



Statistics of the Swedish Mining Industry 2022

Changes implemented August 15, 2023

Page 18: Table 5, average iron content for Kaunisvaara, text corrected.

New text: 27.8%

Original text: 0.278%

Changes implemented November 21, 2023

Page 11: The colors in the legend in Figure 6 has been corrected.

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

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Cover images: The collage shows a drilling rig underground (top left), a stack of copper cathodes (bottom left) and a pond for tailings at the Kristineberg mine (large image).

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FOREWORD

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

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

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

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

The Swedish mining industry

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

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

In EU terms, Sweden is a fairly major producer of iron ore in particular, as well as lead and zinc. Internationally speaking, however, Sweden is a relatively small

producer (Fig. 2). As shown in Figure 3, ore production has virtually doubled over the past ten years. Boliden's Aitik mine is one factor in the increase, but production has also risen at LKAB's mines and other mines.

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

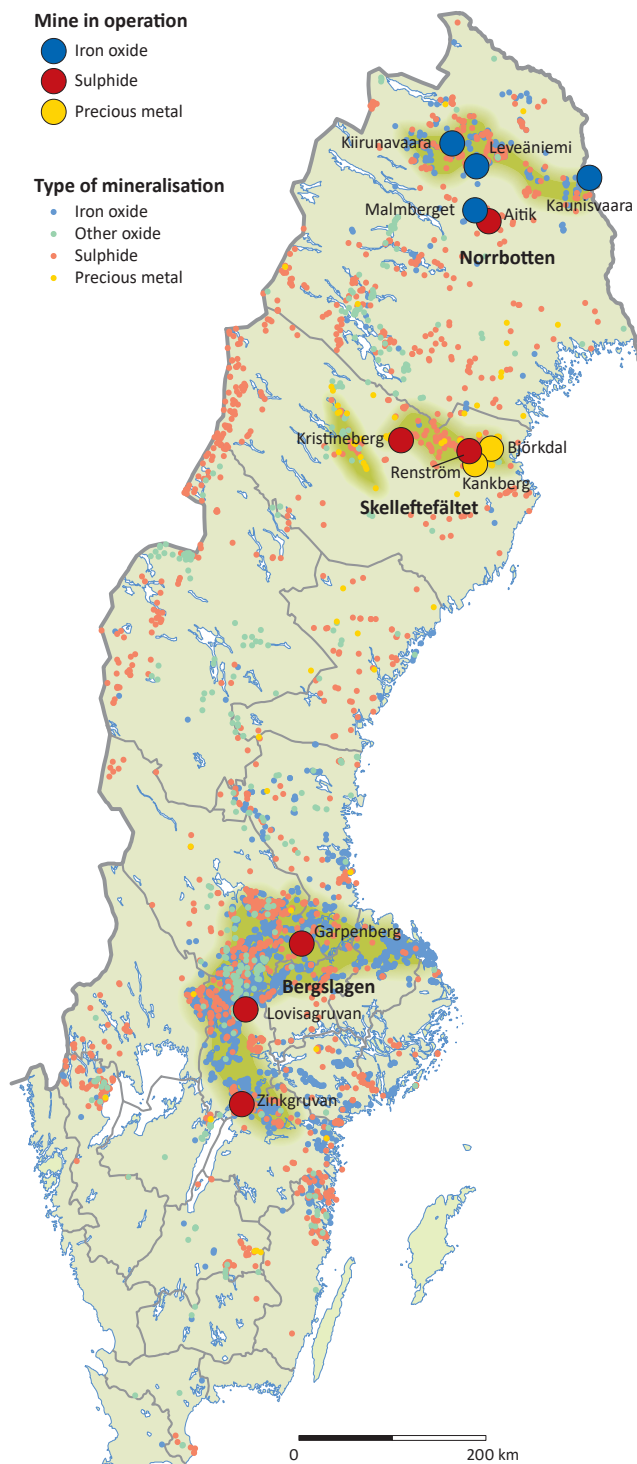
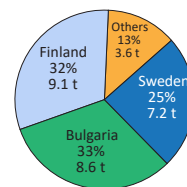
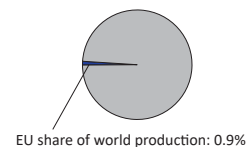


Figure 1. Active mines and known mineralisations in Sweden, 2022.

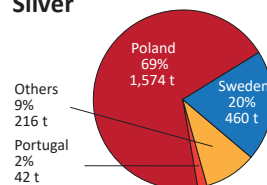
Gold



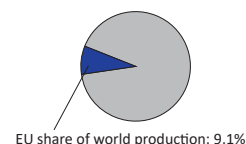
World production: 3,146 tonnes
EU production: 28.5 tonnes



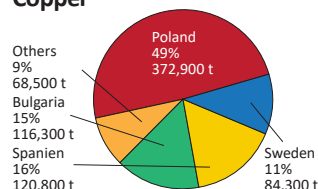
Silver



World production: 25,050 tonnes
EU production: 2,291 tonnes



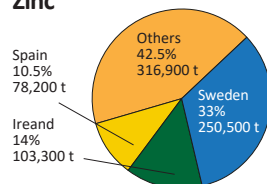
Copper



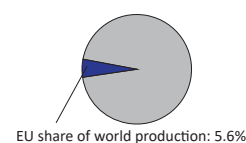
World production: 21.5 million tonnes
EU production: 762,800 tonnes



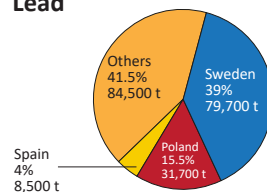
Zinc



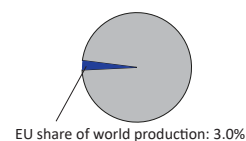
World production: 13.26 million tonnes
EU production: 748,800 tonnes



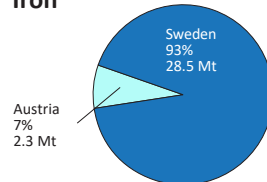
Lead



World production: 6.8 million tonnes
EU production: 204,400 tonnes



Iron



World production: 2,400 million tonnes
EU production: 30.4 million tonnes

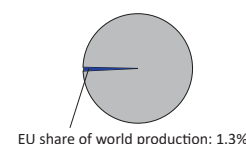


Figure 2. Sweden's mining production in 2022 in relation to the EU and the rest of the world.

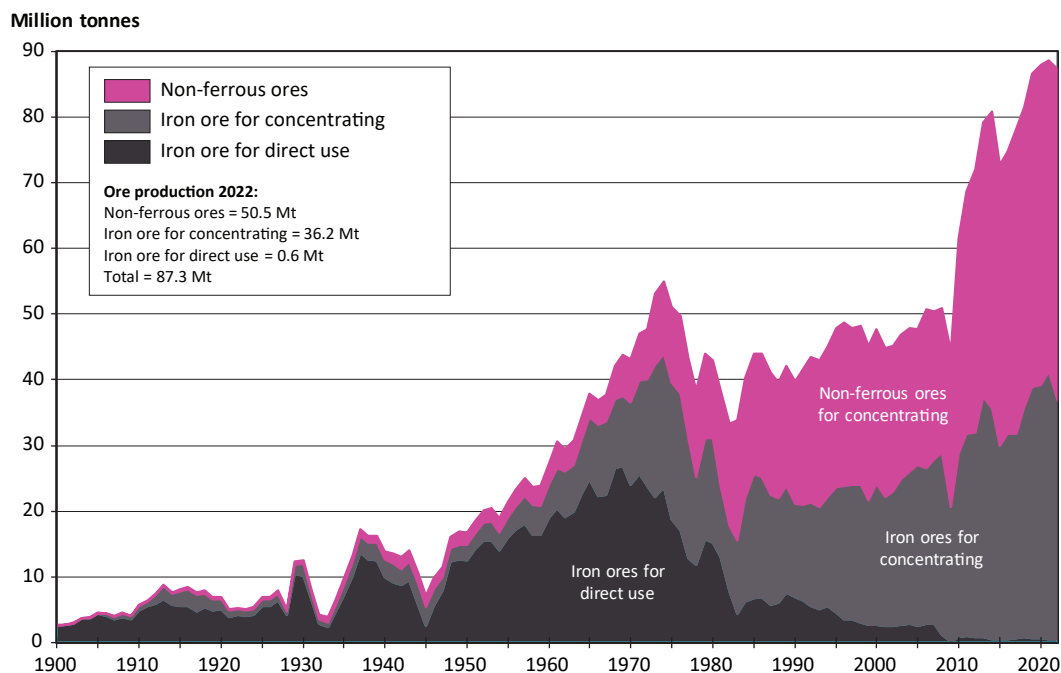


Figure 3. Production of ore in Sweden, 1900–2022.

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

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

Table 1. Continued.

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

NUMBER OF MINES 1900–2022

There were between 100 and 200 operating mines and ore fields in Sweden in the early 20th century. There were up to 260 mines by the end of the First World War (Figure 4). But there are discrepancies between early statistical reporting and the reports published from the 1930s onwards. The main difference is that production was originally reported for all individual mines within

an ore field, but later figures refer to entire ore fields. For instance, production from 12 separate mines in the Dannemora field was reported during the period 1910–1920. Since 1940 the statistics have been aggregated as “Dannemora”.

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

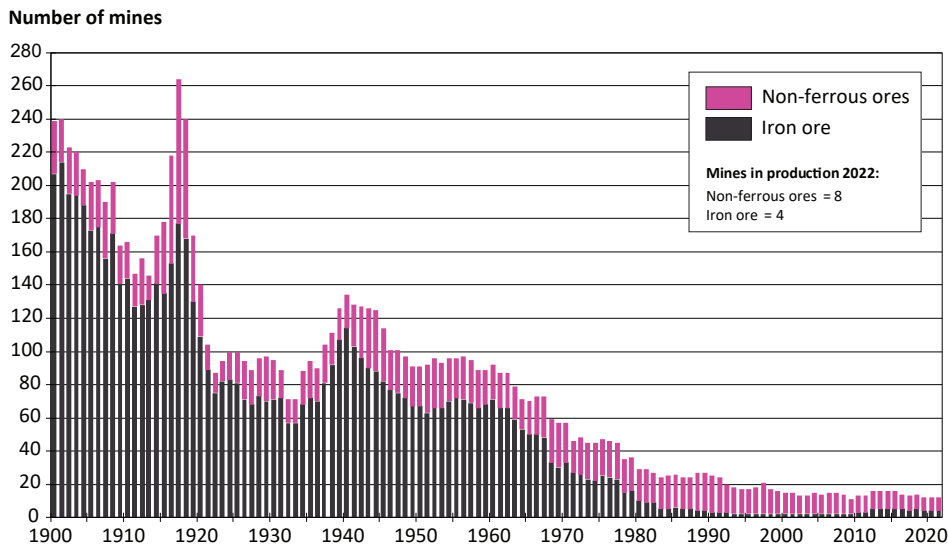


Figure 4. Number of mines in operation in Sweden, 1900–2022.

