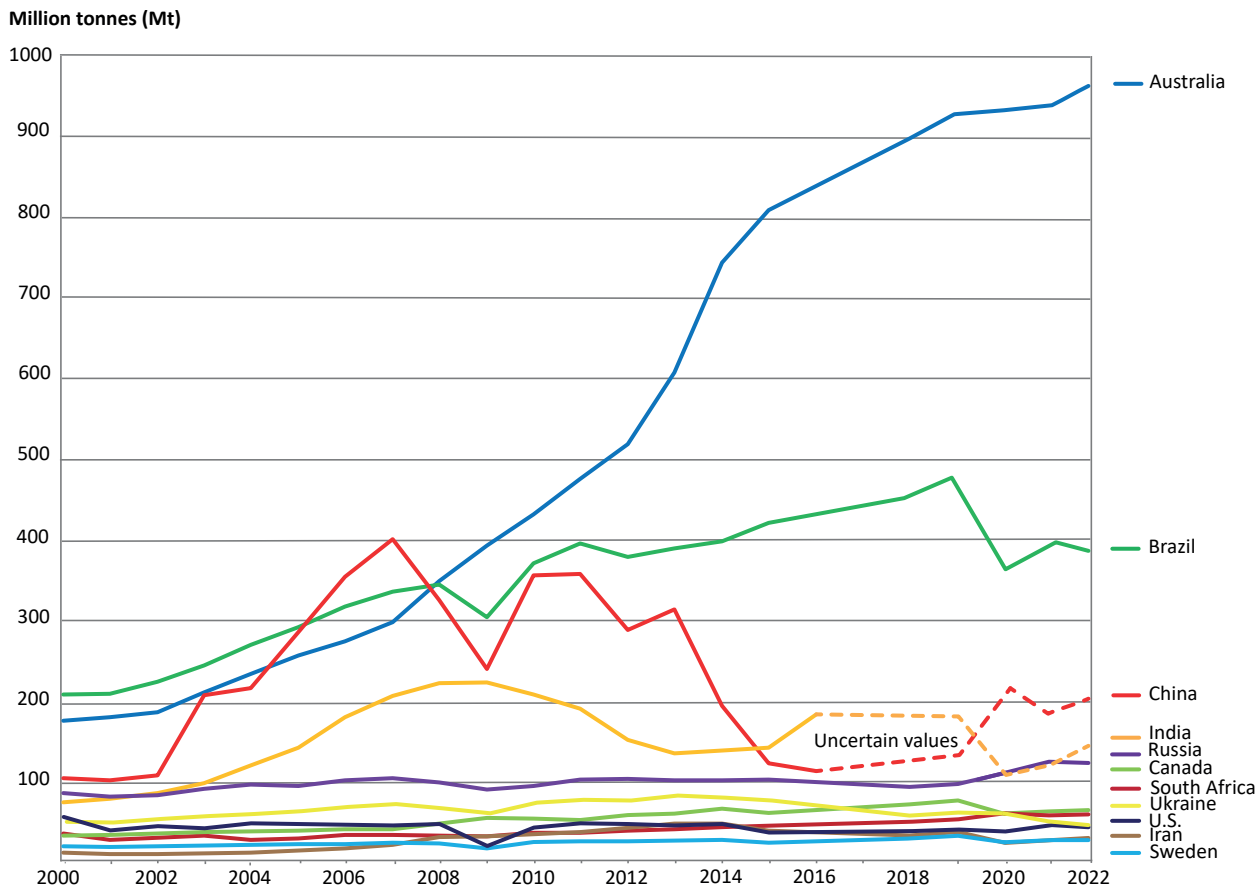


Figure 11. Global iron ore production, 2000–2022. (As of May 2024 international statistics are available only up to 2022.)

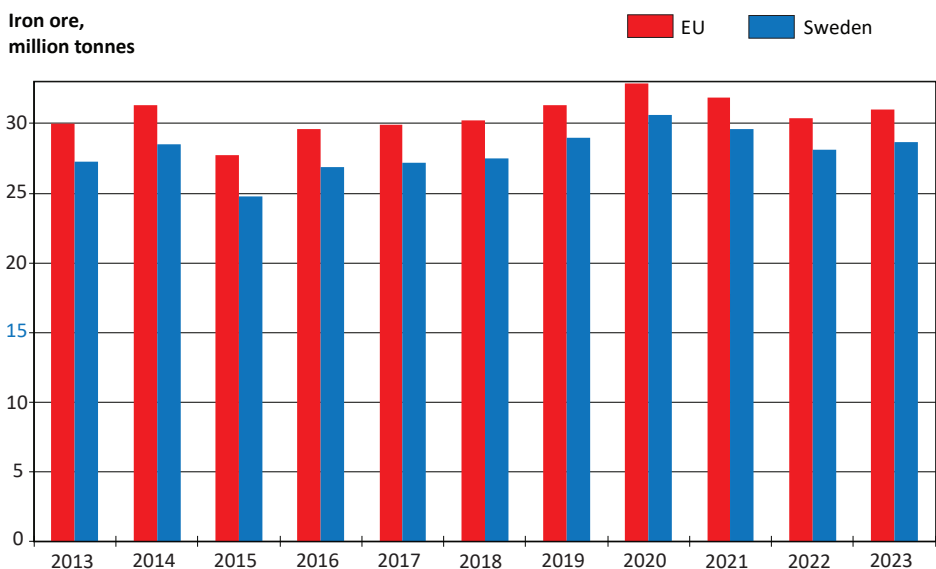


Figure 12. Sweden's share of total EU iron ore production, 2012–2023.



Figure 13. The 40 largest iron ore mines in the world, 2022. (As of May 2024 statistics are available only up to 2022.) Source: S&P Capital IQ

GLOBAL PRODUCTION OF BASE METALS

Copper

Global copper production has risen continuously over the past five years. According to ICSG, total production of copper from mines throughout the world was 22.1 million tonnes in 2023.

Chile is the world’s largest copper producer. In 2023, 24 per cent of all raw materials were produced in Chile. Other major producers are Peru, China and the Democratic Republic of the Congo (DRC). The mines in Sweden account for a fairly small proportion of global copper production – just over 0.3 per cent, but represent 10 per cent of European copper production (Fig. 14).

Lead

Most lead is mined in China (44 per cent). Australia (10 per cent) is also a major producer. According to ILZSG, total production of lead from mines throughout

the world was just under 4.5 million tonnes in 2023. Sweden produced about 73,000 tonnes of lead in 2023 which account for 45 per cent of lead production in the EU (Fig. 15).

Lead is by far the most recycled of all base metals. Recycling is made easier by the fact that virtually all lead is used in a single product – lead batteries, which are easy to collect and also easy to recycle.

Zinc

According to ILZSG, total production of zinc from mines around the world was just under 12.3 million tonnes in 2023.

China is the world’s largest producer of zinc, accounting for 36 per cent of global production. Other major producers are Australia and Peru, with 9 and 10 per cent of global production, respectively.

As Figure 16 shows, Sweden produced approximately 225,000 tonnes of zinc in 2003, and Swedish mines account for just over one-third of zinc production in the EU..

**Copper, metal content
thousand tonnes**

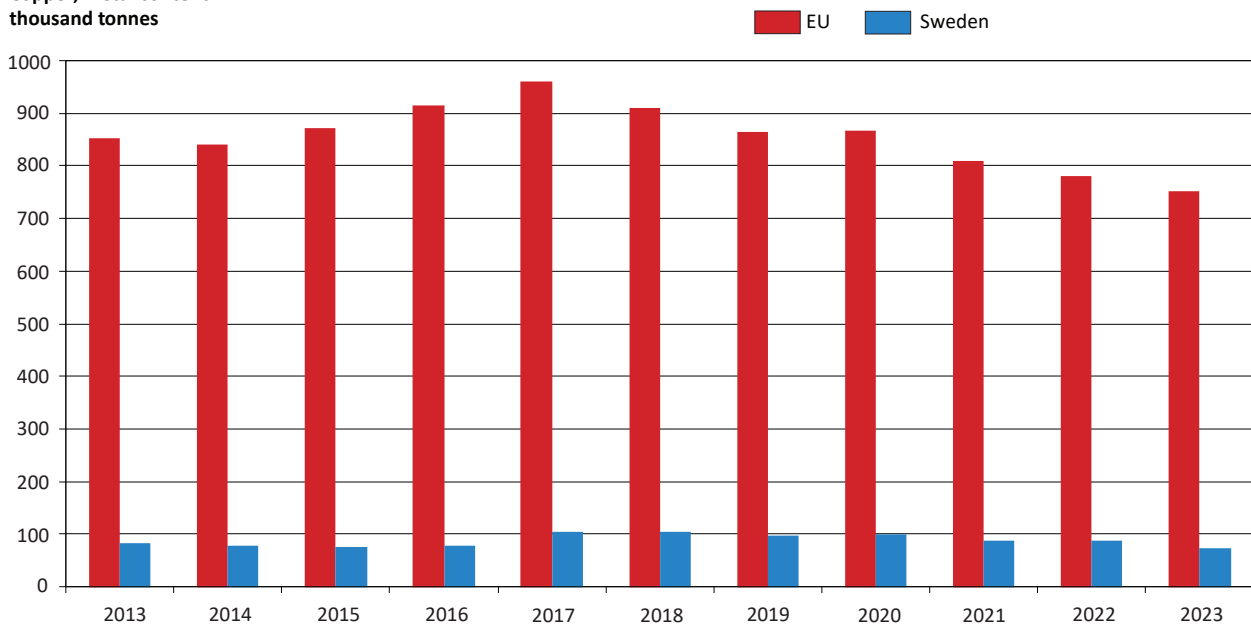


Figure 14. Sweden's share of total mining production of copper in the EU, 2013–2023.

**Lead, metal content
thousand tonnes**

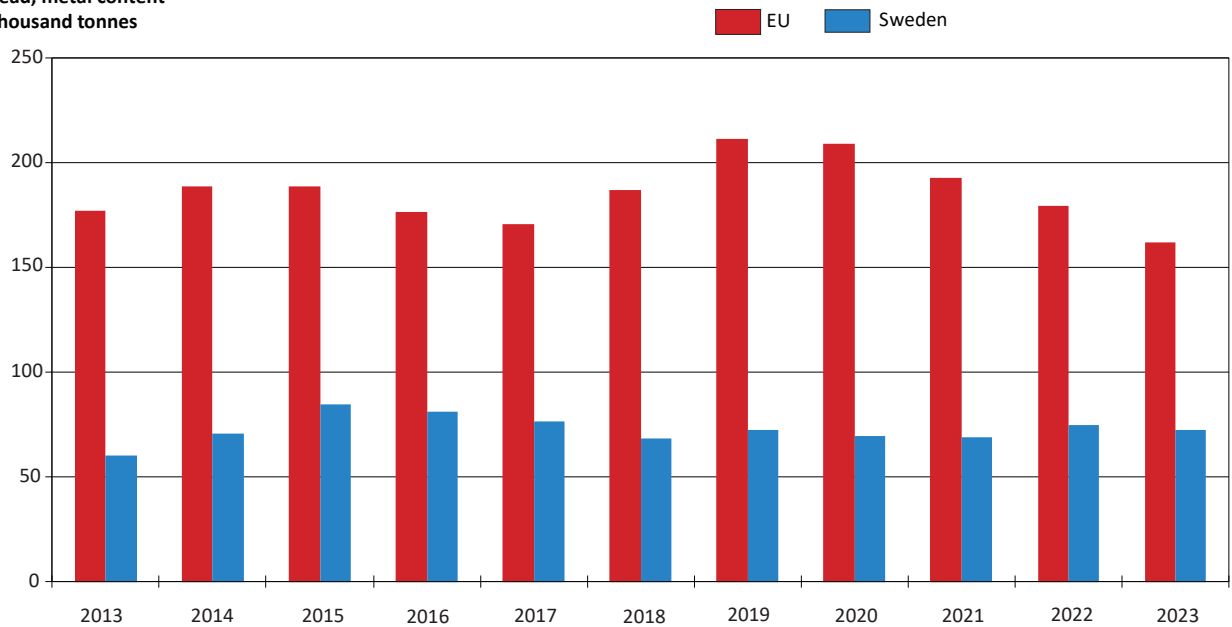


Figure 15. Sweden's share of total mining production of lead in the EU, 2013–2023.

