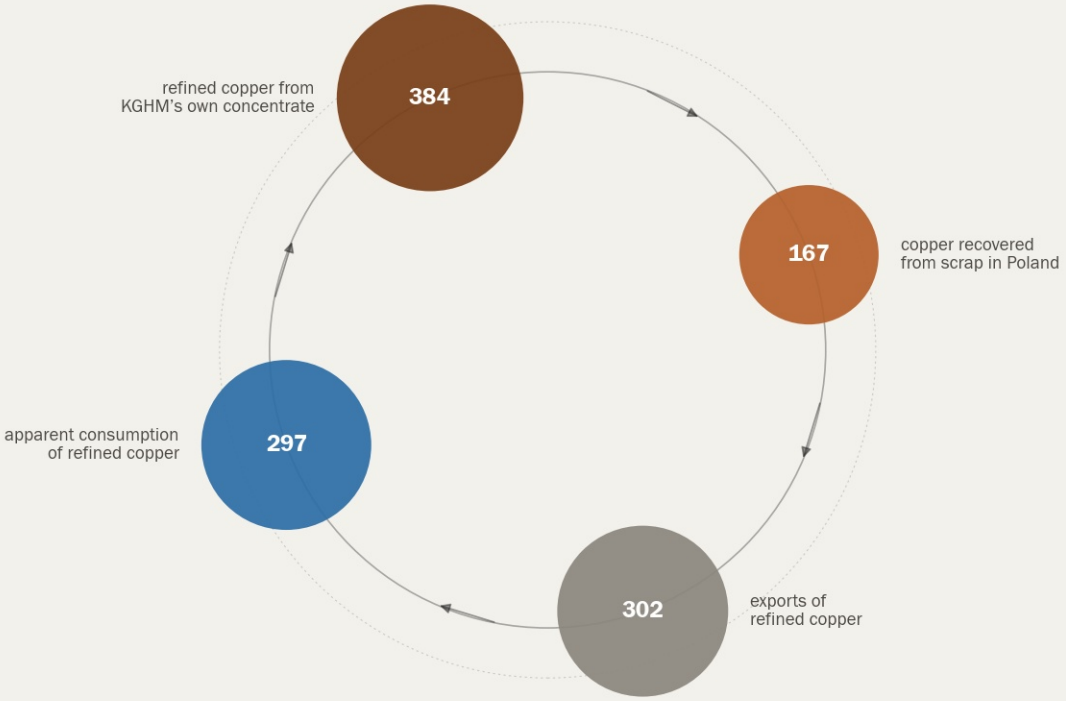
IGMNiR
Economic Chamber of Non-Ferrous Metals and Recycling

Copper in Poland, 2024 (kt Cu; circle area ∝ tonnes)



IGMNIR REPORT · NOVEMBER 2026

Copper in the Polish economy

Value, circularity and security of supply

An integrated assessment of the copper industry in Poland (CU-PL model)

Base year 2024 · Scenarios to 2035 · Transparent, reproducible model

About this report. This report was prepared by the Economic Chamber of Non-Ferrous Metals and Recycling (IGMNiR). It presents CU-PL, an integrated model that estimates the economic, fiscal, environmental and strategic contribution of the copper industry to the Polish economy – from the collection and trading of copper scrap and secondary copper, through the mining, smelting and refining of primary copper, to copper semis, alloys and cables. The annexes list all parameters and sources; the model code and input data are available from IGMNiR on request. The report was prepared with the support of artificial-intelligence (AI) tools for data processing, modelling and drafting.

Data cut-off: statistics 31 October 2026; legal and policy status 7 November 2026. **Base year:** 2024 (latest year with complete structural business statistics and company accounts); trade data to 2025. **Currency:** EUR, current prices (2024 average EUR/PLN 4.3058, Eurostat). **Model version:** CU-PL v1.2 (run ID CUPL-1.2-6389701a82; random-number seed (numeric identifier) 20261118); the model package – code, input data, scenario configuration and checks – is archived by IGMNiR. **Suggested citation:** IGMNiR (2026), *Copper in the Polish economy: value, circularity and security of supply. An integrated assessment of the copper industry in Poland (CU-PL model)*, Economic Chamber of Non-Ferrous Metals and Recycling, November 2026.