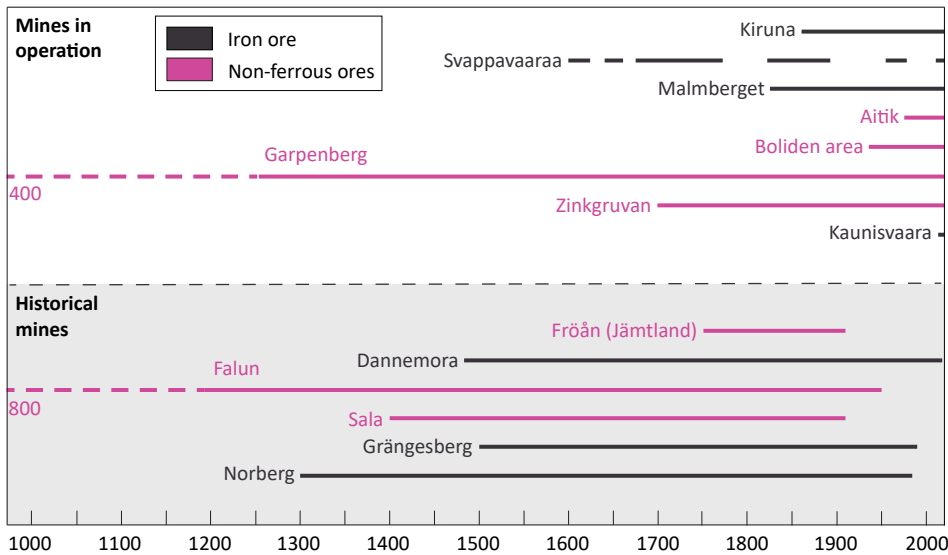


Figure 5. Swedish mines have a long history. The upper part of the diagram shows mines in operation; the lower part shows some major historical mines. Several of these date back to the Middle Ages. Dark grey/black shows iron ore mines; pink represents non-iron ore mines.



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

EMPLOYMENT IN THE MINING INDUSTRY

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

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

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

Work-related accidents and sick leave rates

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

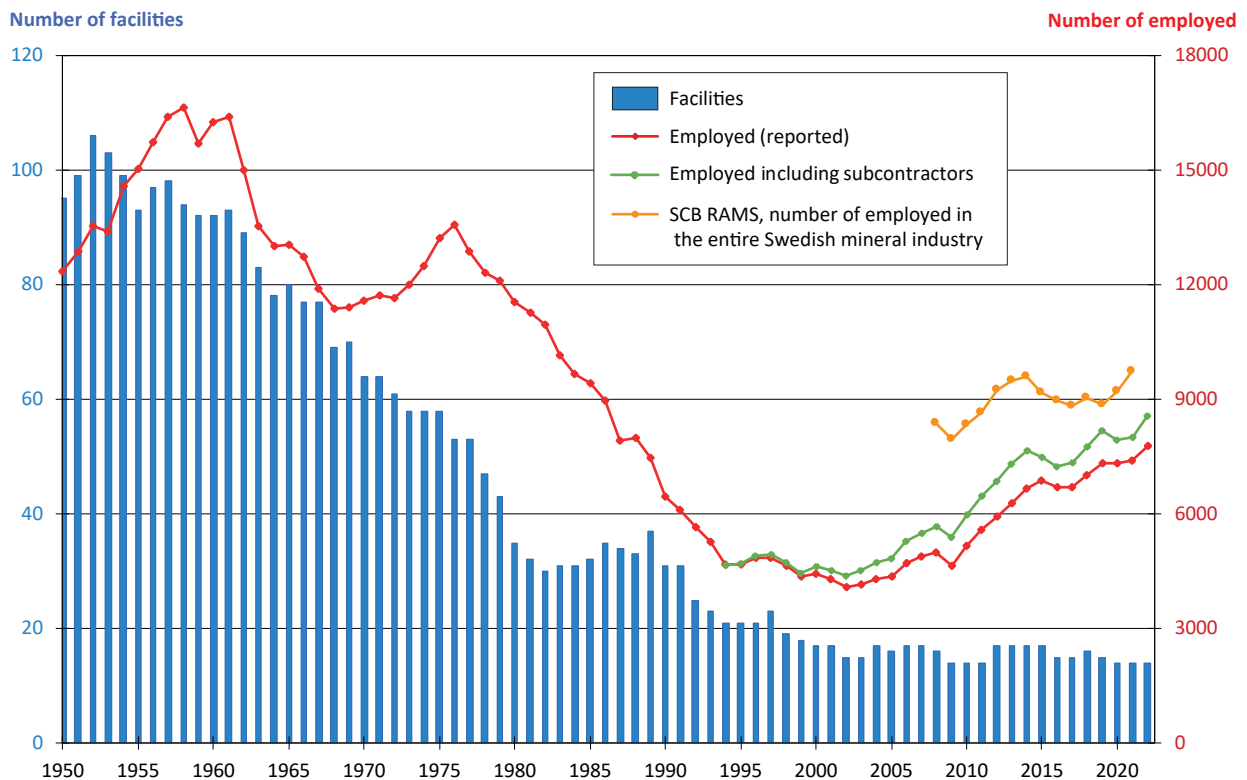


Figure 7. Number of facilities and people working in the mining industry, 1950–2022.

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

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

Table 2. Continued.

Year	Iron ore mines				Non-ferrous ore mines				Total	
	Facilities	White-collar workers	Workers	Total employed	Facilities	White-collar workers	Workers	Total employed	Facilities	Employed
1995	4	416	2 130	2 546	17	315	1 817	2 132	21	4 678
1996	3	603	2 141	2 744	18	325	1 784	2 109	21	4 853
1997	3	612	2 036	2 648	20	329	1 886	2 215	23	4 863
1998	3	573	1 956	2 529	16	316	1 792	2 108	19	4 637
1999	3	520	1 816	2 336	15	304	1 708	2 012	18	4 348
2000	3	641	1 933	2 574	14	279	1 593	1 872	17	4 446
2001	3	667	1 893	2 560	14	264	1 461	1 725	17	4 285
2002	3	642	1 847	2 489	12	260	1 339	1 599	15	4 088
2003	3	640	1 862	2 502	12	263	1 401	1 664	15	4 166
2004	3	618	1 897	2 515	14	294	1 493	1 787	17	4 302
2005	3	665	1 950	2 615	13	286	1 453	1 739	16	4 354
2006	3	706	2 046	2 752	14	324	1 651	1 975	17	4 727
2007	3	742	2 123	2 865	14	342	1 684	2 026	17	4 891
2008	3	779	2 279	3 058	13	328	1 599	1 927	16	4 985
2009	3	756	2 044	2 800	11	239	1 617	1 856	14	4 656
2010	3	763	2 235	2 998	11	361	1 821	2 182	14	5 180
2011	3	815	2 351	3 166	11	408	2 019	2 427	14	5 593
2012	5	1 004	2 518	3 522	12	430	1 970	2 400	17	5 922
2013	5	1 035	2 839	3 874	12	462	1 959	2 421	17	6 295
2014	5	1 016	2 814	3 830	12	489	2 339	2 828	17	6 658
2015	5	1 030	2 344	3 374	12	528	2 974	3 502	17	6 876
2016	4	929	2 277	3 206	11	532	2 946	3 478	15	6 684
2017	4	904	2 255	3 159	11	546	2 991	3 537	15	6 696
2018	5	962	2 412	3 374	11	569	3 053	3 622	16	6 996
2019	4	1 021	2 473	3 494	10	656	3 174	3 830	15	7 324
2020	4	1 152	2 468	3 620	10	681	3 033	3 714	14	7 334
2021	4	1 193	2 353	3 546	10	719	3 122	3 841	14	7 387
2022	4	1 422	2 551	3 973	10	746	3 054	3 800	14	7 773

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

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

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



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

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

Year	Workers, all mines			White-collar workers, all mines		
	Women	Total	%	Women	Total	%
2002	182	3 186	6			
2003	199	3 263	6			
2004	171	3 690	5			
2005	197	3 403	6			
2006	229	3 447	7			
2007	284	3 807	7			
2008	387	3 878	10	270	1 071	25
2009	329	3 661	9	270	1 075	25
2010	481	4 056	12	281	1 111	25
2011	590	4 370	14	328	1 212	27
2012	648	4 462	15	372	1 399	27
2013	703	4 721	15	403	1 497	27
2014	731	5 153	14	424	1 505	28
2015	814	5 318	15	448	1 558	29
2016	832	5 223	16	418	1 461	29
2017	865	5 246	16	426	1 450	29
2018	911	5 465	17	466	1 533	30
2019	980	5 647	17	526	1 677	31
2020	1 017	5 501	18	590	1 833	32
2021	1 209	5 475	22	643	1 912	34
2022	1225	5 605	22	768	2 168	35

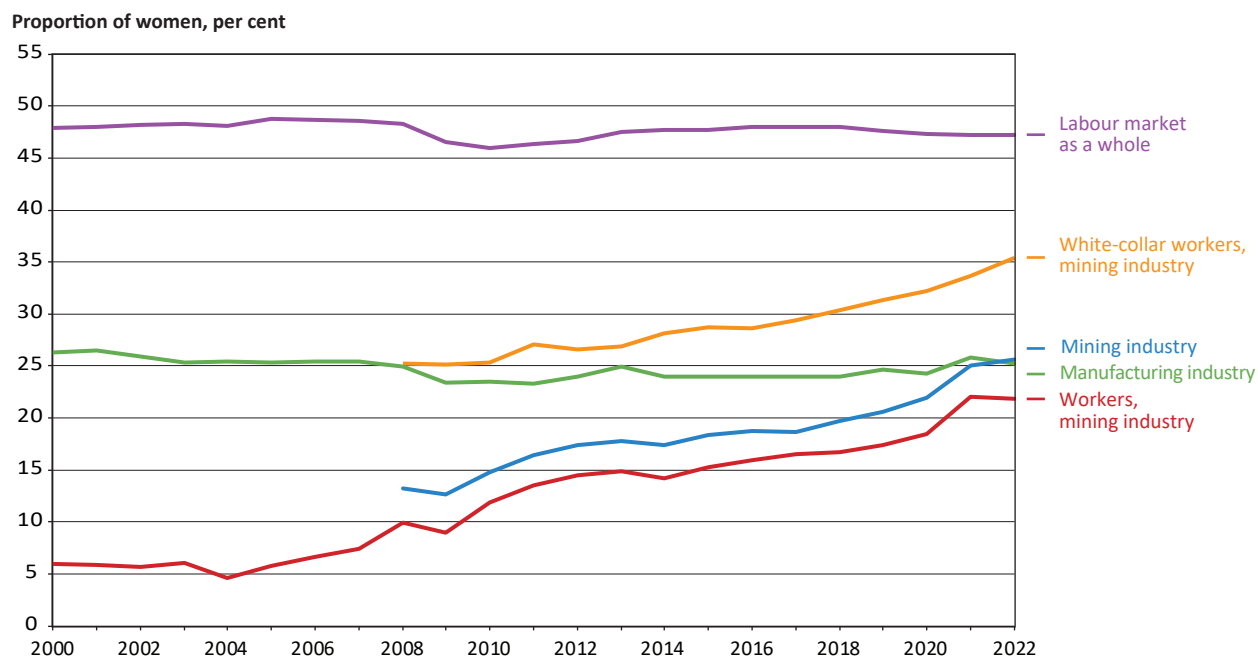


Figure 8. Proportion of women in the mining industry, manufacturing industry and labour market as a whole 2000–2021.