**Zinc, metal content
thousand tonnes**

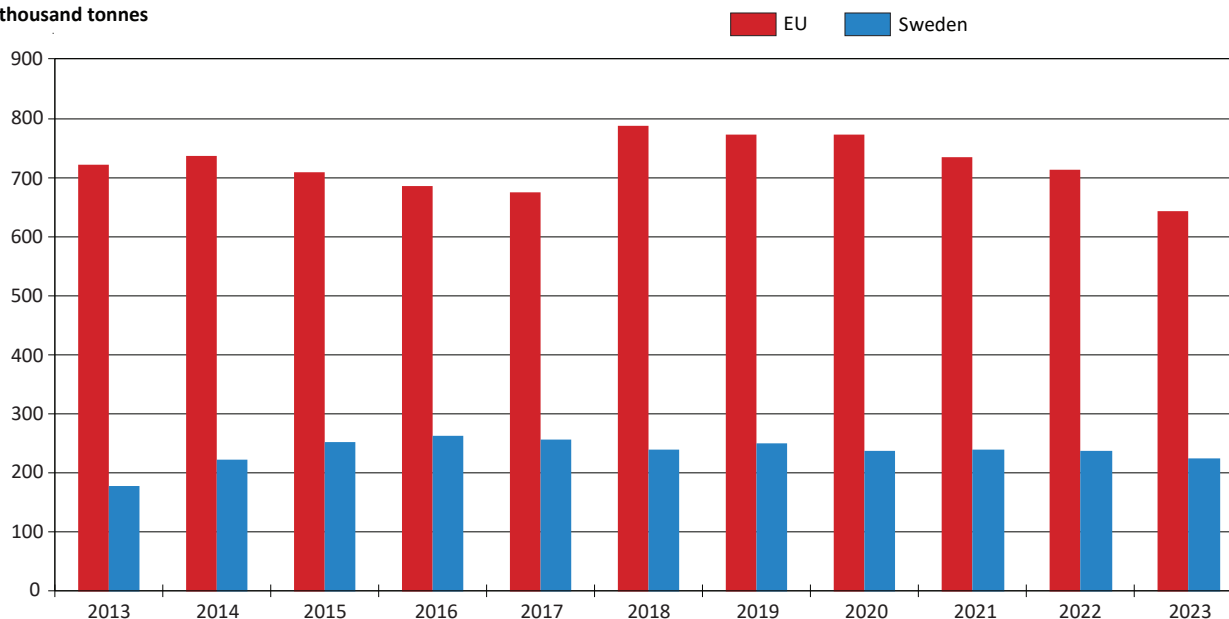


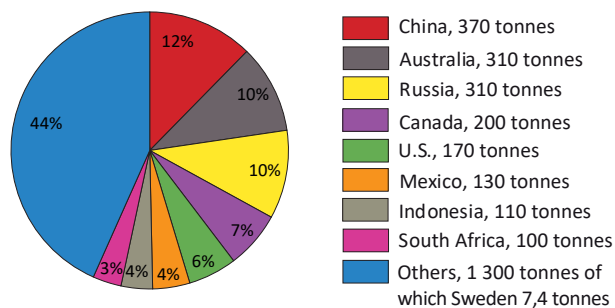
Figure 16. Sweden’s share of total mining production of zinc in the EU 2013–2023.

GLOBAL PRODUCTION OF GOLD AND SILVER

Gold

In 2023, some 3,000 tonnes of gold were mined across the world. Gold is mined in all continents except Antarctica. China, Russia and Australia are the largest producers, accounting for 13, 10 and 10 per cent of global production, respectively. Other major producers are the US and Canada. Sweden produced about 7.4 tonnes of gold in 2023, representing about 0.002 per cent of global production (Fig. 17).

Gold (tonnes)



Silver

Global silver production was 26,000 tonnes in 2023. The most important silver producer was Mexico, with 25 per cent of global production. China and Peru accounted for 13 and 12 per cent of global production, respectively. In Sweden, silver is mined in Zinkgruvan and in Boliden’s Aitik, Boliden area and Garpenberg mines. Some 400 tonnes of silver was produced in Sweden in 2023, accounting for approximately 1.5 per cent of global production (Fig. 17).

Silver (tonnes)

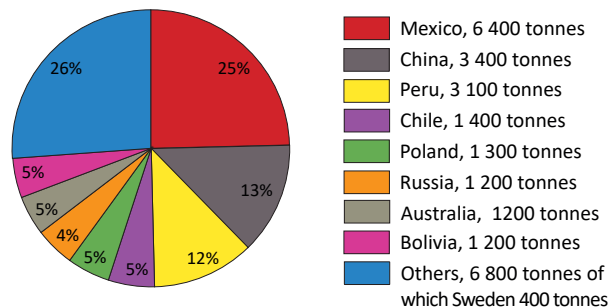


Figure 17. Global mining production of gold and silver, 2023.



Iron pellets. Photo: Carolina Liljenstolpe/SGU

Production of iron ore

In the beginning of each year, SGU sends out a questionnaire to companies operating in the Swedish metal mining industry. The survey includes questions about production volumes, sales and employment. The sections below on *LKAB* and *Kaunisvaara Iron AB* present results from the SGU survey for iron ore mines in production in 2023. The results are 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 northernmost Sweden. Most of the iron ore extracted is high-quality magnetite. This physical fact facilitates concentration and requires less energy for pellet production. The iron content after concentration of ore is over 70 per cent, rendering the product to be sought after in the market.

According to SGU's questionnaire survey, LKAB's production of saleable iron ore product in 2023 totalled about 26.6 million tonnes, an increase of about 0.5 million tonnes (2 per cent) compared to 2022. According to LKAB's annual report, the increase was due to stable production during the second half of the year. The company faced challenges at times during the year due to raw material shortages, production disruptions at refinement plants and capacity limitations on the Iron Ore Line (swe. *Malmbanan*).

Kiirunavaara Mine

When industrial ore mining started at Kiruna 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 refined after sorting above ground in three processing and pelletising plants.

According to data from SGU's annual questionnaire survey for 2023, approximately 22.3 million tonnes of waste rock and ore were extracted from the mine. After sorting and processing, about 0.6 million tonnes of lump ore and 15 million tonnes of refined ore were obtained. Unrefined ore contained 62.6 per cent iron and 0.40 per cent phosphorus. The output concentrate of the processing contained 71.2 per cent iron and 0.024 per cent phosphorus. Kiirunavaara mainly produces blast furnace and direct reduction pellets (DR pellets).

Leveäniemi Mine

Leveäniemi is located south of the town of Svappavaara. Mining takes place in the Leveäniemi open pit, adjacent to the concentrator on the site. According to SGU's questionnaire survey, 14.9 million tonnes of waste rock and ore were mined in 2023, and after processing, 4.7 million tonnes of refined ore were obtained. Unrefined ore entering the concentrator had a 59.5 per cent iron content and a 0.45 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 Malmberget, 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, 16.5 million tonnes of waste rock and ore were extracted in 2023. After processing, just over 10.2 million tonnes of refined ore were obtained. Unrefined ore entering the processing plant contained between 58.3 and 64.2 per cent iron and had a phosphorus content of between 0.25 and 0.48 per cent. The outgoing concentrate contained 70.7–71.6 per cent iron and 0.01–0.03 per cent phosphorus. In addition to blast furnace pellets, fines are produced at Malmberget.

Table 5. Extraction from iron ore mines in 2023. Source: SGU survey.

County Municipality Mining company	Name of the mine	Waste rock and ore			Average content of		Enrichment ore obtained after sorting, total (tonnes)	Lump ore and limonite ore for direct sale, total (tonnes)
		Underground (tonnes)	Open-pit (tonnes)	Total (tonnes)	Iron (%)	Phosphorus (%)		
Norrbotten county								
<i>Gällivare</i>								
LKAB	Malmberget	16 450 204		16 450 204	39,7	0,60	10 191 013	
<i>Kiruna</i>								
LKAB	Kiirunavaara	22 327 400		22 327 400	40,2	0,28	15 017 794	608 273
<i>Svappavaara</i>								
LKAB	Leveäniemi		14 904 000	14 904 000	44,0	0,64	4 677 733	
<i>Pajala</i>								
Kaunis Iron	Kaunisvaara		23 709 591	23 709 591	27,4*		5 635 525	
Whole Sweden 2023		38 777 604	38 613 591	77 391 195			35 522 065	608 273
Whole Sweden 2022		40 277 392	30 696 506	70 973 898			36 192 368	565 303

* After sorting

Table 6. Extraction of ore and waste rock at iron ore mines, 1986–2023. 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
2023	60 472	24 341	40	35 522	59	608	1,0

Table 7. Production of saleable product (lump ore, fines, concentrates and pellets) in thousands of tons, 2010–2023. Source: SGU survey.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Whole Sweden	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	28 687

Table 8. Processing of iron ore in 2023. Source: SGU survey.

County <i>Municipality</i> Mining company 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 (%)	S (%)
Norrbotten																	
<i>Gällivare</i>																	
LKAB																	
Malmberget	mv	FAR	2 763 891	64.21	0.25	0.03	0.04	MPC	7 030 000	71.24	0.01		0.04	8.47	1.73	0.07	
	mv	PAR	6 953 518	60.77	0.31	0.04	0.04	MAF	1 617 202	70.70	0.03	0.01	0.04				
	mv	AMD						Spec. prod.	384 790	71.58			0.04				
	mv	AMGB						Total:	9 031 992								
	mv	AMLB	1 959 289	58.34	0.48	0.02	0.05										
	mv	HPAR	328 082	58.38	0.48		0.06										
		Total:	12 004 780														
<i>Kiruna</i>																	
LKAB																	
Kirunavaara	mv. f	Kiirunavaara	17 580 471	62.60	0.40			KA1+KA2+KA3	12 589 921	71.20	0.024			7.70	2.30		
Svappavaara	mv. f		4 052 265	59.50	0.45			Svappavara	3 188 942	71.00	0.02						
		Total:	21 632 736					Total:	15 778 863								
<i>Pajala</i>																	
Kaunis Iron AB																	
Kaunisvaara		Kaunisvaara	5 739 507	27.43		0.103		Kaunisvaara	2 127 881	67.39		0.071		3.511		0.12	
Whole Sweden 2023			39 377 023						26 938 736								
Whole Sweden 2022			37 062 741						26 477 417								

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

KAUNISVAARA IRON AB

Kaunisvaara Mine

Kaunis Iron AB produced approximately 2.1 million tonnes of refined iron ore products in 2023 (2.1 million tonnes in 2022) at the Kaunisvaara mine near the town of Pajala in Norrbotten County. According to SGU's survey, 23.7 million tonnes of waste rock

and ore were extracted from the mine and just under 5.6 million tonnes of fines were obtained after sorting. The unrefined ore contained 27.4 per cent iron and 0.10 per cent sulphur. Outgoing concentrate contained 67.4 per cent iron and 0.071 per cent sulphur. The concentrate is transported about 150 km by truck to a transshipment station at Pitkäjärvi (near Svappavaara) for onward shipment on the Iron Ore Line to the port of Narvik in Norway.

Table 9. Sintering of iron ore concentrate in 2023.

County Municipality Mining company		Sinter plant	Incoming raw material			Received product Total (tonnes)*	
			Total (tonnes)	Average content (%)			
			Iron	Phosphorus	Sulphur		
Norrbotten county							
<i>Gällivare</i>							
LKAB		Malmberget	7 030 000	71.24	0.010	-	7 475 748
<i>Kiruna</i>							
LKAB		Kiruna	12 589 921	71.20	0.024	-	12 755 992
		Svappavaara	3 188 942	71.00	0.020	-	3 312 747
		Total:	15 778 863				16 068 739
Whole Sweden 2023			22 808 863				23 544 487
Whole Sweden 2022			27 032 490				22 211 939

* Note: LKAB's production consists of pellets.