How to read the numbers. The report uses three kinds of figures. *Observations* (O) are published statistics and company data – Eurostat structural business statistics, PRODCOM, Comext, the financial statements of KGHM Polska Miedź S.A., including the mineral extraction tax charged to it, and other company reports. *Estimates* (E) combine observations with allocations or calibrated parameters – the copper shares of scrap trading, castings and cables, copper recovered from scrap, the metal yield, scrap collected in Poland and the share of post-consumer scrap. *Model results* (M) depend in addition on counterfactual assumptions – supply-chain and induced effects, modelled taxes, potentially avoided emissions and mining burdens, their valuation and the scenarios. All economic results are gross contributions, not net effects of policy; value added is at basic prices and therefore excludes the mineral extraction tax, which is shown separately; jobs are persons employed except for KGHM, which reports full-time equivalents.

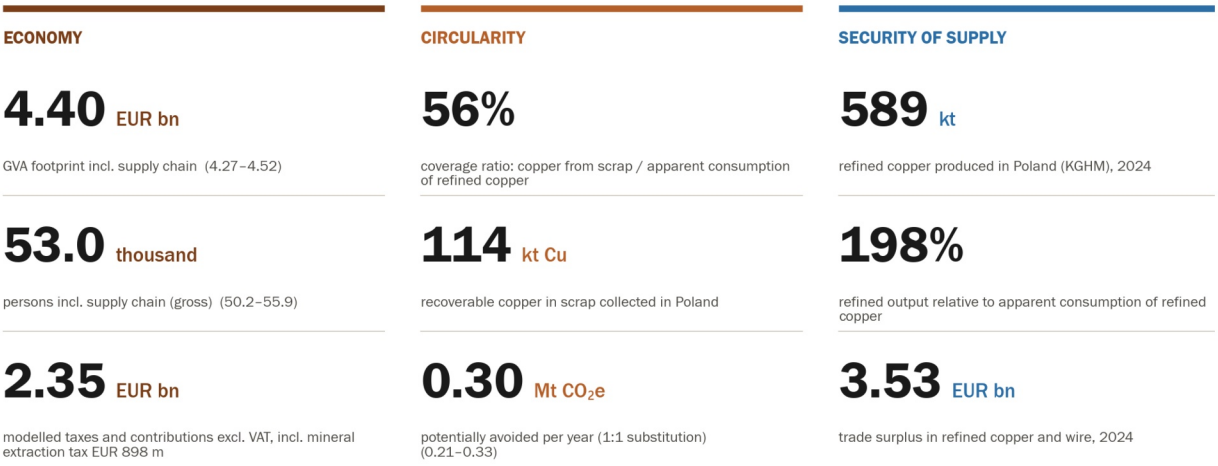
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Key findings

Poland is one of Europe's largest producers of copper and silver. In 2024 KGHM Polska Miedź mined 30.6 Mt of ore and produced 589 kt of refined copper – 384 kt from its own concentrate and 205 kt from purchased materials, mainly copper scrap and imported concentrate. Refined output corresponds to about 198% of the country's apparent consumption of refined copper, and Poland exports cathodes and wire rod with a surplus of EUR 3.5 billion. Together with their suppliers, companies in the copper value chain account for a gross value-added footprint of about EUR 4.4 billion (Type I, at fixed input-output coefficients) and about 53.0 thousand jobs; the taxes and contributions linked to the chain, its suppliers and household spending are estimated at EUR 2.3 billion a year, including PLN 3,865 million of mineral extraction tax charged to KGHM.

FIGURE 1 The copper industry in Poland at a glance



Central estimates for 2024; ranges in brackets = P5–P95 of 10,000 Monte Carlo draws. Extended value chain: scrap collection and trade, secondary copper, primary copper (KGHM), semis and alloys, copper in wires and cables. GHG: conditional, substitution-based estimate, mostly outside Poland. Source: IGMNiR CU-PL v1.2.

SEVEN FINDINGS

- **Economic contribution.** Direct gross value added (GVA) of the extended copper value chain is EUR 3,085 million (90% band 3,024–3,147). Including domestic supply chains (Type I) it is EUR 4,401 million and, with household spending (Type II), EUR 5,158 million. Primary copper – mining, concentration, smelting, refining and wire rod at KGHM – accounts for 78% of direct GVA. The recycling chain – scrap collection and trading and secondary copper – generates EUR 250 million directly, and copper in wires and cables EUR 379 million.
- **Jobs and public finances.** About 27,900 people work directly in the chain (band 26,950–28,950) and about 53,000 including suppliers. Taxes and contributions linked to the chain, its suppliers and household spending amount to an estimated EUR 2,347 million a year (PLN 10,108 million; VAT excluded). The largest single item is the mineral extraction tax: KGHM was charged PLN 3,865 million in 2024 (EUR 898 million, equivalent to 37% of the GVA of primary copper, which excludes the tax) and PLN 4,693 million in 2025. Unlike the other taxes,

which are model estimates, this figure is observed; the tax is not deductible for corporate income tax.