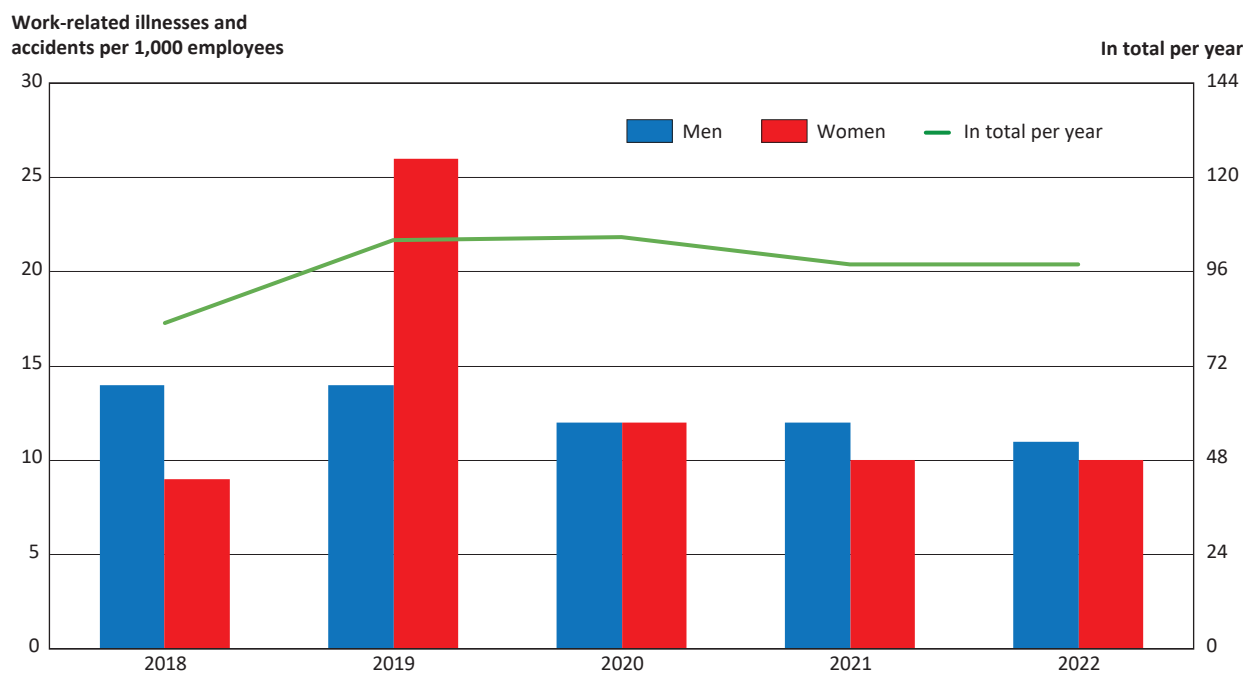


Figure 9. Number of work-related illnesses and accidents with resulting absence due to illness at Swedish mines, 2018–2022. Number per 1,000 employees by gender and total. Source: Swedish Work Environment Authority



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

Iron ore

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

LKAB

LKAB's iron ore mines are located in the environs of Malmberget, Kiruna and Leveäniemi (in Svappavaara)

in Norrbotten County in northern Sweden. Most of the iron ore extracted is high-quality magnetite, which is naturally magnetic. This facilitates concentration and requires less energy for pellet production. The iron content after concentration is over 70 per cent, rendering the product sought after in the market.

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

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

County 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	18 266 192		18 266 192	38.3	0.55	10 026 191	
<i>Kiruna</i>								
LKAB	Kiirunavaara	22 011 200		22 011 200	38.9	0.32	13 999 811	565 303
<i>Svappavaara</i>								
LKAB	Leveäniemi		8 539 643	8 539 643	43.7	0.64	5 771 350	
LKAB	Gruvberget							
<i>Pajala</i>								
Kaunis Iron	Kaunisvaara		22 156 863		27.8		5 837 801	
Whole Sweden 2022		40 277 392	30 696 506	48 817 035			35 635 153	565 303
Whole Sweden 2021		44 839 400	32 875 237	53 757 112			40 037 047	595 076

* After sorting

Kiirunavaara Mine

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

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

Leveäniemi Mine

Mining takes place in the Leveäniemi open pit, which is located south of the town of Svappavaara and adjacent to the concentrator on the site. According to SGU's

survey, 8.5 million tonnes of ore was mined in 2022 and after sorting, 5.8 million tonnes of refined ore was obtained. Unrefined ore entering the concentrator had a 59.4 per cent iron content and a 0.46 per cent phosphorus content. The concentrator's output level was 71.0 per cent iron and 0.02 per cent phosphorus. Svappavaara mainly produces blast furnace and direct reduction pellets (DR pellets).

Malmberget Mine

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

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

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

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

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

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

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

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

KAUNIS IRON AB

Kaunisvaara Mine

Kaunis Iron AB produced approximately 2.1 million tonnes of refined iron ore products in 2022 (2.0 million tonnes in 2021) at Kaunisvaara Mine near the town of Pajala in Norrbotten County. According to SGU's survey, almost 22 million tonnes of ore was extracted from the mine and just under 5.8 million tonnes of ore for concentrating was obtained after sorting. The unrefined ore contained 27.8 per cent iron and 0.05 per cent sulphur. Outgoing concentrate comprised 67.1 per

cent iron and 0.06 per cent sulphur. The concentrate is transported about 150 km to a transshipment station at Pitkäjärvi (near Svappavaara) for onward shipment on the Ore Railway to the port of Narvik in Norway.

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

Table 9. Sintering of iron ore concentrates n 2022.

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

* Note: LKAB's production consists of pellets.

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

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

Table 10. Continued.

Year		Production of con- centrates (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 ana- lysed	<0,01	0,01 –0,04	>0,04	
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	-	



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

Non-ferrous ores

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

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

MANDALAY RESOURCES

Björkdal Mine

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

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

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

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

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

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

BOLIDEN MINERAL AB

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

Aitik Mine

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

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

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

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

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

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

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

Boliden area

In the Boliden area within the Skellefteå field in Västerbotten, Boliden has production at three mines: Kristineberg, Renström and Kankberg. Preparations are under way to begin mining the mineralisation at Rävliiden, near Kristineberg. The ores in Renström and Kristineberg are massive sulphide ores with copper, zinc and lead as well as considerable levels of gold and

silver. The ore in Kankberg mine is of a different type, the economically viable elements being gold and tellurium (Table 11).

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

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

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

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

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

* Estimated quantity

Metal content, tonnes

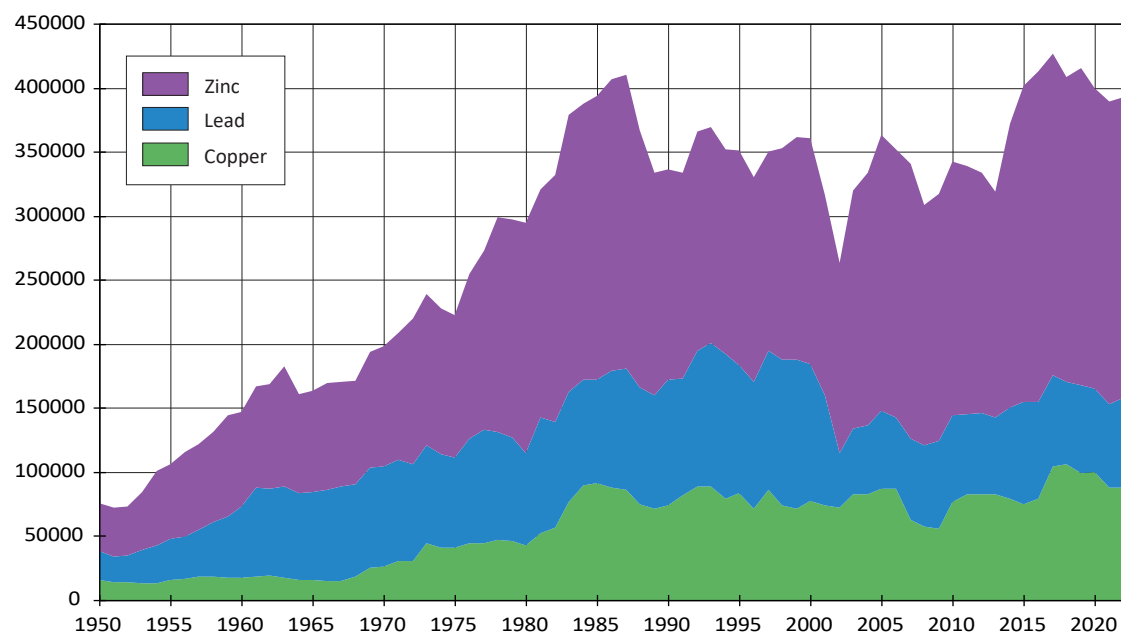


Figure 10. Metal content in copper, lead and zinc ores mined in Sweden, 1950–2022.

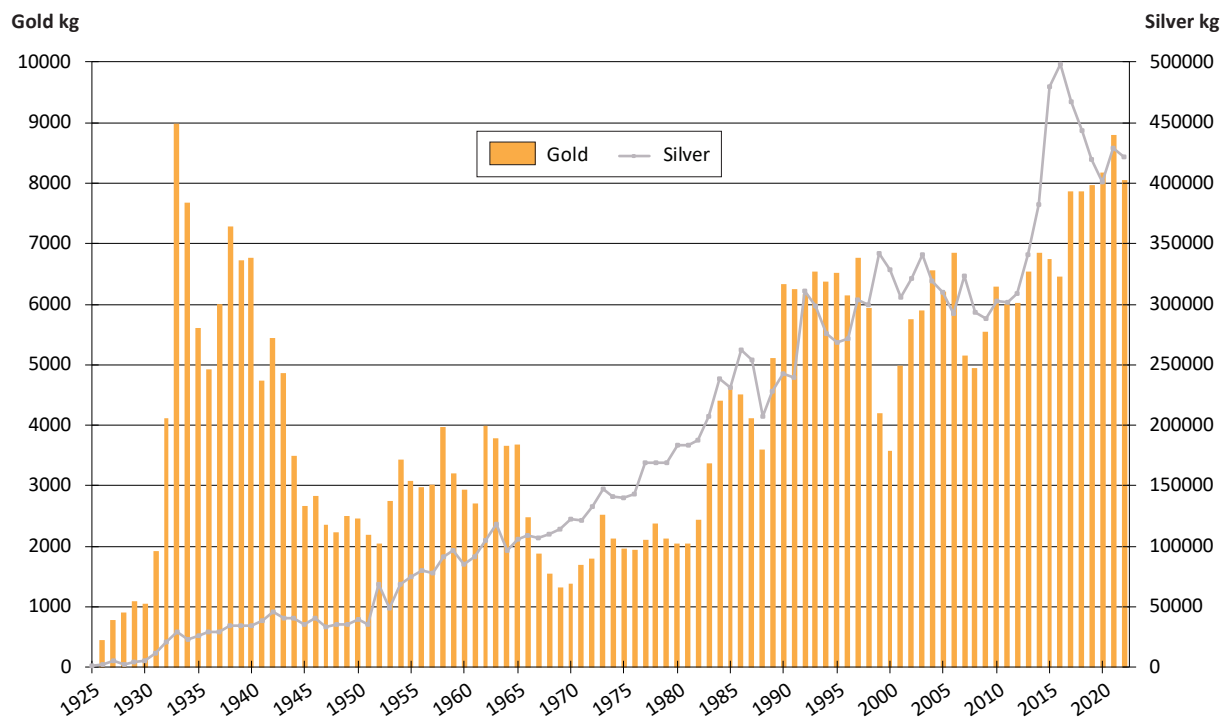


Figure 11. Production of gold and silver (metal content) in Swedish mines, 1925–2021.

Garpenberg Mine

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

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

DRAGON MINING SWEDEN AB

Svartliden Mine

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

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

ronmental Court of Appeal dismissed the application on 14 March 2023.

LOVISAGRUVAN AB

Lovisa Mine

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

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

LUNDIN MINING

Zinkgruvan Mine

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

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

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



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

Environmental statistics

MINING WASTE

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

Tailings are a residue from ore processing. After processing, the tailings are transported as slurry (sand and process water) with a high water content via pipe-

lines to ponds (tailings storage facilities), where the solid material is allowed to settle. Figure 13 shows the location and size of tailings deposits in Sweden. Tailings can also be deposited as infill in mined out drifts or be converted into a thickened deposit, where the process water is squeezed out and then reused in the enrichment processes.