Table 10. Production of iron ore concentrates broken down into phosphorus and sulphur content (1,000 tonnes), 1974–2023. Source: SGU survey.

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
1974	12 509	1 992	9 967	-	108	21	421	972	363	712	10 462	-
1975	12 020	1 089	8 388	2 043	232	30	238	862	364	614	10 180	-
1976	12 735	1 197	8 496	2 397	296	53	296	1 208	167	572	10 788	-
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	-

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
1986	13 738	441	13 110	-	-	187	-	966	6 445	298	6 029	-
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	23 961	-	-	-	2 113	-	-	2 113	24 364	-
2023	26 939	385	24 396	-	-	-	2 543	-	1 617	2 127	24 812	-



Drilling in the Kankberg Mine where gold and tellurium are the economically interesting substances. Photo: Carolina Liljenstolpe/SGU.

Production of 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 2023 are presented below. The results are also summarised in Tables 11–14 and in Figures 18 and 19. Other information about the mining companies comes from their annual reports or websites.

Approximately 46.9 million tonnes of ore were produced at non-iron ore mines in Sweden in 2023, down almost 7 per cent compared to the previous year (Table 11). The mines produced 808,025 tonnes of concentrates. The quantity of concentrates fell by about 10 per cent compared to the previous year (Table 13). Table 14 shows that the largest decrease in in terms of metal content was recorded for copper. The metal content of both gold and silver also fell (Fig. 19).

MANDALAY RESOURCES

Björkdal Mine

The 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.

During the first few years, the ore was mined only in an open pit, but both open-pit and underground mining took place from 2005 to 2018. Since 2019, most mining has taken place underground. Waste rock containing gold from earlier mining 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.

In 2023, about 1.1 million tonnes of ore were mined at Björkdal (Table 11), but the concentrator processed 1.24 million tonnes of ore (Table 12); gold-mineralised waste rock accounted for the difference. Production of concentrate was lower than the previous year, but the gold grade for 2023 was slightly higher, so the metal produced in 2023 was 1,347 kg, about 30 kg more than the preceding year.

Table 11. Extraction of waste rock and ore at non-ferrous mines in 2023 (tonnes). Source: SGU survey

County Municipality Mining company	Name of the mining field (mine)	Type of ore	Production method*	Waste rock and ore			
				Under- ground	Open-pit	Enrichment ore	Waste rock
Örebro County							
<i>Askersunds kommun</i>							
Zinkgruvan Mining AB	Zinkgruvan	zinc, lead, copper	1	1 849 429		1 385 263	464 166
<i>Lindesbergs kommun</i>							
Lovisagruvan AB	Lovisagruvan	zinc, lead, silver	3	57 734		34 034	23 700
Dalarnas County							
<i>Hedemora kommun</i>							
Boliden Mineral AB	Garpenberg	zinc, lead, copper	1, 2, 3, 4	3 690 987		3 143 599	547 388
Västerbottens County							
<i>Lycksele kommun</i>							
Boliden Mineral AB	Kristineberg	copper, lead, zinc	3	1 148 379		557 786	590 593
<i>Skellefteå kommun</i>							
Boliden Mineral AB	Renström	copper, lead, zinc	3	750 017		505 004	245 013
Boliden Mineral AB	Kankberg	gold, tellurium	3	636 030		482 403	153 627
Björkdalsgruvan AB	Björkdalsgruvan	gold	1, 2	1 495 915	212 564	1 091 449	617 030
Norrbottnens County							
<i>Gällivare kommun</i>							
Boliden Mineral AB	Aitik	copper, gold	1		75 991 144	40 689 434	35 301 710
Whole Sweden 2023				9 628 491	76 203 708	47 888 972	37 943 227
Whole Sweden 2022				9 381 911	73 768 675	50 473 917	32 676 669

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

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. The 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 Skellefte field in Västerbotten. In addition to in the Skellefte field, Boliden conducts mining operations at two other mines in Sweden: Garpenberg in Dalarna and Aitik in Norrbotten, as well as mines in Ireland and Finland. In July 2023, Tara was placed on care and maintenance and remained so by the end of the year.

Aitik Mine

When mining in Aitik started in 1968 it had an estimated lifespan of fifteen years. Today, estimates suggest that reserves and assets present in the mine and nearby deposits are likely to suffice for many decades of ore production. Initial annual production was two million tonnes of ore, which was enriched at the mine. In 2023,

ore production was 40.7 million tonnes (Table 11), down about 6 per cent compared to 2022.

Mineralisation at Aitik is a porphyry copper deposit, an ore type characterised by low metal content but very large tonnage. Most of the world's copper production originates from ores of this kind in the Americas and south-east Asia. In addition to copper, silver and gold are mined at Aitik. The ore is mined in an open-pit mine 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 260,897 tonnes in 2023 (Table 12). This was lower than the previous year. Gold and copper concentrations in the ore were also lower than the preceding year, which led to a lower metal production from mining at Aitik.

The Boliden area

In the Boliden area within the Skellefte field in Västerbotten, Boliden has production at three mines: Kristineberg, Renström and Kankberg. Preparations are

Table 12. Processing in non-ferrous ore mines in 2023 (tonnes). Source: SGU survey

County Municipality Mining company Enrichment plant	Enrichment method*	Incoming raw material					Received concentrates							
		Total (tonnes)	Average content				Type	Total (tonnes)	Average content					
			Cu (%)	Pb (%)	Zn (%)	Ag (g/tonnes)			Au (g/tonnes)	Cu (%)	Pb (%)	Zn (%)	Ag (g/tonnes)	Au (g/tonnes)
Örebro County														
<i>Örebro</i>														
Zinkgruvan Mining														
Zinkgruvan	f	1 376 948	2.52	2.87	7.28	66	Copper	16 798	26.40				319	
							Lead	37 292		70.48	7.09		1 378	
							Zinc	144 479		2.67	52.84		102	
Dalarna County														
<i>Hedemora</i>														
Boliden AB														
Garpenberg	f	3 151 197	0.06	1.45	3.25	98.9	0.37	Copper 1	7 259	13.07	41.13	2.90	20 493	79.33
								Lead 1	48 830	0.74	73.39	4.28	1 798	2.22
								Zinc 1	175 865	0.13	1.06	54.49	112	0.31
								Lead 2	371	0.12	15.55	5.48	3 036	477.9
Västerbotten County														
<i>Skellefteå</i>														
Boliden AB														
Boliden	f	1 594 531	0.32	0.39	3.16	49.8	2.08	Copper 1	385.9	0.64	3.52	3.91	1 867	1267.47
								Lead 1	8 021	4.38	42.30	9.55	2 423	8.72
								Zinc 1	39 028	0.51	0.83	55.67	95	1.21
								Copper 2	18 073	22.86	4.41	3.88	1 742.7	30.1
								Zinc 2	44 301	0.30	2.02	53.48	158.29	2.28
								Zinc 3	922	0.74	0.72	53.71	100.4	1.29
								Gold 1	6.506				382 425	237 921
Björkdalsgruvan AB														
Björkdal	fv	1 239 412					1.25	Gold 1	1					507 570
								Gold 2	233					1491
								Gold 3	128					329.6
								Gold 4	5 135					59.7
Norrbotten County														
<i>Gällivare</i>														
Boliden AB														
Aitik	f	40 689 434	0.18			0.80	0.08	Copper 1	260 897	24.6			95.9	6.61
Whole Sweden 2023		48 051 523							808 025					

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

under way to begin mining the mineralisation at Räv-liden, near Kristineberg. The ores at Renström and Kristineberg are massive sulphide ores with copper, zinc and lead as well as considerable levels of gold and silver. The ore at Kankberg mine is of a different type, the economically viable elements being gold and tellurium (Table 11).

Ore from the mines in the Skellefte field is transported to the concentrator in Boliden for enrichment. As shown in Table 12, 1.59 million tonnes were enriched in 2023, about 2 per cent down compared to 2022.

Average metal content was also lower than the previous year, resulting in lower metal production from the Boliden area. Tellurium production at the Kankberg mine was an exception. Production there was 35.3 tonnes, up 9 per cent compared to the previous year.

Garpenberg Mine

The ore at Garpenberg in Hedemora Municipality, Dalarna County, consists of several ore bodies in a altered, folded and faulted limestone horizon. The ore bodies are thought to have been formed by impregna-

tion 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 locally high. Lapperberget is the largest ore body. Boliden conducts active exploration and during the year discovered a new mineralisation called Stationen in the mine area.

Table 11 shows that 3.1 million tonnes of ore were produced at Garpenberg in 2023, up 3 per cent compared to the previous year. Metal concentrations and the quantity of metal produced were higher for copper, lead and gold than in 2022, whereas production figures for zinc and silver were lower. Just over 176,000 tonnes of zinc concentrate, 49,000 tonnes of lead concentrate and 7,300 tonnes of copper concentrate were produced in 2023 (Table 12).

DRAGON MINING SWEDEN AB

Svartliden Mine

Dragon Mining's gold mine at Svartliden is located about 70 km west-northwest 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 enrichment plant, the company owns three mines, one project and one enrichment 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 SGU's questionnaire survey for 2023, the gold content in outgoing concentrate from the enrichment plant was 571 kg (642 kg in 2022).

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 were mined and tested at the Svartliden enrichment plant. The company then applied for an environmental permit to mine gold at Fäboliden. The permit application was rejected in 2022. That decision was appealed. In March 2023, the Land and Environmental Court of Appeal dismissed the application for permission to appeal. The company appealed that decision to the Supreme Court in April 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. The ore is similar in style to that mined at Zinkgruvan.

Ore mining takes place at different levels in the mine. The deepest level is currently 235 metres below the surface. Approximately 34,000 tonnes of ore were mined in 2023 (Table 11), an increase of about 1,000 tonnes compared to 2022. Until May 2023, the company sold the ore to a processing plant in Poland (ZGH Boleslaw). For the time being, the ore is being stockpiled pending sale. The company is also examining the possibility of building 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 of more than 100 years. It is currently owned by Lundin Mining, a Canadian mining company which also owns or co-owns mines in Brazil, Portugal, Chile, USA and Sweden.

The zinc and lead ore at Zinkgruvan consists of bands of massive sphalerite and galena with volcanic and sedimentary rocks as 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. It is processed 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 2023, consisting of 1.2 million tonnes of zinc-lead ore and 0.2 million tonnes of copper ore (Table 11). Concentrations of copper and lead were higher in 2023 than in the previous year; concentrations of lead, zinc and silver were lower than the previous year. Production of lead, zinc and silver fell (Table 12).