- **Circularity.** Polish smelters and remelters recovered an estimated 167 kt of copper from scrap in 2024 – KGHM alone produced 158.6 kt of electrolytic copper from scrap – which corresponds to 56% of the apparent consumption of refined copper (a coverage ratio). Copper scrap is traded in both directions: Poland imported 152 kt and exported 95 kt, and the CU-PL mass balance gives an estimated 126 kt collected in Poland – a model estimate, not a direct statistic.
- **Climate and mining burden.** Recycling the copper collected in Poland potentially avoids about 302 kt CO_2e a year (90% band 213–329); on the remelting basis, copper recovered from scrap in Poland potentially avoids 441 kt, and crediting only post-consumer scrap gives 148 kt, and a substitution factor of 0.5 gives 94 kt. Each tonne of recycled copper could also potentially avoid around 94 t of flotation tailings and 31 kg of SO_2 at primary producers, mostly outside Poland – about 10.7 Mt of tailings a year for the scrap collected. These conditional estimates assume 1:1 substitution of the global average primary cathode; across the structural alternatives in Table 6 the result ranges from 79 to 348 kt, and none of them is a measured reduction of Poland's emission inventory.
- **Security of supply.** Poland is a net exporter of refined copper and wire rod, with refined output equal to 198% of apparent consumption, and holds balance resources of 55.4 Mt of copper in ore (end-2025). KGHM imported 123.9 kt of concentrate, while imports of copper concentrate (CN 2603) totalled 162 kt (HHI 9,729 by partner country). Two KGHM projects – the Retków-Grodziszcze deposit and the Integrated Recycling Smelter in Legnica – were recognised as Strategic Projects under the Critical Raw Materials Act in October 2026.
- **Regulation as a driver of change.** An amendment adopted in November 2025 lowers the coefficient of the mineral extraction tax on copper and silver to 0.74 in 2026 and 0.68 in 2027–2028, after which the permanent coefficient of 0.85 applies again, and introduces an investment relief from 2029. Copper is a strategic and critical raw material under the Critical Raw Materials Act; it is not covered by the CBAM; the EU guidelines allow compensation of indirect emission costs for mining of non-ferrous metal ores, including copper ores, for costs incurred from 2025; and the ban on imports of Russian refined copper into the EU has applied fully since 25 July 2026. No EU measure specific to copper scrap has been adopted.
- **Outlook.** In the circular-copper scenario (S2, 2035), with copper recovered from scrap rising by 22% within KGHM's processing capacity, GVA including supply chains rises by about EUR 131 million; a stress scenario of lower mine output and weaker demand (S3, 2030) would reduce it by about EUR 567 million, mostly in primary copper. At 2024 prices and output, the new tax coefficients would reduce the mineral extraction tax by about EUR 116 million in 2026 and EUR 180 million a year in 2027–2028 (Ministry of Finance estimates: about PLN 500 million and 750 million).

TABLE 1 Headline results: central estimate and 90% parameter-uncertainty band

Indicator (2024)	Status	Central	P5	P50	P95	Unit
Direct GVA – recycling chain (C1+C2)	E	250	209	248	286	EUR m
Direct GVA – copper industry (C1–C4)	E	2,707	2,672	2,706	2,740	EUR m
Direct GVA – extended value chain (C1–C5)	E	3,085	3,024	3,085	3,147	EUR m
GVA incl. supply chain (Type I)	M	4,401	4,272	4,398	4,524	EUR m
GVA incl. induced (Type II)	M	5,158	5,000	5,149	5,303	EUR m
Direct employment	E	27,885	26,952	27,952	28,968	persons/FTE
Jobs incl. supply chain	M	52,975	50,180	52,931	55,858	persons/FTE
Jobs incl. induced	M	69,573	65,558	69,427	73,540	persons/FTE
Taxes and contributions	M	2,347	2,301	2,348	2,398	EUR m
– of which mineral extraction tax (KGHM; outside GVA)	O	898	898	898	898	EUR m
Potentially avoided GHG – collection-based	M	302	213	274	329	kt CO_2e
Potentially avoided GHG – remelting-based	M	441	313	402	481	kt CO_2e
Potentially avoided GHG – post-consumer scrap only	M	148	96	130	168	kt CO_2e
Potentially avoided GHG – substitution factor 0.5	M	94	21	75	118	kt CO_2e
Primary energy potentially saved	M	3.6	2.3	3.3	4.1	PJ
Flotation tailings potentially avoided	M	10.7	9.5	10.5	11.4	Mt
Gross value of copper from scrap	E	1,410	1,312	1,384	1,448	EUR m
Estimated processing margin	M	168	145	165	186	EUR m
Coverage: copper from scrap / apparent consumption	E	56	53	56	57	%
Coverage: refined output / apparent consumption	E	198	198	198	198	%