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

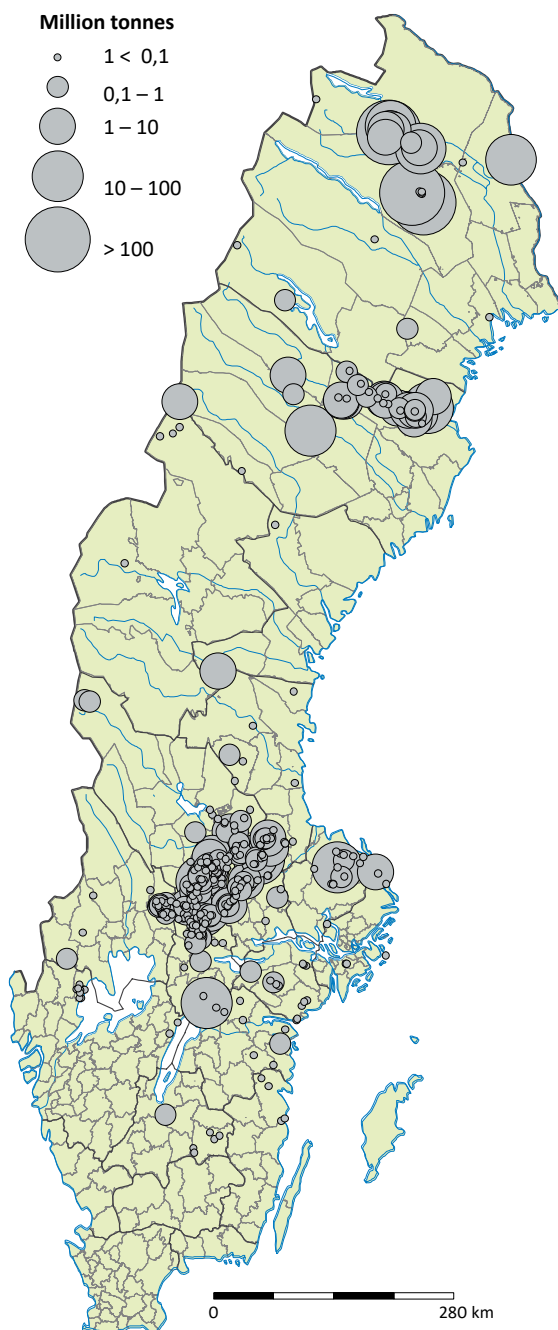


Figure 12. Waste rock, million tonnes. Data from SGU data-base: Ores and Minerals, see MapViewer, www.sgu.se.

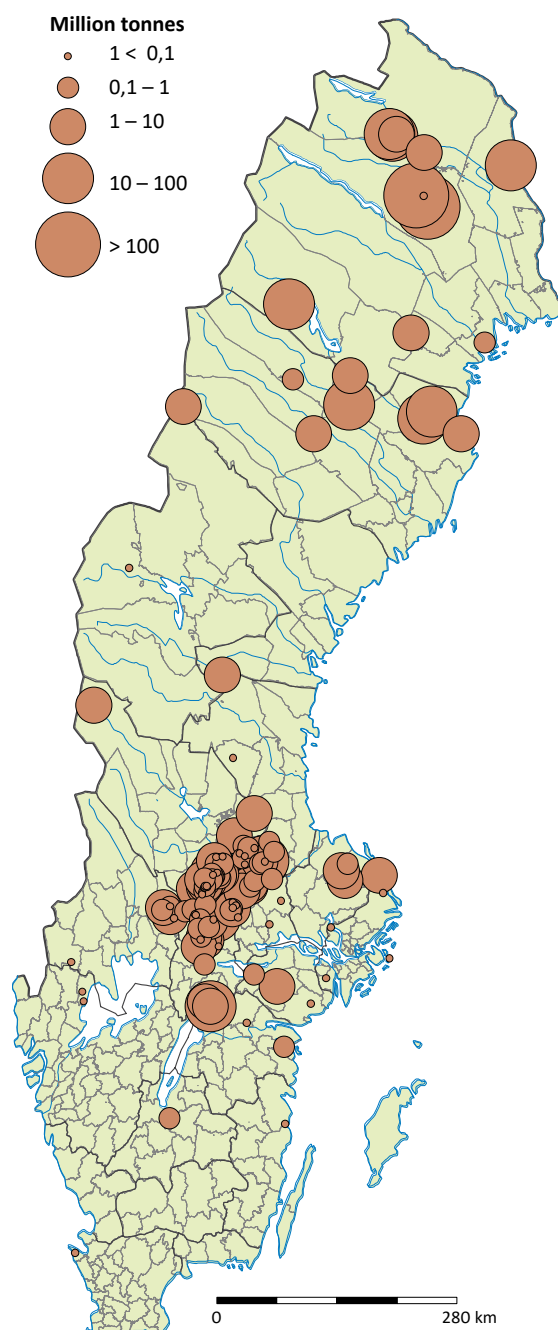


Figure 13. Tailings, million tonnes. Data from SGU data-base: Ores and Minerals, see MapViewer, www.sgu.se.

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

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

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

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

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

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

DISCHARGE OF METALS TO RECIPIENTS

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

RESOURCE EFFICIENCY

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

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

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

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

The resource efficiency of non-ferrous ore mines remained fairly constant between 2017 and 2022 (Fig. 14). Resource efficiency is highest at the Aitik mine. Energy consumption per unit of ore produced here was approximately 27 kWh/tonne. The lowest resource efficiency is in the Boliden area and at Zinkgruvan, where energy consumption per tonne of ore

produced was just over 143 kWh/tonne and 100 kWh/tonne respectively. Boliden's concentrator processes ore from the mines at Kankberg, Kristineberg and Renström, which are located between 10 and 90 km from the concentrator. Transport is probably a factor contributing to the low resource efficiency at Boliden. The resource efficiency of Björkdal Mine has varied over time. One reason is the operational variation between open-pit and underground mining.

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

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

Resource efficiency non-iron ore mines, kWh/tonne

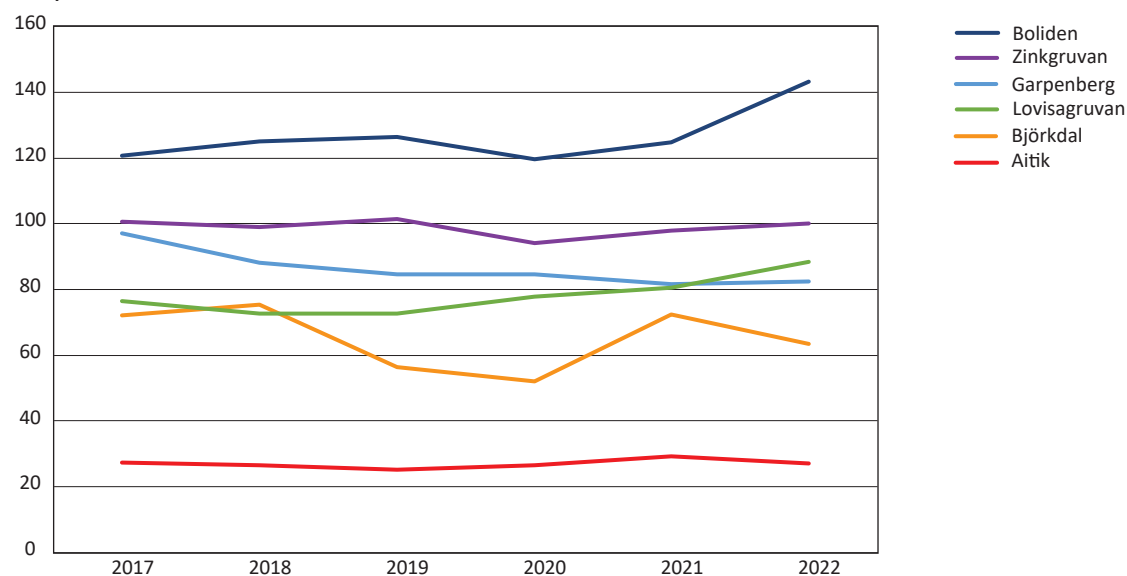


Figure 14. Resource efficiency non-iron ore mines 2017–2022. Source: own processing of data from the Swedish Environmental Reporting Portal (SMP)

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

ENERGY CONSUMPTION

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

Data from SMP show that the average rate of electrification at Swedish mines remained fairly constant at

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

SECONDARY RAW MATERIALS

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

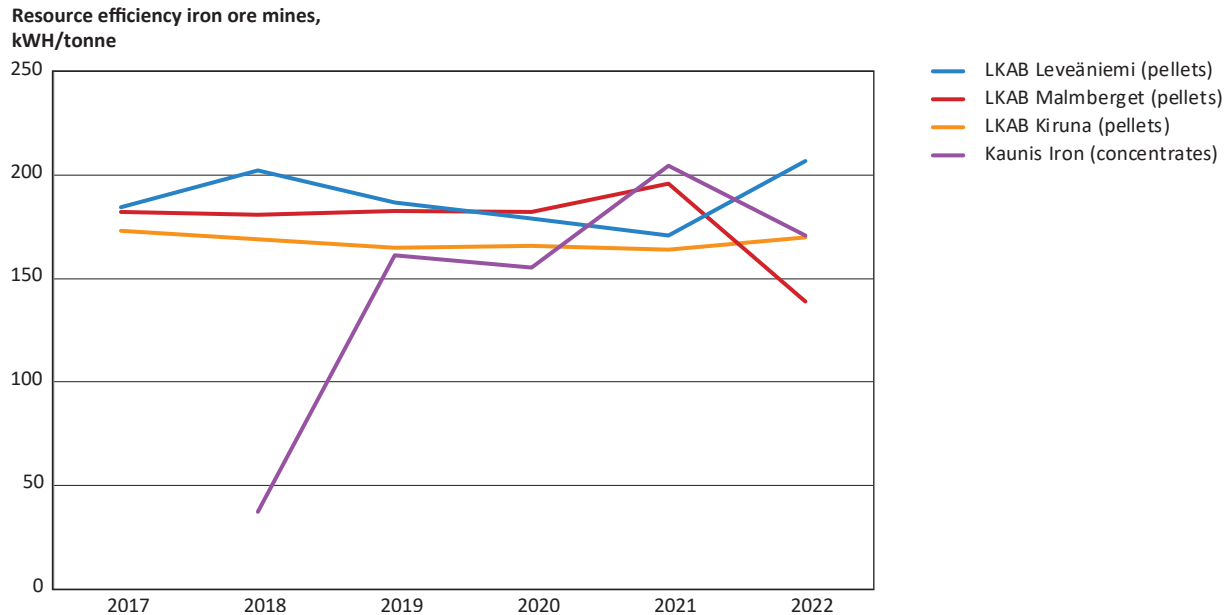


Figure 15. Resource efficiency iron ore mines 2017–2022. Source: own processing of data from the Swedish Environmental Reporting Portal (SMP)

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

In the smelters, metals are produced from concentrates or concentrate extracted in the mines (“primary smelting material”) or from recycled materials (secondary smelting materials such as scrap, e-scrap, metal ash

or steel mill dust). The amount of metals produced in Sweden from recycled materials during 2017–2022 is presented in Table 18.