Table 13. Production of concentrates of non-ferrous ores (tonnes), 1978–2023. 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
2023	-	303 412	94 514	404 595	-	5 504	-	808025

Table 14. Metal content in non-ferrous ores (concentrate) in tonnes or kg), 1978–2023. Source: SGU survey

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	88337	70339	233958	-	-	8054	422086	32 708	-
2023	73 780	65 570	217 596	-	-	7 358	404 055	35 507	-

* Estimated quantity

Metal content, tonnes

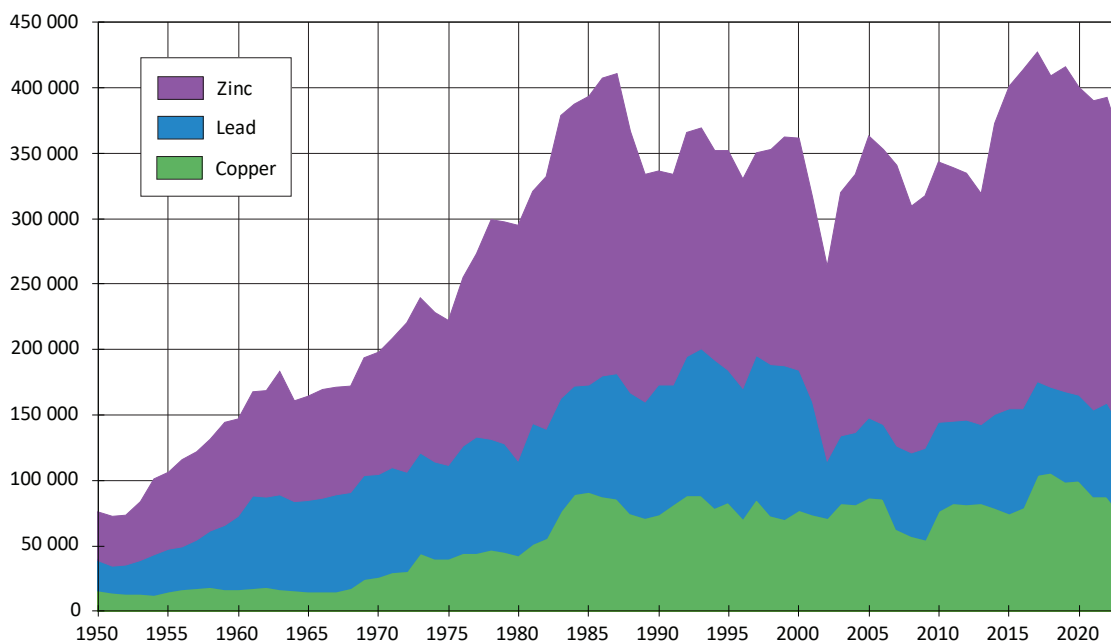


Figure 18. Metal content in copper, lead and zinc ores mined in Sweden, 1950–2023.

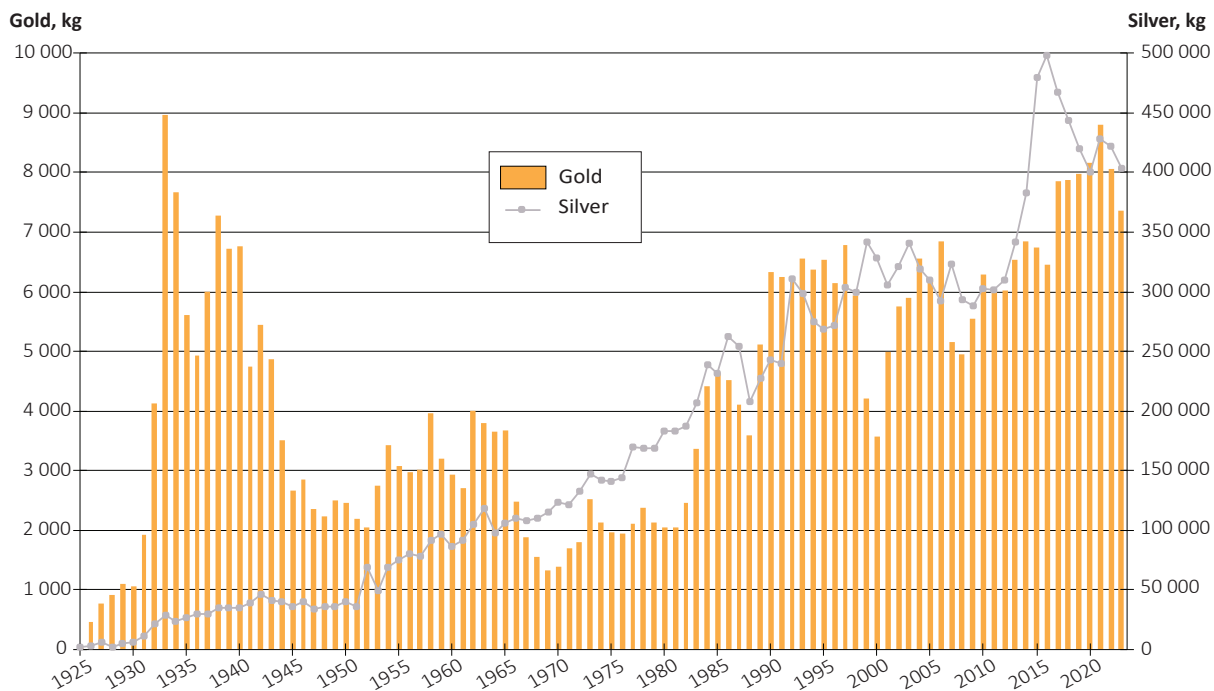


Figure 19. Production of gold and silver (metal content) in Swedish mines, 1925–2023.



Tailings at the Björkdal Mine. Photo: Carolina Liljenstolpe/SGU.

Environmental statistics

MINING WASTE

Mining usually generates two solid waste fractions: waste rock and tailings. Both are produced when ore is separated from the surrounding uneconomic rock.

Figure 20 shows the location and size of waste rock storage sites in Sweden. Waste rock is a heterogeneous material. It may consist of both fine and coarse material, from sand to boulder size. Piles of waste rock are mainly located close to mines, to reduce transport costs and in order to return some of the material back into the open-pit or underground mining sites when ore has been mined out.

Figure 21 shows the location and size of tailings deposits in Sweden. Tailings are a residue from the processing, after which the tailings are transported as

slurry (sand and process water) with a high-water content via pipelines to ponds (tailings deposits), where the solid material is allowed to settle. Tailings deposits are usually located some distance from the processing plants. Tailings can also be deposited as infill in disused mining sites 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 factors greatly impact the amount of mining waste, for example when a company chooses to expand mining at a new level.

Table 15 shows that the amount of waste rock generated at non-ferrous ore mines increased to 37.8 million tonnes, and tailings fell to 47.2 million tonnes in

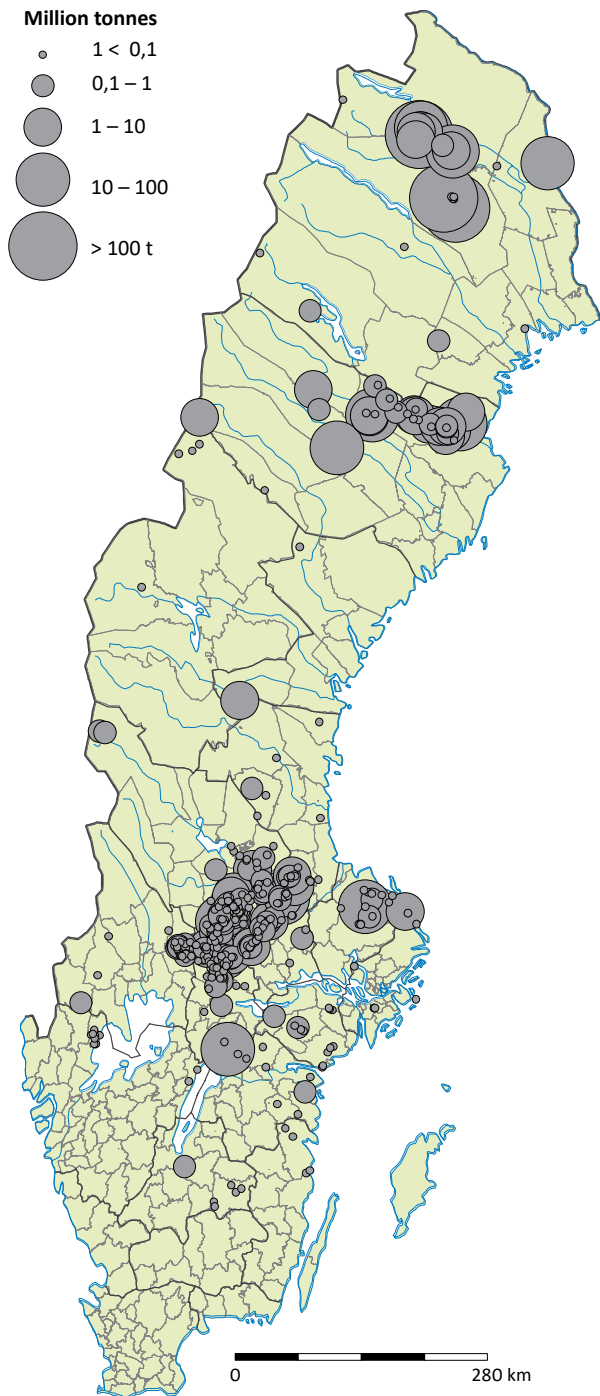


Figure 20. Map showing location and size of waste rock storage sites in Sweden, million tonnes. Data from SGU database: Ores and Minerals; see MapViewer Ores and Minerals, www.sgu.se.

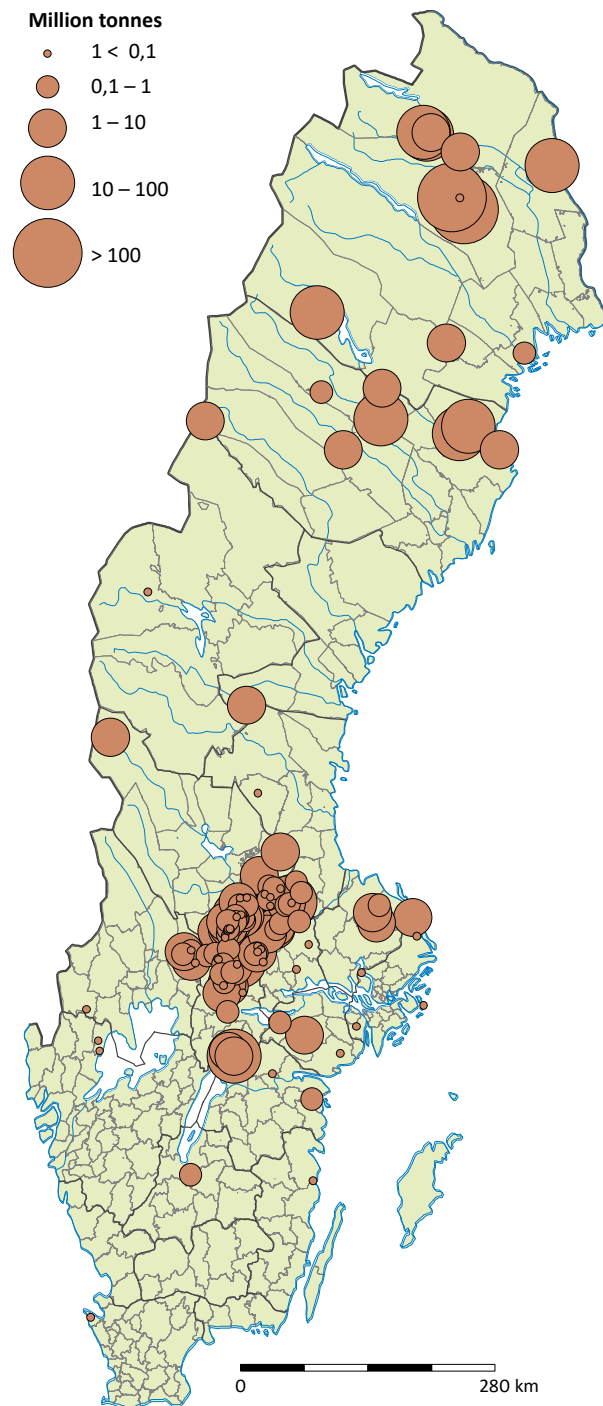


Figure 21. Map showing location and size of tailings deposits in Sweden, million tonnes. Data from SGU database: Ores and Minerals; see MapViewer Ores and Minerals, www.sgu.se.

2023. The amount of waste generated at iron ore mines rose by 6.4 million tonnes in 2023, and the quantity of tailings fell by 1.8 million tonnes compared to the previous year.

Mining residues may be used for backfilling and also as rock material in roads or sold as aggregates, as long as they do not pose an environmental hazard. However, the vast majority of waste is landfilled. Based on reported data for 2023, 66 per cent was used as landfill and 30 per cent as backfill. One per cent of mining waste was sent to market and 3 per cent was used in mine infrastructure (Table 16).

The totals in Tables 17 and 18 differ by nearly 6.1 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 RECEIVING WATER BODIES

Operations at Swedish mines are subject to maximum permitted levels for metal discharges to surrounding water. Metal discharges have generally fallen over time. This is due to stricter statutory requirements and more efficient water management and water treatment processes. In 2023, metal discharges rose slightly, mainly those of lead and zinc. Data on metal discharges from Swedish mines have been obtained from the Swedish environmental reporting portal and are presented in Table 17.