Source: IGMNiR CU-PL v1.2; Monte Carlo 10,000 draws with Gaussian copula; "central" is the deterministic run with modal parameter values; where ranges are skewed (notably avoided emissions) it differs from the median (P50). Status: O observation, E estimate, M model result. Segments C1–C5: see Chapter 4. GVA, jobs and taxes are gross contributions; KGHM employment in FTE. GVA is at basic prices and excludes the mineral extraction tax (a tax on products). Taxes exclude VAT; the mineral extraction tax is the amount charged to KGHM in 2024, the other taxes are model estimates. Potentially avoided emissions, energy and tailings are avoided-burden estimates assuming 1:1 substitution of primary cathode (global average); they occur largely outside Poland and do not reduce the national inventory. The emission perspectives are alternatives and are not additive. GVA, trade balances and the processing margin must not be added together.

01 Introduction

Copper conducts electricity and heat better than any other affordable metal. It is the material of power grids, transformers, electric motors, buildings, vehicles, electronics and defence equipment, and the energy transition – electrified transport, renewable generation and grid expansion – raises demand for it. Copper can be recycled repeatedly without loss of its properties, and recycled copper can avoid the mining and concentration of ore, which generate the largest part of the environmental burden of primary copper.[1]

Poland holds a special place in the European copper system. KGHM Polska Miedź operates three underground mines in the Legnica–Głogów Copper Basin, concentrators, two smelter-refineries and a wire-rod plant, and is one of the world's largest producers of silver. Polish smelters are also among the main European processors of copper scrap, and KGHM is converting its Legnica smelter into a recycling plant. Downstream, cable makers, semi-fabricators and alloy producers process copper for the domestic and European markets.

The contribution of this value chain has not been measured in a consistent framework that combines mining, recycling and processing. Official statistics on copper ore mining and copper production in Poland are confidential because of the small number of enterprises, and the recycling part is not visible on its own. This report builds an integrated picture from public statistics, the financial statements of KGHM Polska Miedź S.A., other company reports and the process metallurgy of copper. It also shows the mineral extraction tax, the largest single public revenue linked to the chain.

1.1 Questions addressed

01 How large is the copper industry in Poland – in output, value added and jobs – and how is it organised along the value chain?

02 What economic activity and public revenue does it generate, including the mineral extraction tax, through its operations, purchases and the spending of its employees?

03 How much copper is recovered from scrap in Poland, and how much greenhouse-gas emissions and mining burden could recycling potentially avoid compared with primary copper?

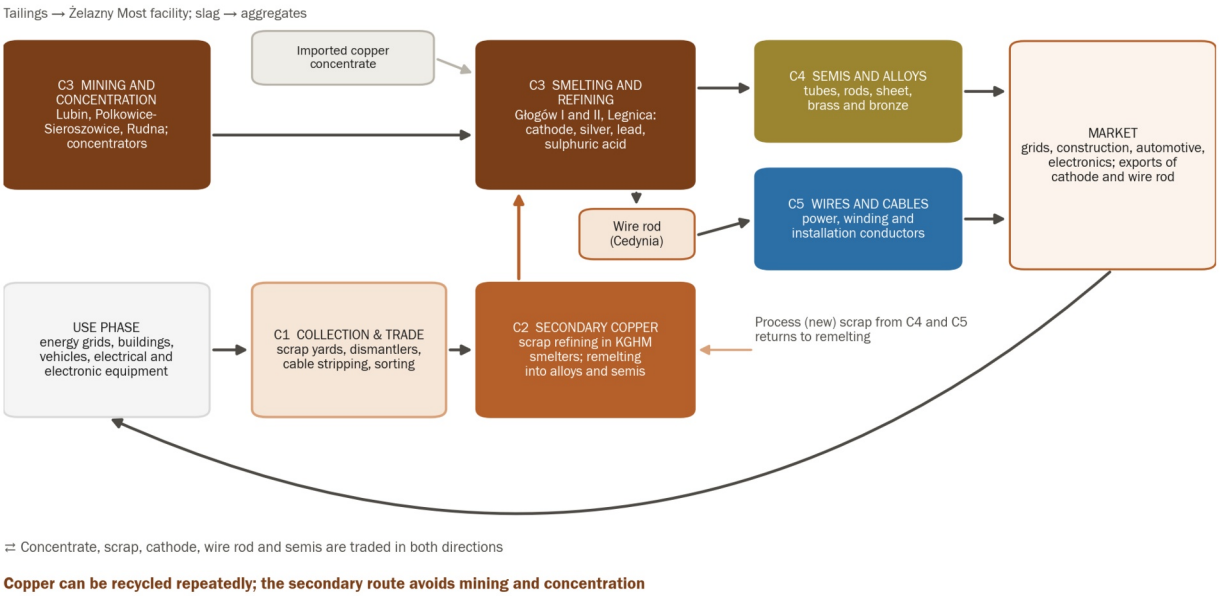
04 What is the strategic value of the industry for the supply of copper in Poland and the EU?