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

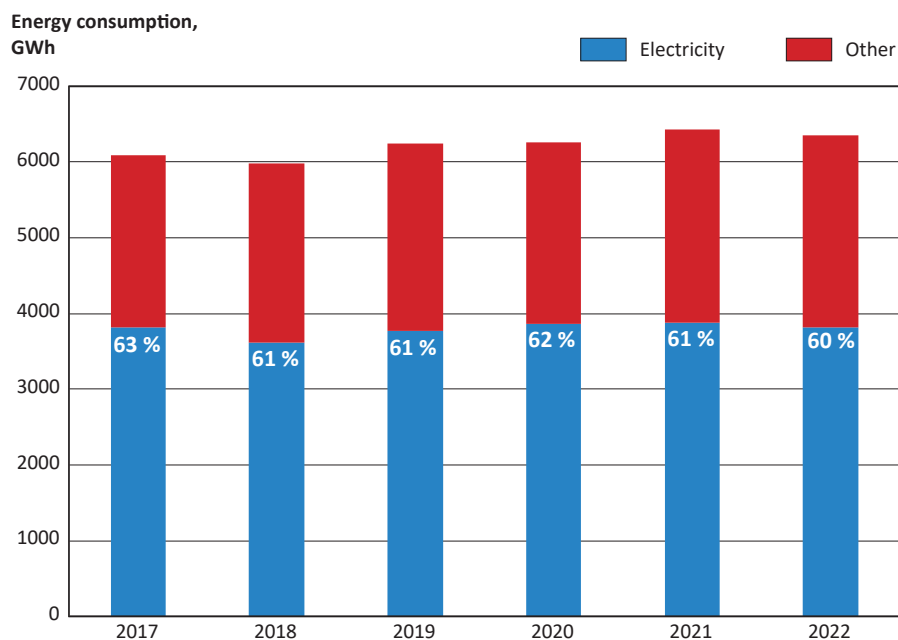


Figure 16. Energy consumption and electrification of Swedish mines 2017–2022. Source: own processing of data from the Swedish Environmental Reporting Portal (SMP).

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

	2017	2018	2019	2020	2021	2022
Iron (steel scrap)	2 317 000					
Copper	61 488	56 125	54 378	58 757	60 220	50 089
Lead (Boliden Bergsöe)*	50 000	47 000	49 000	46 000	46 000	42 000
Zinc	24 696	0	19 007	27 071	17 935	18 547
Aluminium	72 589	74 176	68 500	58 100	67 000	63 800
Gold	5.6	4.7	4.1	4.5	3.19	3.48
Silver	97	109	100	131	111	112

* Refers to lead alloys.

Exploration and exploration permits

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

There were 640 current exploration permits at the end of 2022 (Table 19, Figure 18). This figure was up on the previous year, when 587 permits had been issued.

Eighty-six new exploration permits were granted in 2022 (Figure 19, Table 20). Figures 19 and 20 show that exploration permits granted are decreasing over time, both in number and in area covered. 111 permits were granted in 2020; between 100 and 200 permits were granted each year in the preceding years. The number of renewals has also decreased. Twenty-one permits were renewed in 2022, down from 61 in 2021 and 72 in 2020 (Table 21). The permits granted in 2022 were for Västerbotten County, Norrbotten County, Dalarna County and Örebro County.

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

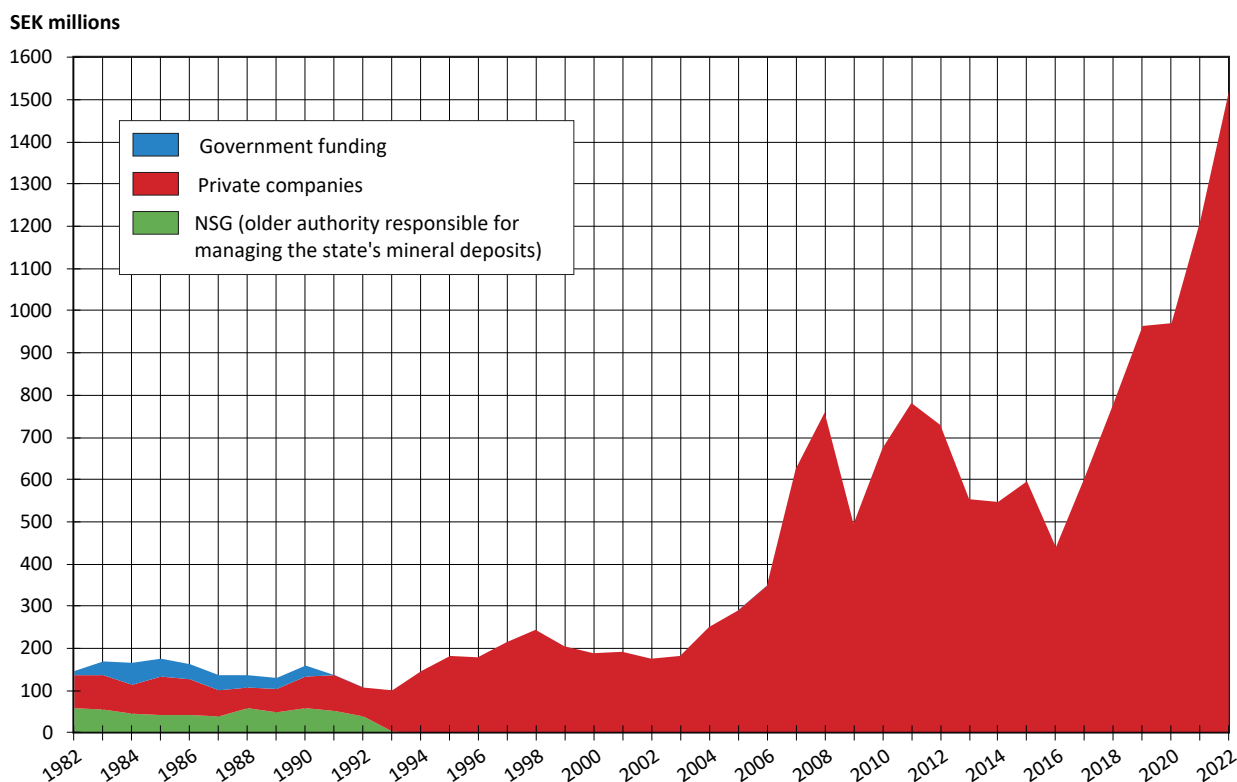


Figure 17. Value of exploration in Sweden 1982–2022 (current prices)

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

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

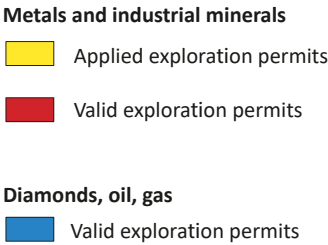


Figure 18. Exploration permits in Sweden, data obtained April 2023.

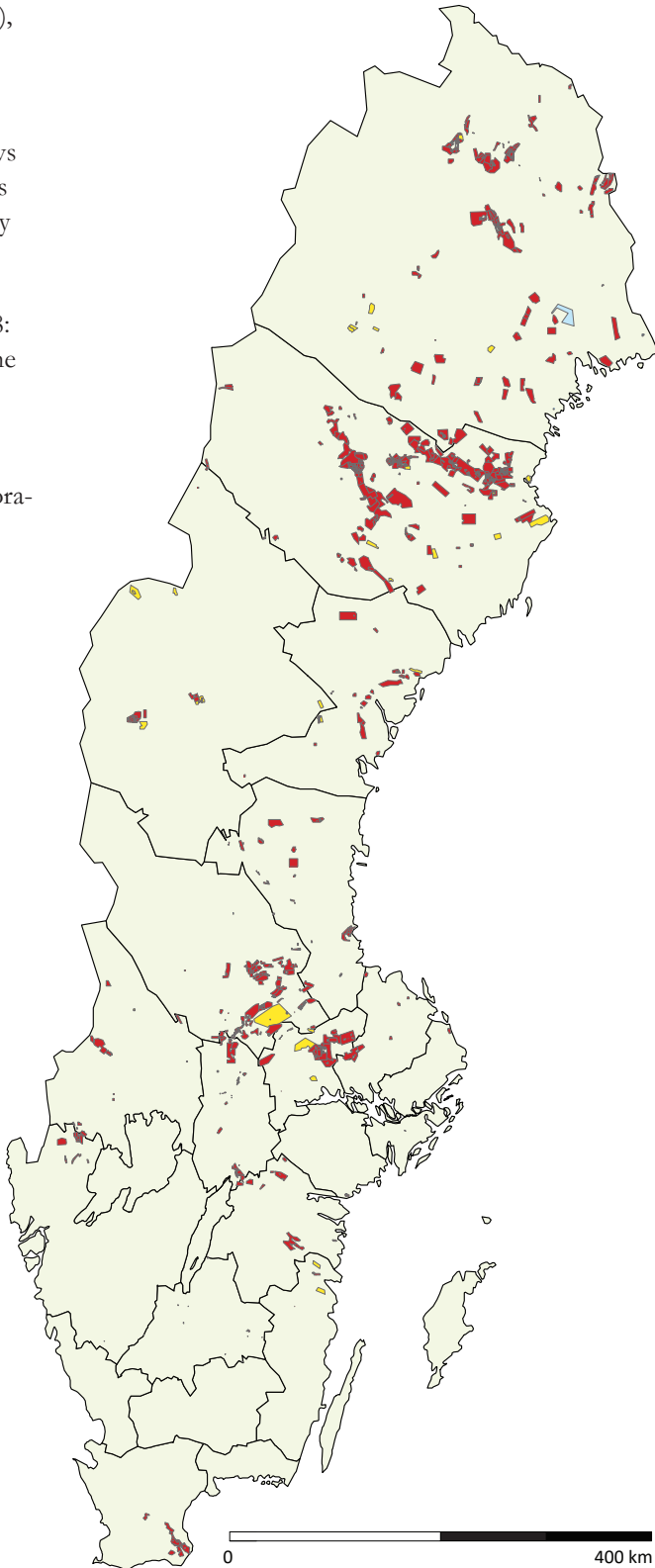


Table 19. Valid exploration permits at the end of 2022. Source: Bergsstaten

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

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

²⁾ The Minerals Act 1 kap. 1 § 3 st. includes oil, gaseous hydrocarbons and diamond

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

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

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

²⁾ The Minerals Act 1 kap. 1 § 3 st. includes oil, gaseous hydrocarbons and diamond

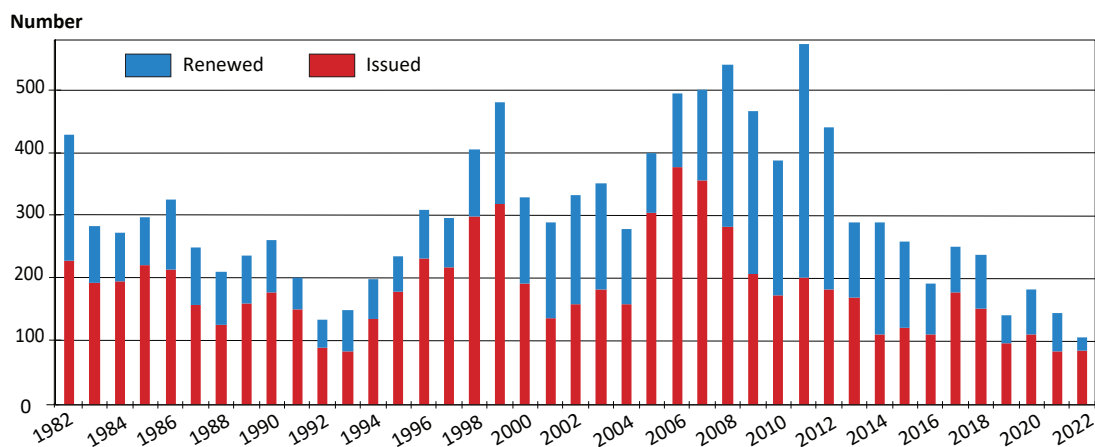


Figure 19. Number of claim certificates and exploration permits issued or renewed, 1982–2022.