Table 15. Estimated amount of waste rock and tailings generated 2022 and 2023 and in total between 1833 and 2023.* Source: SGU survey

	Estimated amount (million tonnes)		
	2021	2020	1833–2021
Iron ore mines			
Waste rock	42,4	36,0	1 141
Tailings	12,4	10,6	362
Non-ferrous ore mines			
Waste rock	37,8	32,5	1 027
Tailings	47,2	49,7	1 215
All mines			
Waste rock	80,2	68,5	2 167
Tailings	59,6	60,3	1 577
Total	139,80	128,80	3 745

* 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	1,7
Waste rock for backfilling	0
Waste rock for landfill	34
Waste rock for mine infrastructure	3,9
Tailings for backfilling	0
Tailings for landfill	8,5
Non-ferrous ore mines	
Waste rock selling	0,3
Waste rock for backfilling	38,0
Waste rock for landfill	0,1
Waste rock for mine infrastructure	0,4
Tailings for backfilling	1,8
Tailings for landfill	45
All mines	
Waste rock	78,4
Tailings	55,3
Total	133,718
Share for landfill	66 %
Share for backfilling	30 %
Share for selling	1 %
Share for infrastructure	3 %

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 then kWh/tonne. The calculations in this section are based on data from the Swedish Environmental Reporting Portal (SMP).

The resource efficiency of non-ferrous ore mines between 2016 and 2023 is presented in Figure 22. Resource efficiency is highest at the Aitik mine. Energy consumption per unit of ore produced here in 2023 was approximately 27 kWh/tonne. The lowest resource efficiency is in the Boliden area, where energy consump-

tion per tonne of ore produced was just over 161 kWh/tonne. 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 in the Boliden area. Resource efficiency at Lovisa Mine rose in 2023, probably because the company stockpiled ore for half the year.

Resource efficiency at 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 between 2016 and 2023 at iron ore mines is presented in Figure 23.

Table 17. Discharges of cadmium, copper, nickel, lead and zinc from Swedish mines to receiving water bodies 2014–2023 (kg/year). Source: own processing of data from the Swedish Environmental Reporting Portal (SMP)

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Cadmium	8.00	8.09	4.60	5.13	5.29	7.23	6.56	3.34	4.97
Copper	211.52	203.04	151.97	112.20	80.76	91.24	85.52	63.17	68.19
Nickel	244.89	227.34	175.82	153.14	128.31	196.53	175.39	113.87	157.07
Lead	70.29	61.84	43.29	148.57	119.75	109.46	79.29	44.66	99.22
Zinc	2693.80	2470.53	1303.61	2071.50	1851.20	2564.98	1791.96	688.75	1481.48

Resource efficiency non-iron ore mines, kWh/tonne

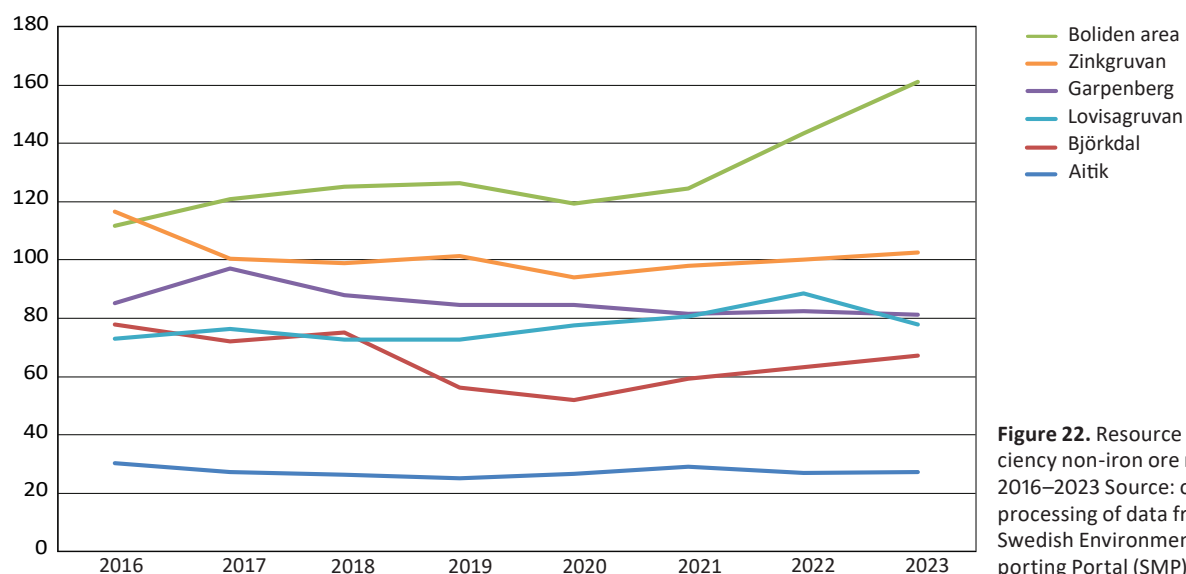


Figure 22. Resource efficiency non-iron ore mines 2016–2023 Source: own processing of data from the Swedish Environmental Reporting Portal (SMP)

ENERGY CONSUMPTION

Energy consumption at Swedish mines has increased over time, 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 level of electrification at Swedish mines remained fairly constant at around 60 per cent between 2016 and 2023 (62 per cent in 2023, Fig. 24). Changes in the level of electrification may ultimately be expected to be impacted by electrification and the transition to fossil-free operation.

Short-term changes in the degree of electrification may be due to factors such as changes in extraction of waste rock or long-distance transport that currently involves diesel use.

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 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 concen-

Resource efficiency iron ore mines, kWh/tonne

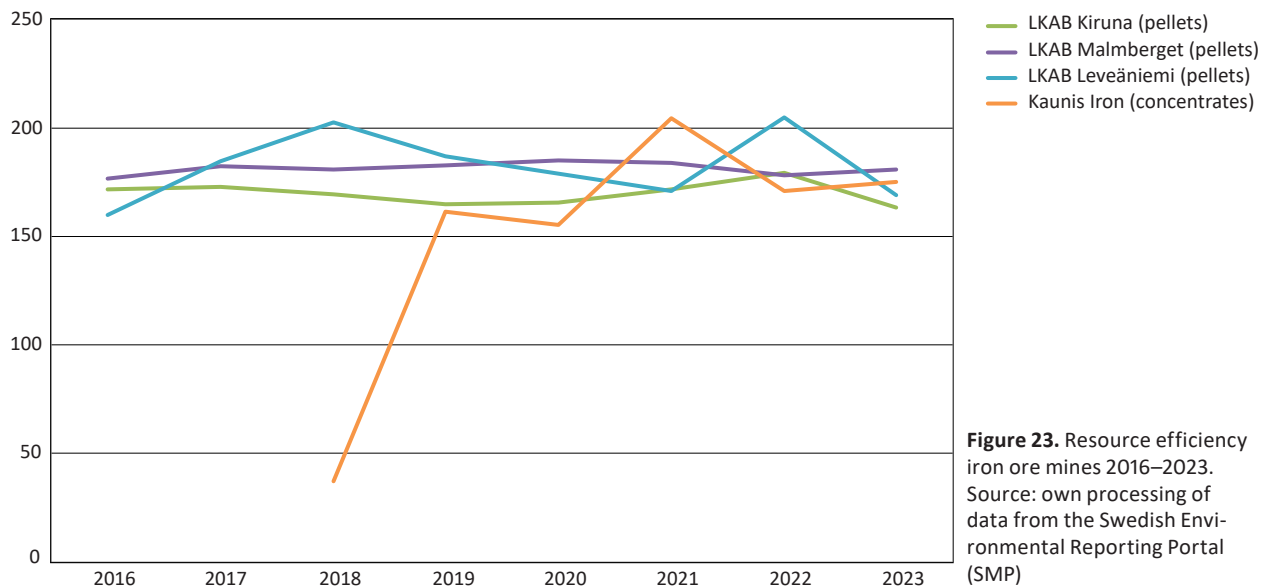


Figure 23. Resource efficiency iron ore mines 2016–2023. Source: own processing of data from the Swedish Environmental Reporting Portal (SMP)

trates 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). Table 18 presents a selection of metal quantities produced from recycled materials in Sweden during 2016–2023. The plant Boliden Rönnskär produce copper, zinc, gold and silver. Overall production here fell

in 2023. This is largely due to a fire at the electrolysis plant, which caused a production outage.

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

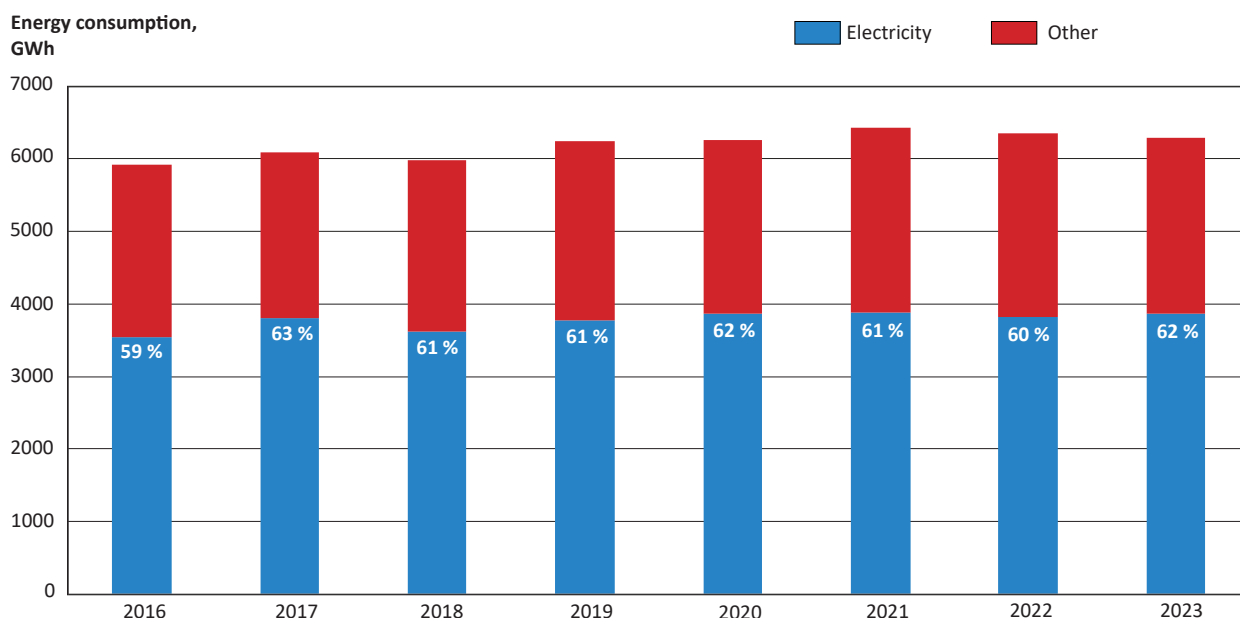


Figure 24. Energy consumption and electrification at Swedish mines 2016–2023. Source: own processing of data from the Swedish Environmental Reporting Portal (SMP).

Table 18. Metal produced from secondary raw materials (recycled raw materials) 2016–2023, in tonnes. The metal content has been refined in Sweden, whereas the origin is both domestic and imported. Källa: World Steel Recycling in Figures, Miljörapport Rönnskär, Boliden Årsredovisning, Miljörapporter för Stena Aluminium och Kubikenborg Aluminium.