05 How could these contributions change by 2030 and 2035 under new rules on mineral taxation, critical raw materials and recycling?

Scope. The recycling chain comprises the collection and trading of copper scrap (C1) and secondary copper (C2); the copper industry adds primary copper – mining, concentration, smelting, refining and wire rod at KGHM (C3) – and copper semis and alloys outside KGHM (C4); the extended value chain adds the copper share of wire and cable manufacturing (C5). Other products containing copper – electrical machinery, electronics, building installations – are outside the model, as are KGHM's foreign operations.

[1] International Copper Association (2023), *Copper Environmental Profile*; European Copper Institute (2023), *Copper – the essential material for the energy transition*.

FIGURE 2 The copper value chain in Poland and the five segments of the CU-PL model



⇄ Concentrate, scrap, cathode, wire rod and semis are traded in both directions

Copper can be recycled repeatedly; the secondary route avoids mining and concentration

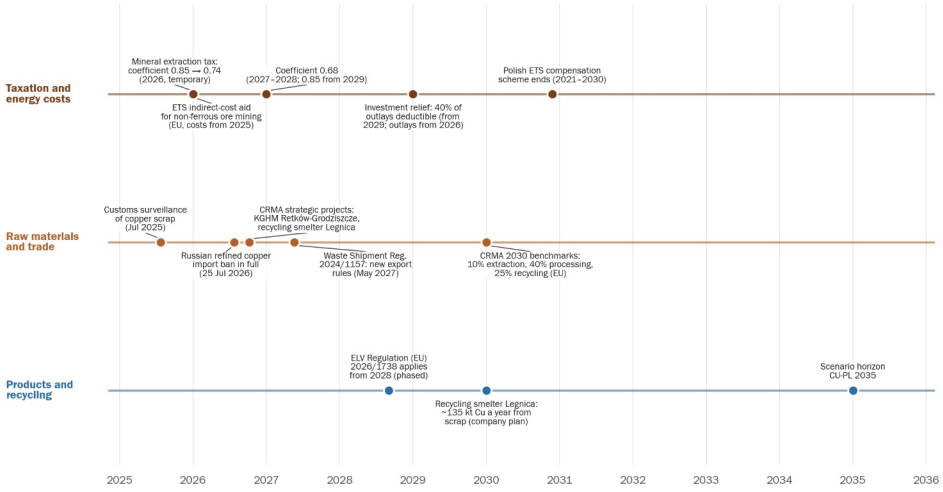
1.2 Structure of the report

Chapter 2 sets out the policy context, including the mineral extraction tax. Chapter 3 describes the industry with company data, official statistics, maps and trade flows. Chapter 4 explains the CU-PL model. Chapters 5–7 present economic and fiscal, environmental and strategic results; Chapter 8 the uncertainty analysis and checks; Chapter 9 the scenarios to 2035. Chapter 10 draws conclusions. The annexes document data sources, parameters, installations and terms.

02 Policy and regulatory context

Copper is affected by national mineral taxation, EU climate and energy policy, raw-materials and trade policy, and waste and product rules. This chapter describes their status on 7 November 2026; it does not assess them.

FIGURE 3 Regulatory milestones for the copper value chain, 2025–2035



Source: Act on the tax on extraction of certain minerals as amended by the Act of 21 November 2025 (Dz.U. 2025 poz. 1804); Communication C/2026/196; Regulations (EU) 2024/1252, 2024/1157, 2026/506, 2026/1738; Commission Decision C(2026) 8051; KGHM. Legal status 7 November 2026.