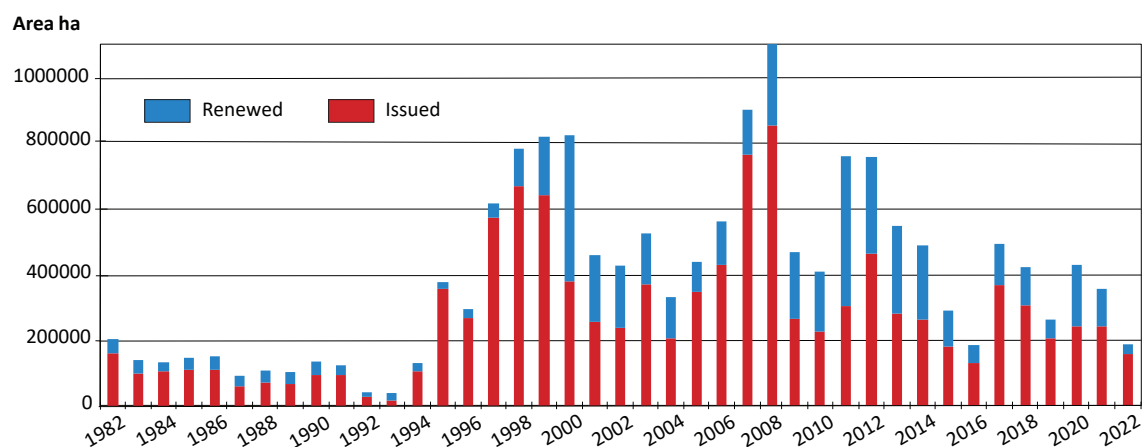


Figure 20. Area of claim certificates and exploration permits issued or renewed (not including diamonds), 1982–2022.

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

County	Mineral Act 1 kap. 1 § 1 och 2 st. ¹⁾	
	Number	Area (ha)
Dalarna	1	180.61
Norrbottnen	10	19694.03
Västerbotten	9	8224.00
Örebro	1	529.98
Total	21	28629

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

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

Mineral	Number applied for 2022		Number applied for 2021		Difference 2021–2022
Copper	444	69 %	367	63 %	77
Gold	417	65 %	354	60 %	63
Silver	285	45 %	236	40 %	49
Zinc	270	42 %	231	39 %	39
Lead	209	33 %	176	30 %	33
Iron	116	18 %	87	15 %	29
Cobalt	102	16 %	66	11 %	36
Nickel	85	13 %	53	9 %	32
Palladium	58	9 %	34	6 %	24
Platinum	52	8 %	31	5 %	21
Tungsten	50	8 %	41	7 %	9
Molybdenum	44	7 %	39	7 %	5
Vanadium	38	6 %	27	5 %	11
Lanthanum	36	6 %	13	2 %	23
Scandium	35	5 %	13	2 %	22
Yttrium	34	5 %	12	2 %	22
Graphite	25	4 %	17	3 %	8
Titanium	24	4 %	14	2 %	10
Iridium	23	4 %	16	3 %	7
Osmium	23	4 %	16	3 %	7
Rhodium	23	4 %	16	3 %	7

Mineral	Number applied for 2022		Number applied for 2021		Difference 2021–2022
Ruthenium	23	4 %	16	3 %	7
Lithium	17	3 %	18	3 %	-1
Tin	15	2 %	12	2 %	3
Tantalum	13	2 %	11	2 %	2
Apatite	8	1 %	7	1 %	1
Manganese	7	1 %	0	0	7
Beryllium	5	1 %	1	< 1 %	4
Niobium	5	1 %	1	< 1 %	4
Antimony	5	1 %	1	< 1 %	4
Bismuth	4	1 %	1	< 1 %	3
Zirconium	4	1 %	3	1 %	1
Cesium	3	< 1 %	3	1 %	0
Chromium	3	< 1 %	0	0	3
Pyrite	3	< 1 %	0	0	3
Nepheline syenite	1	< 1 %	1	< 1 %	0
Wollastonite	1	< 1 %	1	< 1 %	0
Diamond	1	< 1 %	0	0	1
Gaseous hydrocarbons	1	< 1 %	0	0	1
Thorium	1	< 1 %	0	0	1
Rubidium	0	0	2	< 1 %	-2

Number of visits to the drill core archive (days)

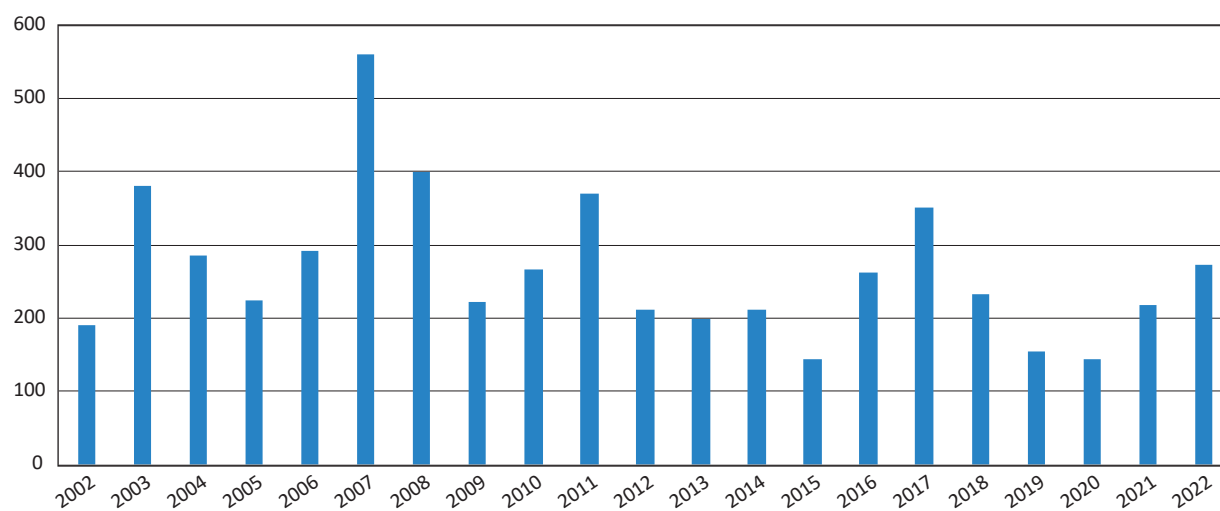


Figure 21. Number of booked visit days in SGU's drill core archive, 2002–2022.



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

Mining concessions and mineral fees in Sweden

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

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

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

Table 24 shows how mining concessions were distri-

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

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

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

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

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

* Conversion to mining concessions of old, expiring permissions (utmål).

** Cases where Bergsstaten has referred the decision to the government.

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

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

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

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

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

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

* This also includes application fees for exploration concession.



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

National interests

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

National interests comprise areas of particular national importance that can therefore take precedence over other interests when changes in land use are being considered. Precedence over local and public interests also

means that the value or importance of national interests may not be substantially harmed or altered. National interests comprise a basis for planning that must be considered by county administrative boards and municipalities in the long-term planning process. SGU is the government agency responsible for identifying deposits of valuable minerals or materials of national importance. This means that SGU assesses and prioritises mineral deposits of national interest under Chapter 3, section 7 (ii) of the Environmental Code.

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

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

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

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

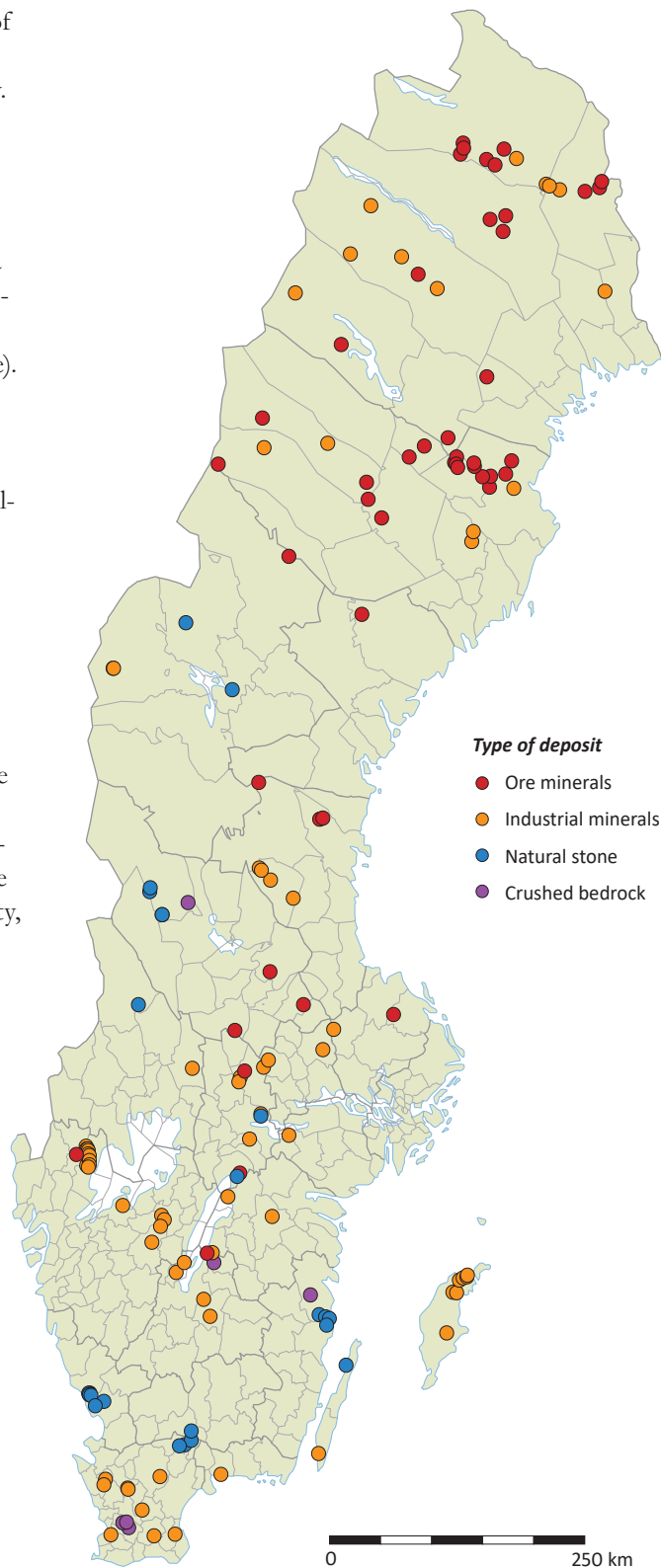


Figure 22. Mineral deposits of national interest under the Environmental Code

Table 27. Nationally important mineral deposits by county.

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

Table 27. Continued.