	2018	2019	2020	2021	2022	2023
Copper	56 125	54 378	58 757	60 220	50 089	25492
Lead (Boliden Bergsöe)*	47 000	49 000	46 000	46 000	42 000	53 000
Zink	0	19 007	27 071	17 935	18 547	15 376
Aluminium	74 176	68 500	58 100	67 000	63 800	74591
Gold	4,68	4,08	4,48	3,19	3,48	3,87
Silver	109	100	131	111	112	88

* Refers to lead alloys

Exploration and exploration permits

In 2023, investment in mining exploration in Sweden increased by just over 30 per cent as compared to the previous year (current prices, not adjusted for inflation). Investments in 2023 totalled SEK 1,975 million (Fig. 25). The main exploration operators in Sweden are the mining companies LKAB and Boliden, which together account for 81 per cent of investment. Almost 87 per cent of exploration was conducted by companies

operating mines in Sweden. Most exploration was in the form of near-mine explorations, i.e. exploration in or near an existing mine, and took place in Norrbotten and Västerbotten counties.

Figure 26 presents the total global mining exploration budget. According to S&P Global Market Intelligence, investment in exploration totalled approximately USD 12.8 billion in 2023, a drop of about 2 per cent

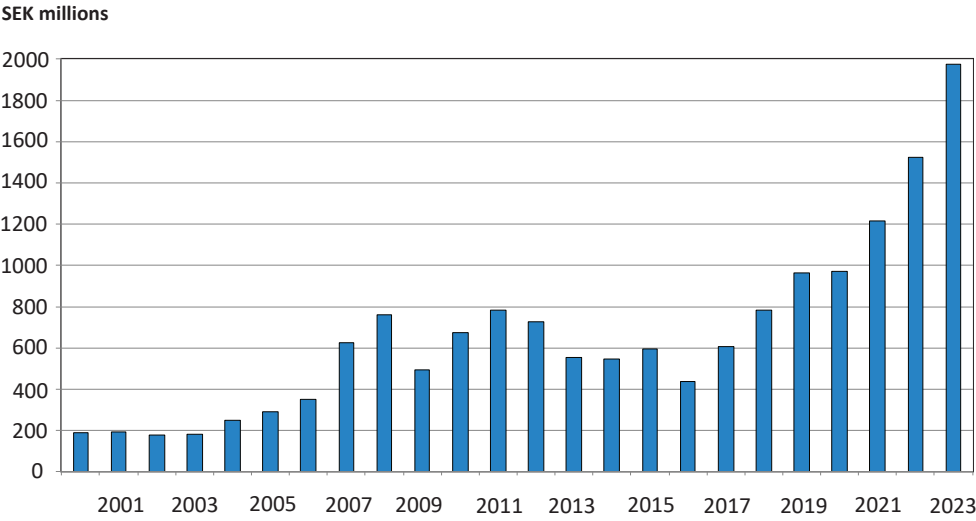


Figure 25. Mining exploration budget in Sweden, 2000–2023 (current prices, not adjusted for inflation).

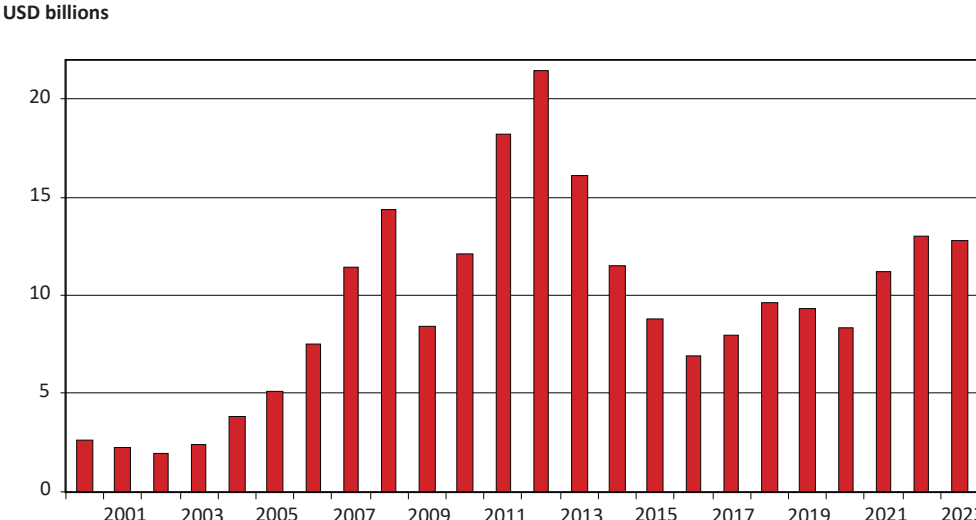


Figure 26. Global mining exploration budget, 2000–2023 (current prices). These figures do not include exploration for iron ore, coal, oil, gas, aluminium and most industrial minerals.

from the previous year. The year 2023 saw an economic downturn, which normally causes businesses to reduce their investments.

There were 750 current exploration permits at the end of 2023 (Fig. 27, Table 19). This is a large increase compared to the previous year, when 639 permits had been issued. One hundred and eighty-five new exploration permits were granted in 2023 (Table 20). This was an increase compared to the previous year, both in number and area covered. 2023 may represent a change in trend; the number of exploration permits granted annually has otherwise fallen continually over the past ten years. The number of renewals of permits also increased. Forty-seven permits were renewed in 2023 (Table 21), up from 21 in 2022 (Fig. 28).

Valid permits covered 40 metals and minerals (Table 22). Copper and gold dominated, with 66 and 60 per cent, respectively. Next were silver (42 per cent), zinc (38 per cent), lead (28 per cent), cobalt (18 per cent) and nickel (17 per cent).

Figure 30 shows the number of days booked at the SGU drill core archive in Malå. One hundred and ninety-one days were booked in 2022. A booking may be made for one or more people. Visitors 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.

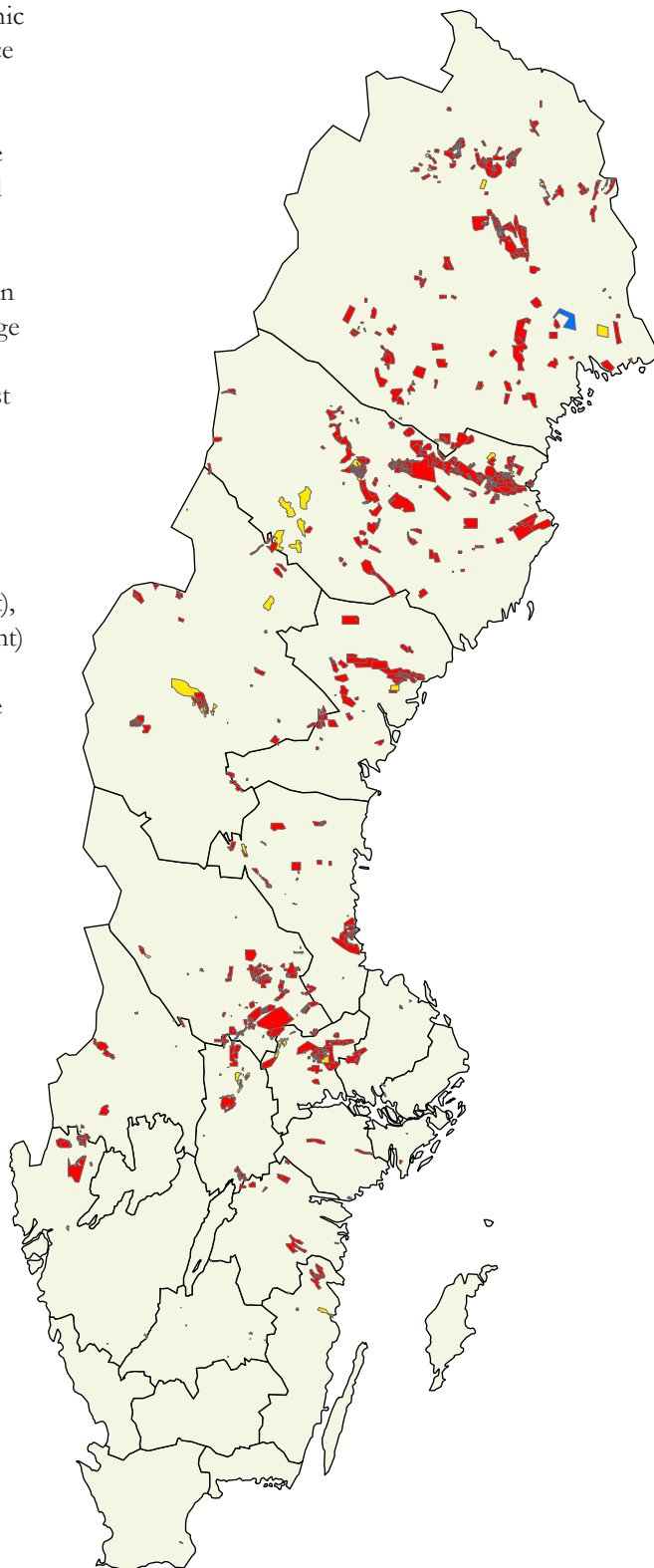
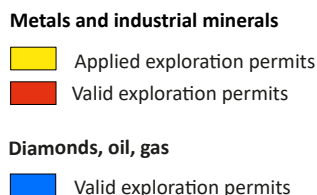


Figure 27. Exploration permits in Sweden, data obtained April 2024.

Table 19. Valid exploration permits at the end of 2023. 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	103	181 813.18			103	181 813.18
Gävleborg	47	77 077.48			47	77 077.48
Jämtland	35	78 450.66			35	78 450.66
Jönköping	10	563.24			10	563.24
Kalmar	9	16 356.25			9	16 356.25
Norrbottn	179	423 933.77	1	17 115.86	180	441 049.63
Skåne	4	175.00			4	175.00
Stockholms	4	1 911.14			4	1 911.14
Södermanland	3	6 018.44			3	6 018.44
Uppsala	9	34 356.86			9	34 356.86
Värmland	15	23 099.67			15	23 099.67
Västerbotten	204	568 713.92			204	568 713.92
Västernorrland	29	64 700.09			29	64 700.09
Västmanland	37	71 527.86			37	71 527.86
Västra Götaland	21	44 282.71			21	44 282.71
Örebro	32	44 962.81			32	44 962.81
Östergötland	9	25 009.34			9	25 009.34
Total	750	1 662 952	1	17 116	751	1 680 068

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 2023. 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	17	70 795			17	70 795
Gävleborg	12	41 151			12	41 151
Jämtland	22	61 506			22	61 506
Kalmar	6	14 983			6	14 983
Norrbottn	53	155 569	1	17 116	54	172 685
Stockholms	2	823			2	823
Södermanland	1	5 266			1	5 266
Värmland	5	7 187			5	7 187
Västerbotten	30	119 917			30	119 917
Västernorrland	16	42 815			16	42 815
Västmanland	13	24 377			13	24 377
Västra Götaland	2	28 169			2	28 169
Örebro	6	15 232			6	15 232
Total	185	587 790	1	17 116	186	604 906

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.

Number

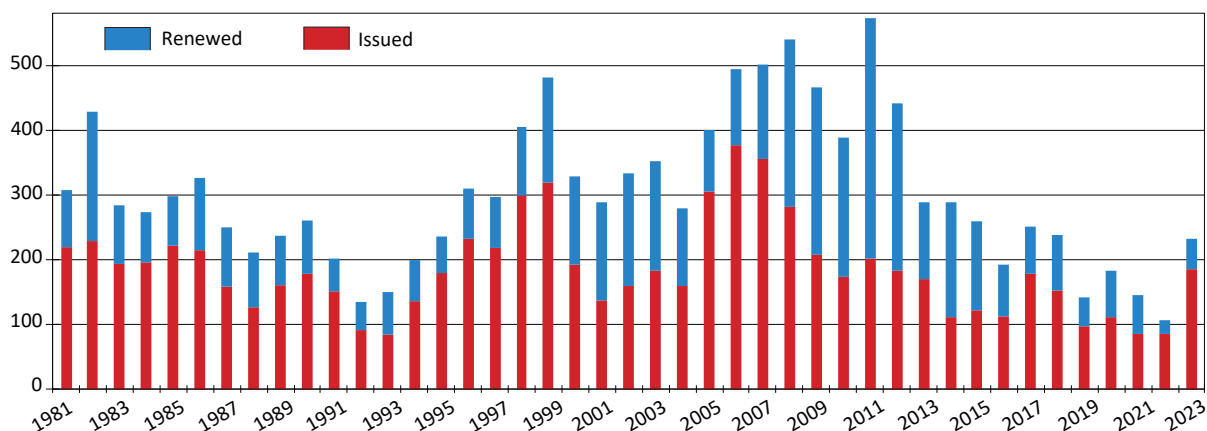


Figure 28. Number of claim certificates and exploration permits issued or renewed, 1981–2023.