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

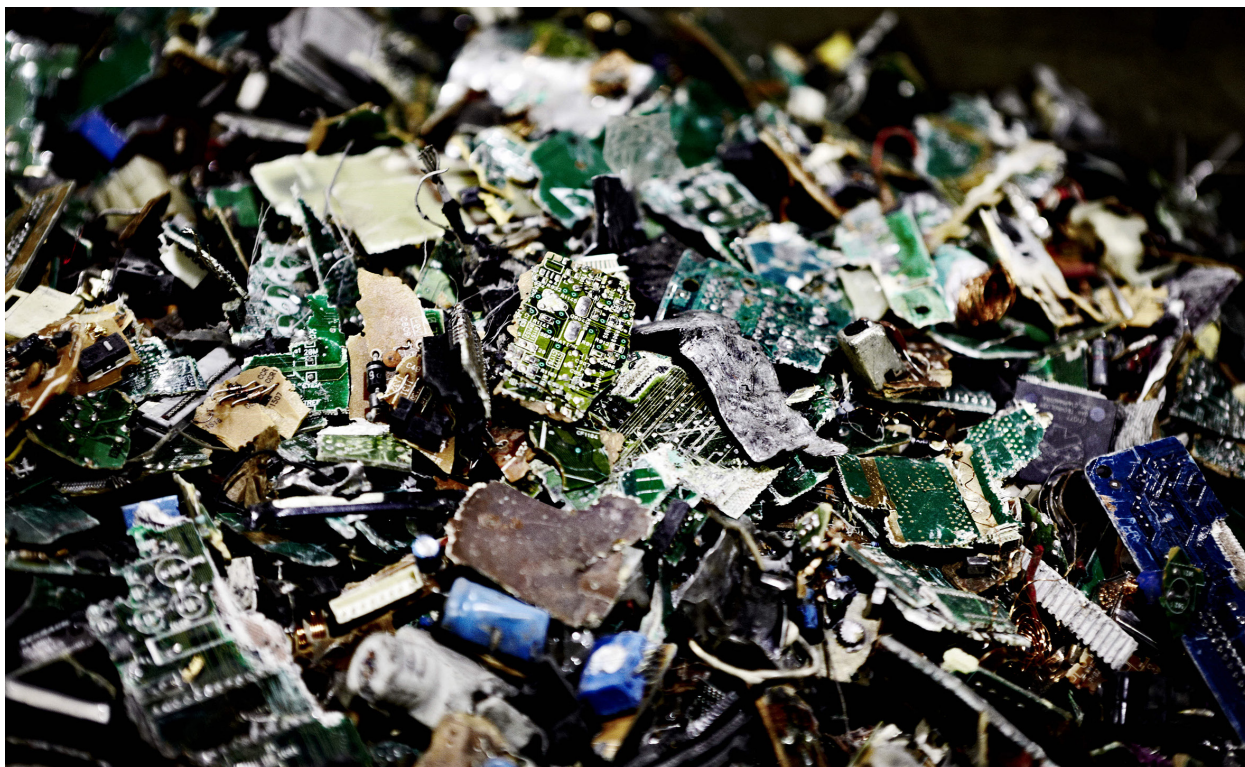
Table 27. Continued.

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, chalcopryite, gold and silver	7 209 245	748 807
Björkdal*	Skellefteå	Gold	7 213 261	764 402
Renström	Skellefteå	Chalcopryite, sphalerite	7 209 671	740 651
Åkerberg	Skellefteå	Gold	7 225 446	770 197
HolmtIron	Norsjö	Sphalerite, chalcopryite	7 228 662	714 692
Kristineberg*	Lycksele	Sphalerite, chalcopryite, galena, gold and silver	7 228 056	667 278
Kittelfjäll	Vilhelmina	Olivine	7 235 117	521 574
Granlidknösen*	Storuman	Fluorspar	7 240 577	585 036
Varuträsk	Skellefteå	Pegmatite	7 198 617	772 449
Repsjömyran	Vindeln	Diatomite	7 145 452	730 720
GåstIron	Vindeln	Diatomite	7 155 023	732 473
Maurliden*	Norsjö	Sphalerite, chalcopryite, gold and silver	7 222 898	712 406
Maurliden Östra*	Norsjö	Sphalerite, chalcopryite, galena, gold and silver	7 221 594	714 037
NorrIden*	Norsjö	Chalcopryite, sphalerite	7 218 332	716 160
StorIden*	Malå	Sphalerite, chalcopryite, gold and silver	7 239 127	682 043
SvartIden*	Storuman and Lycksele	Gold	7 185 935	626 203
Fäboliden*	Lycksele	Gold	7 167 708	640 256
StortIronhobben*	Storuman	Gold	7 202 540	624 506
Älgträsk*	Skellefteå	Chalcopryite, gold	7 219 384	732 938
ÄglIden*	Skellefteå	Chalcopryite, gold	7 222 984	731 892
Rönnbäcken*	Storuman	Nickel, cobalt	7 264 510	519 514
Stekenjokk*	Vilhelmina	Sphalerite, chalcopryite, 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	Chalcopryite, gold	7 451 772	758 482
Malmberget*	Gällivare	Iron ore	7 463 198	745 186

Table 27. Continued.

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

* Demarcated in detail.



Sweden exports scrap and waste products. Photo: Boliden

Export and import of mineral ore and metal and mineral products

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

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

Figure 23 shows exports and imports of mineral raw materials and finished mineral products, such as metals, for the years 2018 to 2022. Construction minerals in the diagram consist of import and export of minerals

used in the construction industry. Energy minerals in the diagram include carbon, peat and similar minerals. Other metal products include metal raw materials for industry; finished metal products such as nails are not included because finished products are farther down the processing chain.

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

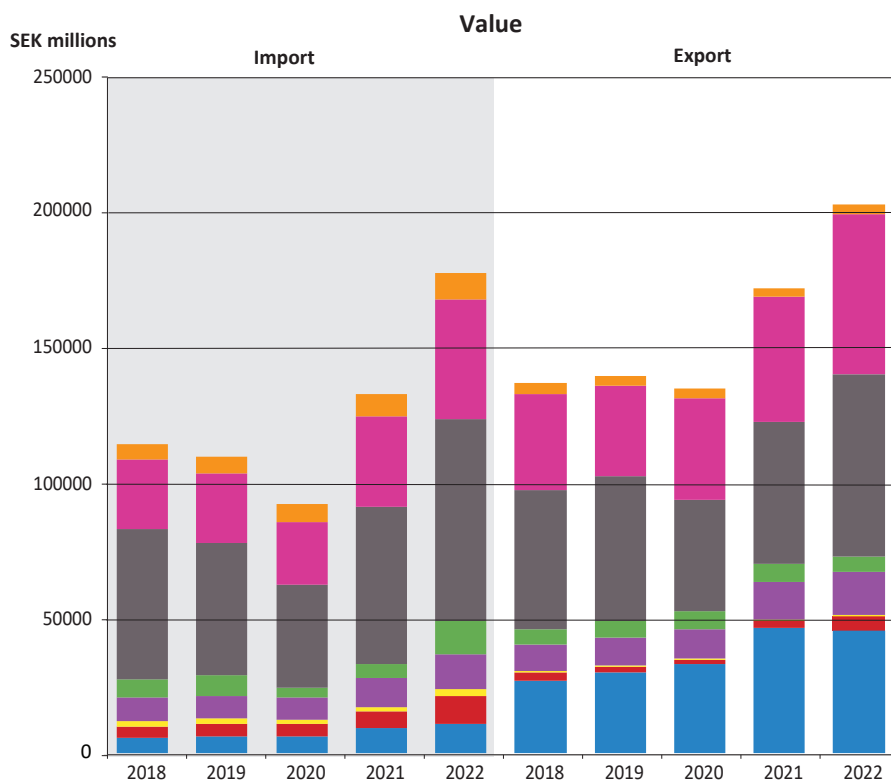
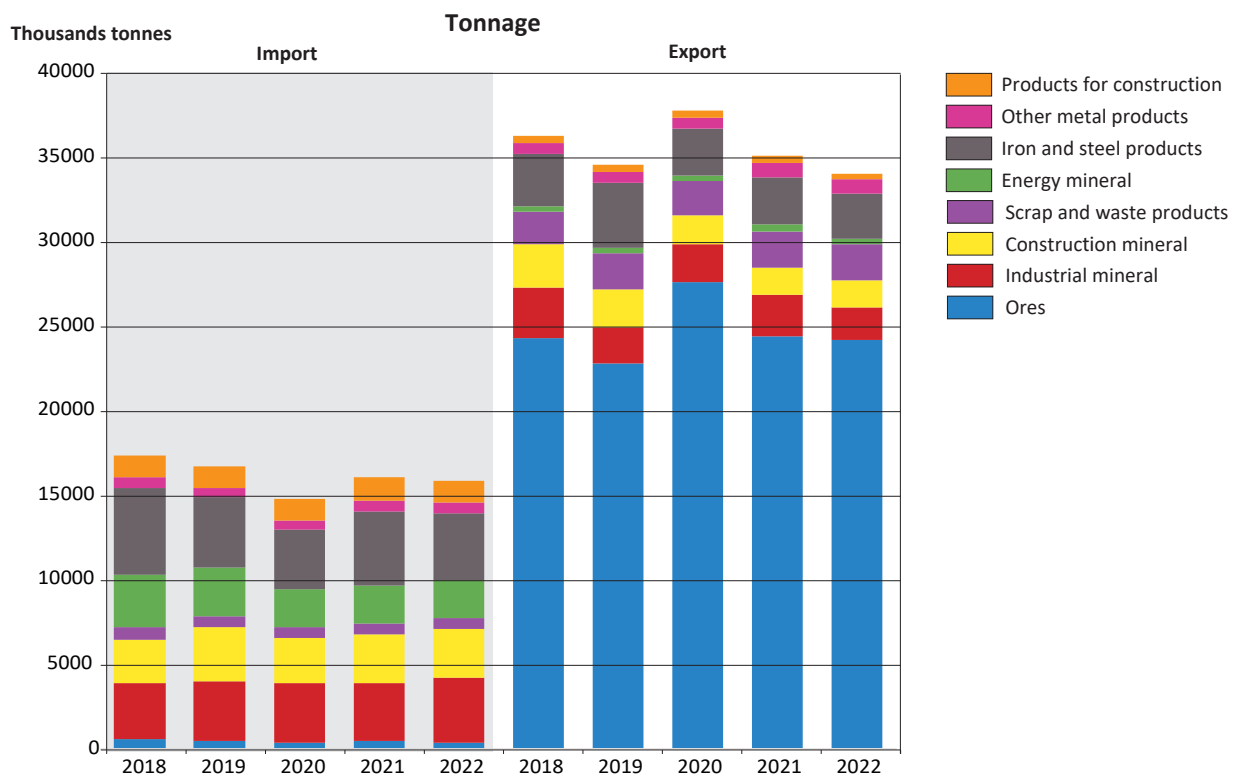


Figure 23. Export and import of ores, metals and minerals 2018–2022 by tonnage and value. Source: Statistics Sweden

Swedish mining industry economics

PRODUCTIVITY

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

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

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

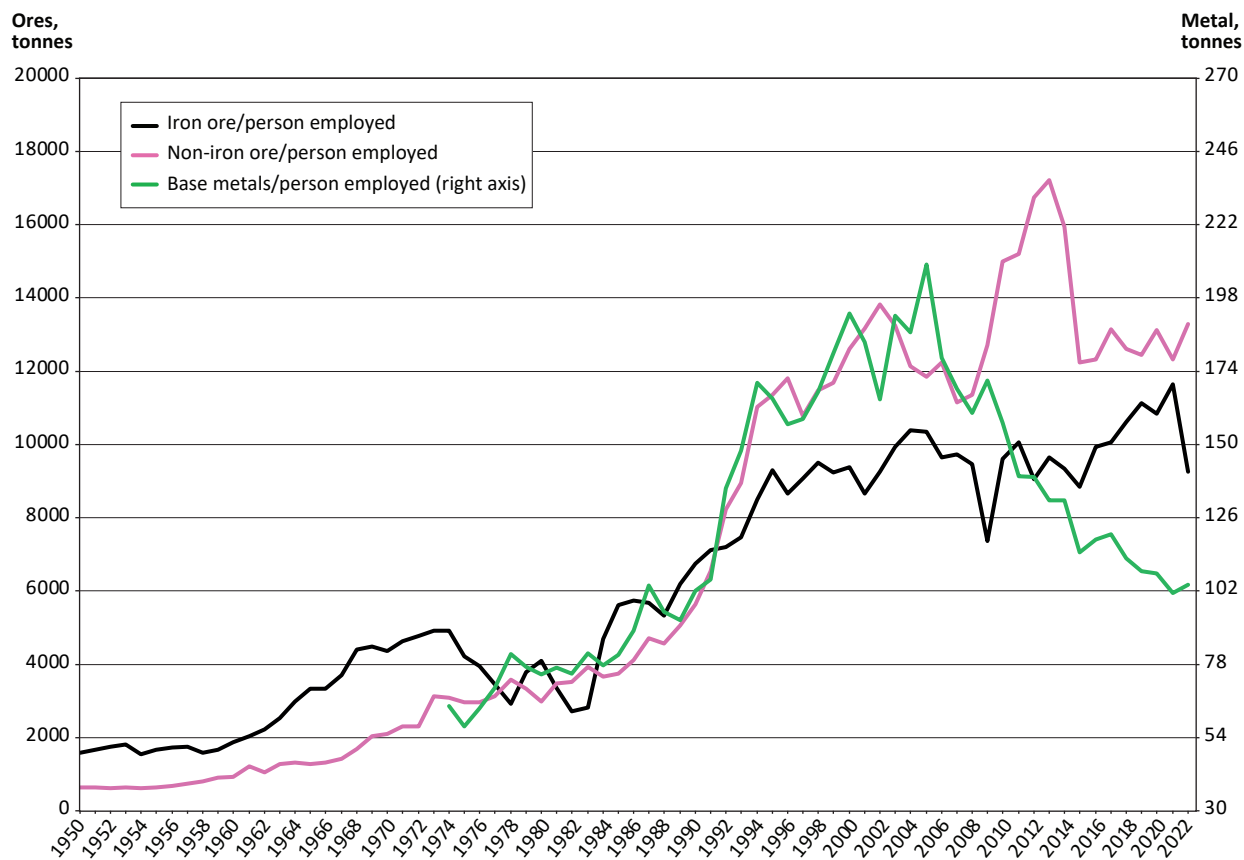


Figure 24. Productivity based on person employed per mined tonne of ore and recovered amount of metals 1950–2021.

SALES

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

Sales have varied over time. The lowest level was during the financial crisis in 2009 when sales were less than SEK 20 billion, and during the crisis years 2014–2016, with similar annual sales. The Swedish

mining industry as a whole made a loss in 2014 and 2015, mainly due to the bankruptcies of some newly started mines at Dannemora and Tapuli (Pajala). Note that these figures only refer to mining operations and enrichment plants; metal and steel mills are not included.

SEK millions

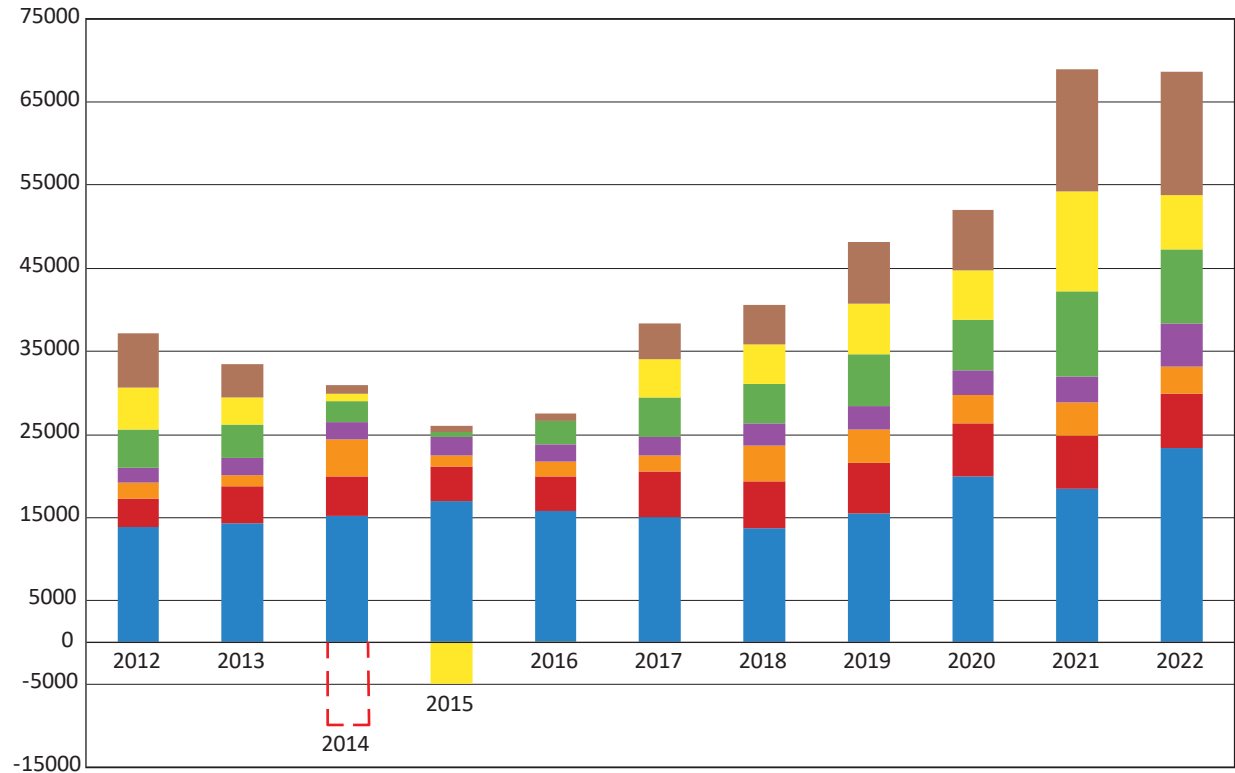


Figure 25. Mining industry sales 2012–2022 with key income items. “Taxes” includes corporation tax, payroll tax and social security contributions. “Profit brought forward” is profit for the year minus dividends.

References

- Australian Government, 2023: *Resources and Energy Quarterly: March 2023*. [<https://www.industry.gov.au/sites/default/files/2023-04/resources-and-energy-quarterly-march-2023.pdf>] Last accessed 25-04-2023.
- Boliden, 2023: *Verksamhet*. [<https://www.boliden.com/sv/verksamhet>]. Last accessed 25-04-2023.
- Boliden, 2023: *Års- och hållbarhetsredovisning 2022. Metaller för klimatomställningen*. [<https://vp217.alertir.com/afw/files/press/boliden/202303076677-1.pdf>]. Last accessed 25-04-2023.
- Dragon mining, 2023: *Operations*. [<http://www.dragonmining.com/operations>]. Last accessed 25-04-2023.
- European Commission, 2020: *Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability* Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Brussels 2020. COM2020/474 final.
- European Commission, 2023: *Study on the Critical Raw Materials for the EU (2023)*, Final report. doi: 10.2873/725585
- Kaunis Iron, 2022: *Årsredovisning räkenskapsåret 2021*. Kaunis_Ars-och-Hallbarhetsredovisning-2021_Final_low.pdf (timelab.se) Last accessed 25-04-2023.
- Kaunis Iron, 2023: *Från ett till tre dagbrott*. [<https://www.kaunisiron.se/bolaget/gruvor/>]. Last accessed 25-04-2023.
- LKAB, 2023: *Vi leder omställningen av vår industri mot en hållbar framtid. Års- och hållbarhetsredovisning 2022*. [https://lkab.com/wp-content/uploads/2023/03/LKAB_arsredovisning2022.pdf]. Last accessed 25-04-2023.
- Lovisagruvan AB, 2023: *Årsredovisning 2022*. [<https://mb.cision.com/Main/11567/3732464/1907680.pdf>]. Last accessed 25-04-2023.
- Lundin mining, 2023: *Zinkgruvan*. [<https://lundinmining.com/operations/zinkgruvan/>]. Last accessed 16-04-2023.
- Mandalay resources, 2023: *Björkdal mine*. [<https://mandalayresources.com/operations/bjorkdal-mine/>]. Last accessed 16-04-2023.
- Refinitiv World Bureau of Metal Statistics, 2023: *World Metal Statistics Yearbook 2022*. [<https://eikon.refinitiv.com/>]. Last accessed 25-04-2023 (login required).
- Rio Tinto, 2023: *Rio Tinto releases fourth quarter production results*. [<https://www.riotinto.com/news/releases/2023/Rio-Tinto-releases-fourth-quarter-production-results>]. Last accessed 06-02-2023.
- SGU, 2023: Mining statistics for the production year 2022, questionnaire survey. SGU:s dnr 311-161/2023.
- SMP, 2023: *Svenska miljörapporteringsportalen*. [<https://smp.lansstyrelsen.se/Default.aspx>]. Retrieved 27-04-2023 (login required).
- S&P Global Market Intelligence, 2023: *S&P Capital IQ*. [<https://www.spglobal.com/marketintelligence/en/>]. Last accessed 16-04-2023. (login required).

- Swedish Work Environment Authority, 2023: *Arbetskadestatistik*. Statistics database. [<https://www.av.se/arbetsmiljoarbete-och-inspektioner/arbetsmiljostatistik-officiell-arbetskadestatistik/sok-arbetsmiljostatistik/>]. Last accessed 25-04-2023.
- U.S. Geological Survey, 2022: *Mineral commodity summaries 2022*. U.S. Geological Survey, 202 p. doi: 10.3133/mcs2022.
- Vale, 2023: *Vale's production and sales in 4Q22 and 2022*. [<https://api.mziq.com/mzfilemanager/v2/d/53207d1c-63b4-48f1-96b7-19869fae19fe/3273bd23-534d-9b9f-8bc3-3d0643bae6ee?origin=1>]. Last accessed 06-02-2023.
- World bank group, 2020: *Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition*. [<https://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf>]. Last accessed 25-04-2023.
- World Steel Association, 2023: *2022 global crude steel production totals*. [December 2022 crude steel production and 2022 global crude steel production totals]. Last accessed 09-03-2023.

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

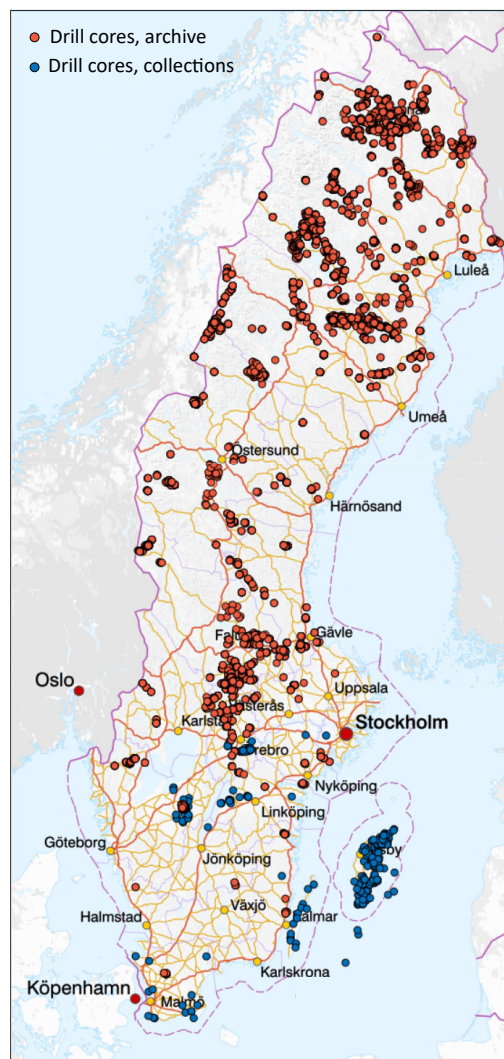
Growing number of visits to the SGU drill core archive

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

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

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

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



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

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