Area ha

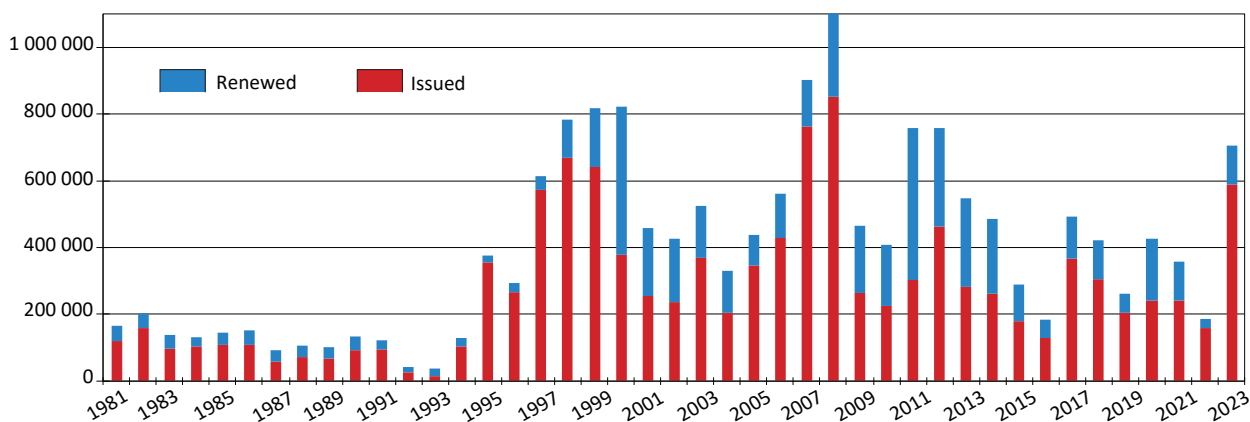


Figure 29. Area of claim certificates and exploration permits issued or renewed (not including diamonds), 1981–2023.

Table 21. Exploration permits renewed in 2023. Source: Bergsstaten.

County	Mineral Act 1 kap. 1 § 1 och 2 st. ¹⁾	
	Number	Area (ha)
Dalarna	5	6 834.01
Gävleborg	6	19 005.53
Jämtland	2	1 744.46
Norrbottnen	13	30 448.97
Uppsala	1	12 971.97
Västerbotten	14	28 335.96
Västernorrland	2	1 102.79
Västra Götaland	1	805.22
Örebro	1	11 026.27
Östergötland	2	4 473.50
Total	47	116 749

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 2023, compared with 2022. The percentage shows the proportion of each element in the total number of exploration permits. Difference in number. Source: Bergsstaten.

Mineral	Number applied for 2023		Number applied for 2022		Difference 2022–2023
Copper	499	66 %	444	69 %	55
Gold	451	60 %	417	65 %	34
Silver	318	42 %	285	45 %	33
Zinc	284	38 %	270	42 %	14
Lead	213	28 %	209	33 %	4
Cobalt	133	18 %	102	16 %	31
Nickel	129	17 %	85	13 %	44
Iron	119	16 %	116	18 %	3
Lanthanum	89	12 %	36	6 %	53
Scandium	87	12 %	35	5 %	52
Yttrium	87	12 %	34	5 %	53
Palladium	84	11 %	58	9 %	26
Platinum	82	11 %	52	8 %	30
Molybdenum	76	10 %	44	7 %	32
Tungsten	62	8 %	50	8 %	12
Iridium	43	6 %	23	4 %	20
Osmium	43	6 %	23	4 %	20
Rutenium	43	6 %	23	4 %	20
Rhodium	42	6 %	23	4 %	19
Litium	41	5 %	17	3 %	24
Vanadium	38	5 %	38	6 %	0

Mineral	Number applied for 2023		Number applied for 2022		Difference 2022–2023
Graphite	38	5 %	25	4 %	13
Tantalum	33	4 %	13	2 %	20
Titanium	27	4 %	24	4 %	3
Tin	21	3 %	15	2 %	6
Beryllium	13	2 %	5	1 %	8
Apatite	10	1 %	8	1 %	2
Cesium	10	1 %	3	< 1 %	7
Zirconium	9	1 %	4	1 %	5
Niobium	9	1 %	5	1 %	4
Manganese	8	1 %	7	1 %	1
Bismuth	5	1 %	4	1 %	1
Fluorspar	5	1 %	0	0	5
Antimony	5	1 %	5	1 %	0
Rubidium	1	< 1 %	0	0	1
Magnesite	1	< 1 %	0	0	1
Nepheline syenite	1	< 1 %	1	< 1 %	0
Wollastonite	1	< 1 %	1	< 1 %	0
Gaseous hydrocarbons	0	0	1	< 1 %	-1
Thorium	0	0	1	< 1 %	-1

Number of visits to the drill core archive (days)

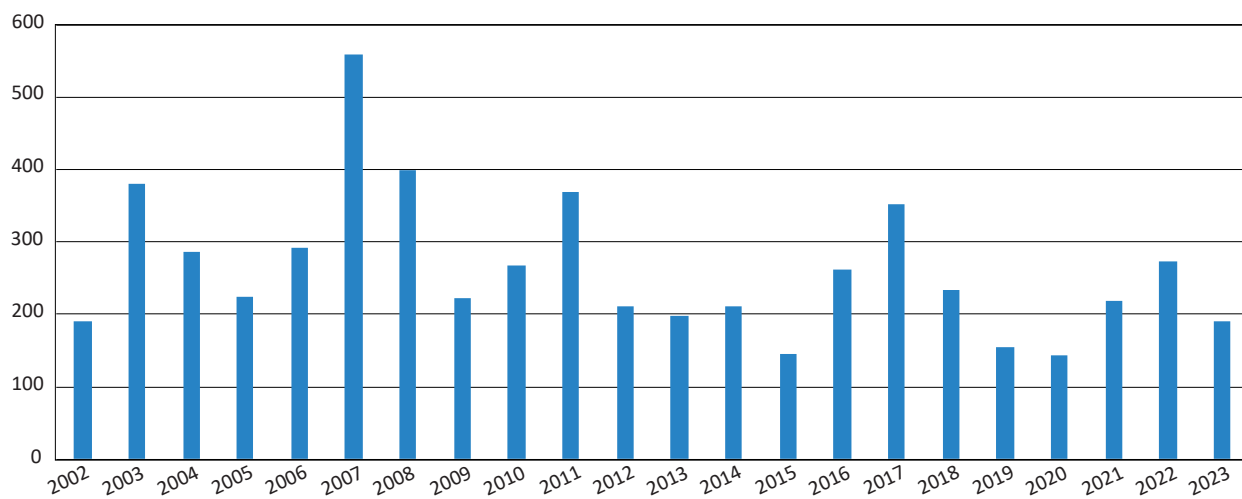


Figure 30. Number of booked days at the SGU drill core archive between 2002 and 2023.



Kristineberg in the Boliden area. One of the applications for a mining concession granted in 2023 was Kristineberg K no. 1. Photo: Boliden

Mining concessions and mineral fees

One application for a mining concession was received by the Mining Inspectorate in 2023. Four applications for concessions were granted (Table 23).

The approved mining concessions concerned Kristineberg K nr 1 in Lycksele, Kvarnforssliden nr 2 in Skellefteå, Liikavaara K nr 2 in Gällivare and Bläckmyran K nr 1 in Hudiksvall.

There were 164 valid mining concessions at the end of 2023. The concessions covered a total area of almost 12,800 ha (Table 24).

Table 24 shows how mining concessions were distributed throughout the country during the year. They were centred around the three main ore districts in Sweden: the ore fields in Norrbotten County, the Skellefteå field with the “Gold Line” in Västerbotten County, and the Bergslagen region (mainly 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 2023. In 2023, 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. Mineral fees totalled just over SEK 24 million. The fees were apportioned between the state (about SEK 6 million) and landowners (about SEK 18 million).

Table 26 presents fees paid to the state under the Minerals Act (apart from mineral fees) for the years 2006 to 2023. Note that application fees for mining concessions are not specified, since these are included in the application fee for exploration permits. The total sum of fees paid to the state in 2023 was just over SEK 20.3 million.

Table 23. Approved and rejected mining concession applications, 2002–2023. 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
2023	1	0	4	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 2023. Source: Bergsstaten.

County	Number of mining concessions			Area (ha)
	Expired	New	Valid att the end of 2022	
Uppsala			2	193
Östergötland			2	563
Kalmar			1	8
Skåne	1		0	0
Örebro			5	909
Dalarna			30	1 384
Gävleborg		1	8	435
Västernorrland			1	36
Jämtland			3	132
Västerbotten		2	74	4 546
Norrbottn	1	1	38	4 569
Total	2	4	164	12 775

Table 25. Mineral fees (SEK) under the Minerals Act 7 kap 7 §, år 2006–2023. 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
2023	23	21 122 454	5 280 617	15 841 845

Table 26. Fees paid to the state (SEK) under the Minerals Act, 2006–2023. Source: Bergsstaten.

År	Ansöknings-avgift*	Undersöknings-avgift	Förlängnings-avgifter	Försvars-avgifter	Markanvisningsavgift	Frånträdande, återbetalning	Summa avgifter
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
2023	403 500	1 188 8032	8 317 384	0	480 000	-78 2424	20 306 492

* This also includes application fees for exploration concession.



One of several small iron ore deposits in the national interest area Olserum in Västervik municipality. Photo: Stefan Andersson/SGU

National interests

Chapters 3 and 4 of the Environmental Code set out 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 importance. This means that SGU assesses and prioritises mineral deposits of national interest under Chapter 3, section 7 (ii) of the Environmental Code. Three criteria must be met in order for a deposit to be designated of national interest:

- The substance or material in question is of major importance for the needs of society.

- The substance or material has particularly valuable properties.
- The area where the deposits of the substance or material are found is well delimited, investigated and documented.

For deposits assessed to be of national importance, detailed delimitations are provided on an ongoing basis. The following deposit was subject to detailed delimitation and designated as being of national interest in 2023:

- Olserum REE – Rare Earth Elements, designation and delimitation, Decided 23 May 2023 (journal no. 31-2034-2022).

The Olserum area of national interest is located in Västervik municipality, and covers approximately 607 hectares (Fig. 32). SGU based its assessment on the fact that REEs are now used in numerous products that are vital to modern technology, and cannot be replaced with other metals. SGU decided that the deposit at Olserum has been thoroughly investigated by means of recent survey, exploration and research.

There were 150 deposits designated as being of national interest in 2023, of which 95 had been delimited and demarcated on a map. The rest have been given a centre coordinate. Some 50 deposits of national interest are of minerals under the Minerals Act; the remainder comprise industrial minerals, natural stone and aggregate (Fig. 31). Table 27 shows that these designated deposits are located in 19 of Sweden's 21 counties. There are no designated deposits in Stockholm County or Kronoberg County.

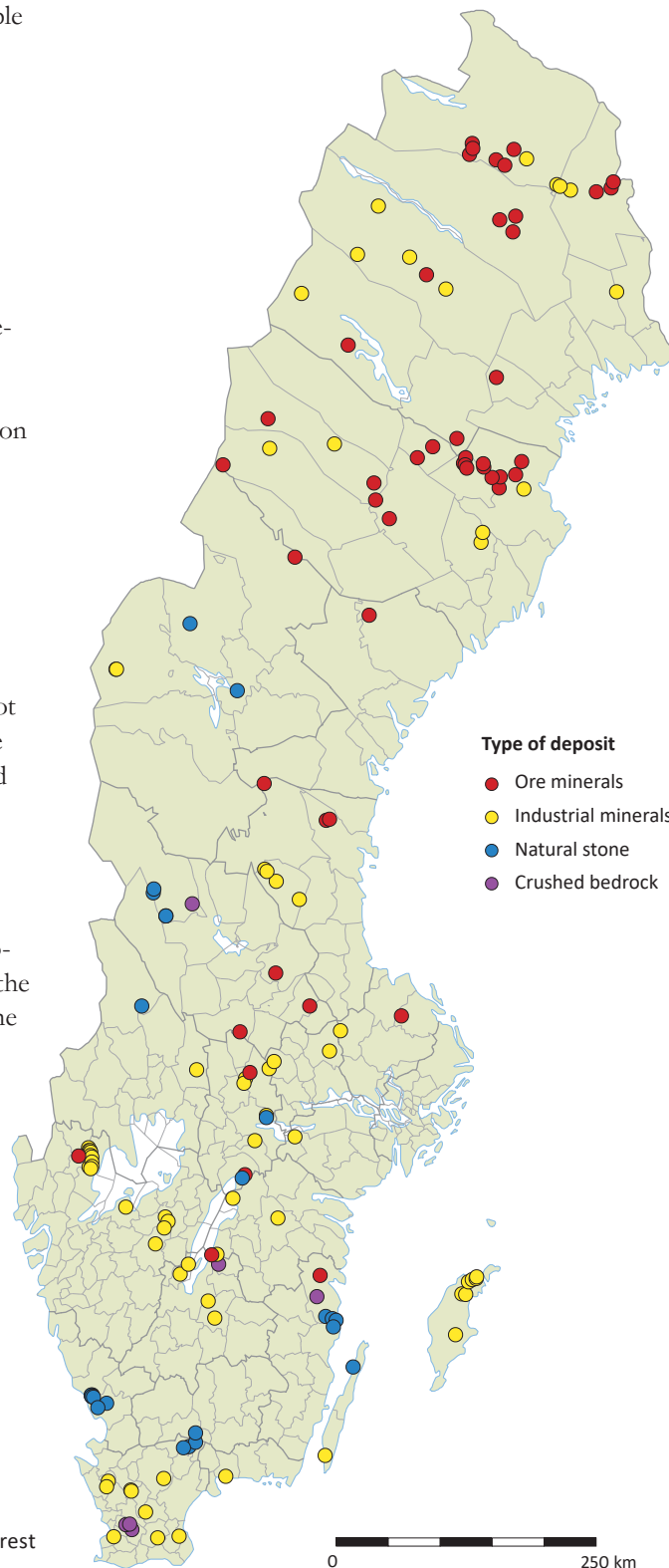


Figure 31. Mineral deposits of national interest under the Environmental Code, 2023.

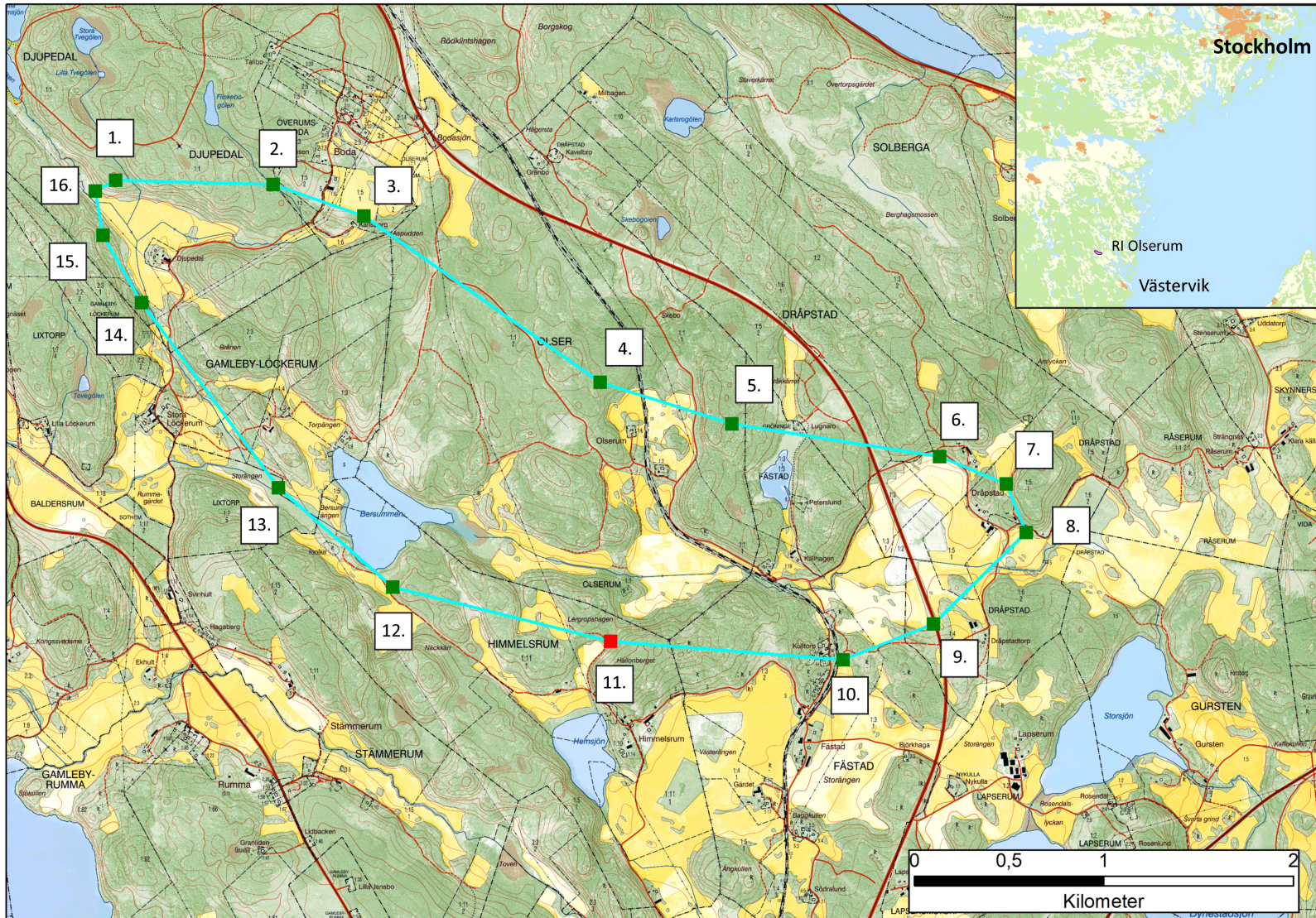


Figure 32. Detailed demarcation for the national interest Olserum.

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
Olserum*	Västervik	REE	6 423 773	578 053
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
Måsalytte*	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 Kuvetronet	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
Nåshult	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
Granolknösen*	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
Norrheden*	Norsjö	Chalcopyrite, sphalerite	7 218 332	716 160
Storheden*	Malå	Sphalerite, chalcopyrite, gold and silver	7 239 127	682 043
Svartheden*	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
Älgräsk*	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.

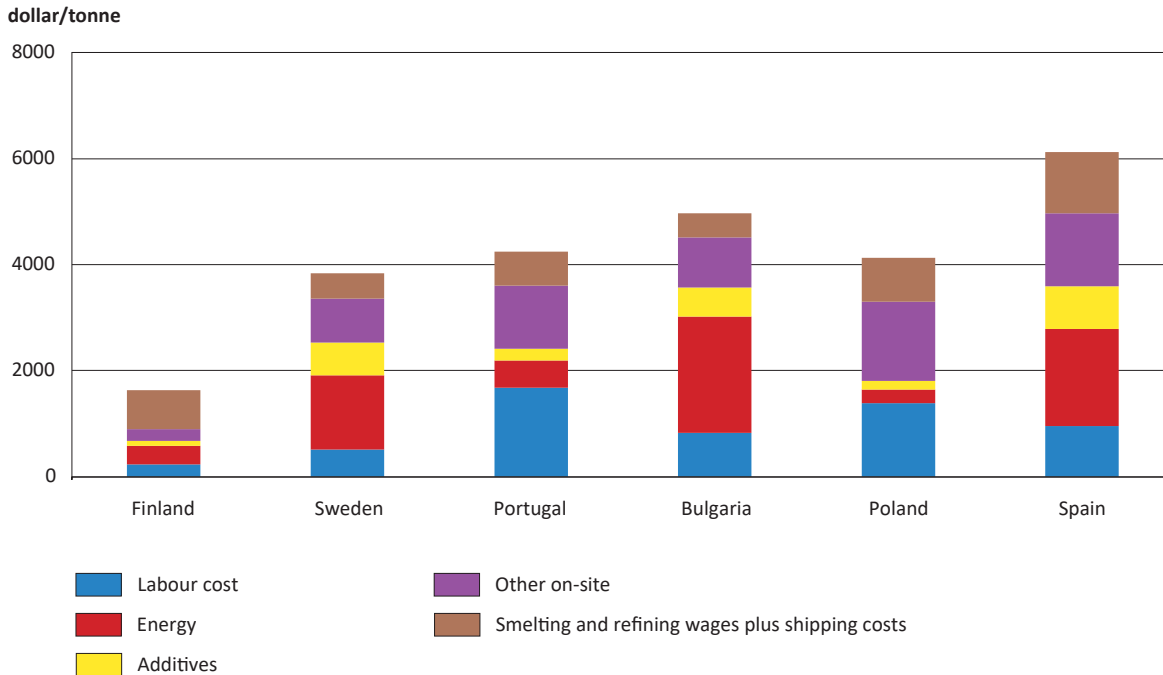
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1992:2	Järnmalsmsrevy 1991	2007:2	Bergverksstatistik 2006
1992:3	Mineralmarknaden, juni 1992 (Tema: Mangan)	2008:1	Mineralmarknaden, mars 2008 (Tema: Wolfram)
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1994:3	Bergverksstatistik 1992	2010:2	Grus, sand och krossberg 2009
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1999:2	Mineralmarknaden, juni 1999 (Tema: Titan)	2022:1	Bergverksstatistik 2021
1999:3	Grus, sand och krossberg. Produktion och tillgångar 1998	2022:2	Statistics of the Swedish Mining Industry 2021
1999:4	Mineralmarknaden, december 1999 (Tema: Silver)	2022:3	Grus, sand och krossberg 2021
2000:1	Bergverksstatistik 1999	2023:1	Bergverksstatistik 2022
2000:2	Naturgrus eller morän	2023:2	Statistics of the Swedish Mining Industry 2022
2000:3	Grus, sand och krossberg. Produktion och tillgångar 1999	2023:3	Grus, sand och krossberg 2022
2000:4	Mineralmarknaden, december 2000 (Tema: Magnesium)		

Costs for extraction of copper



Variable costs. The figure compares the costs for extraction of copper, per ton and distributed among different cost centers, for the six largest producers within the EU. In Sweden, high energy consumption drives up the cost, while the resource-efficient processes simultaneously keep the cost of labour down. Source: S&P Capital IQ

Resource-efficient copper from Sweden contributes to the EU's raw material chains

Today, the EU is heavily dependent on critical and strategic raw materials from countries outside the Union. Our dependence, combined with a growing global demand due to the green and digital transition, makes supply chains vulnerable.

The EU regulation on critical raw materials, which also became Swedish law on May 23, 2024, is the basis for building up the EU's capacity and creating resilient raw material chains. The purpose of the legislation is to

- strengthen domestic supply chains
- develop international partnerships with countries outside the EU from which all parties benefit.

Sweden currently has production of one of the raw materials that the EU identifies as strategic – copper. The largest extraction

of copper within the EU is in Poland, Spain, Bulgaria, Sweden, Finland, and Portugal.

As the figure shows, the variation for some direct costs of copper extraction is quite large within the EU. This is mainly due to different mineralisation types and metal contents, but also differences in costs for energy, transport, inputs, or labour.

Most of the copper produced in Sweden comes from the Aitik mine, where large quantities of low-grade ore with copper contents down to 0.15% are mined. It results in high energy consumption and requires large amounts of chemical additives, which drives up costs. On the other hand, the cost of labour is relatively low, which is due to resource-efficient processes in Swedish copper mines.

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