2.1 Mineral extraction tax

Since 2012 the extraction of copper and silver in Poland has been subject to a tax on the extraction of certain minerals, paid monthly on the copper and silver contained in the concentrate produced. KGHM Polska Miedź S.A. is the only taxpayer for these metals. The tax rate depends on the monthly average price: for copper the rate per tonne is [0.033 × P + (0.001 × P)^2.5] × 0.85, where P is the monthly average LME price converted into PLN and announced by the Minister of Finance; the formula applies above an indexed price threshold and the rate is capped at PLN 16,000 per tonne of copper; for silver an analogous formula applies, capped at PLN 2,100 per kilogram. The tax is not deductible for corporate income tax.[2]

TABLE 2 Mineral extraction tax charged to KGHM Polska Miedź S.A., 2022–2025 (PLN million)

Year	Copper	Silver	Total	Note
2022	2,650	396	3,046	Coefficient temporarily reduced to 0.6 (Art. 22a; January–November)
2023	2,946	550	3,496	
2024	3,157	708	3,865	Base year of CU-PL
2025	3,361	1,332	4,693	Silver price +42%

Source: KGHM Polska Miedź S.A., separate financial statements and Management Board reports 2022–2025. Amounts charged (accrual basis), recognised in costs by nature.

In 2024 the tax accounted for 1.12 USD per pound of the C1 cost of copper in KGHM's concentrate, and in 2025 for 1.42 USD per pound and 16% of the company's costs by nature. State budget revenue from the tax

[2] Ustawa z dnia 2 marca 2012 r. o podatku od wydobycia niektórych kopalin, t.j. Dz.U. 2026 poz. 454, art. 4, 6, 7 ust. 2 i 4 oraz art. 22b; ustawa o podatku dochodowym od osób prawnych, art. 16 ust. 1 pkt 67.

was PLN 4,034 million in 2024, of which PLN 3,786 million from copper and silver, and PLN 4,751 million in 2025, of which PLN 4,494 million from copper and silver. In the first half of 2026 KGHM was charged PLN 4,061 million, reflecting higher metal prices.[3]

An amendment adopted on 21 November 2025 and in force from 1 January 2026 lowers the coefficient in both formulas from 0.85 to 0.74 in 2026 and to 0.68 in 2027–2028; this is a temporary provision, after which the permanent coefficient of 0.85 applies again. From 2029 the taxpayer may deduct 40% of qualifying investment outlays incurred from 2026, up to 30% of the monthly tax, with a 15-year carry-forward. The Ministry of Finance estimated the reduction at about PLN 500 million in 2026 and about PLN 750 million a year in 2027–2028. No further change had been proposed at the cut-off date.[4]

2.2 Carbon pricing and energy costs

Copper smelting installations are covered by the EU Emissions Trading System; copper production (NACE 24.44) is on the carbon-leakage list and receives free allocation, and copper has no product benchmark. Copper production is eligible for compensation of indirect emission costs under the Polish scheme for 2021–2030; KGHM was granted PLN 151.9 million for 2024 costs (October 2025) and PLN 113.7 million for 2025 costs (October 2026). Following the amendment of the guidelines (C/2026/196), Member States may also compensate mining of other non-ferrous metal ores (NACE 07.29, which includes copper ores) for indirect emission costs incurred from 2025; the Polish act had not been amended accordingly at the cut-off date.[5] Copper is not covered by the Carbon Border Adjustment Mechanism, and the Commission's proposal of December 2025 to extend it to downstream goods concerns steel and aluminium only.[6]

2.3 Raw materials and trade

Copper is both a strategic and a critical raw material under the Critical Raw Materials Act, whose benchmarks for 2030 are that EU capacity should cover 10% of consumption of strategic raw materials through extraction, 40% through processing and 25% through recycling.[7] On 9 October 2026 the Commission recognised 46 Strategic Projects, including two by KGHM: the development of the Retków-Grodziszcze deposit and the Integrated Recycling Smelter in Legnica, designed to produce about 135 kt of copper and 250 t of nickel a year from scrap containing 15–60% copper.[8] In Poland, the multiannual National Programme of Exploration for Critical Raw Materials 2026–2033, adopted in September 2026, gives priority to copper; the act implementing the Critical Raw Materials Act was still a draft at the cut-off date, and KGHM's main mining concessions are valid until 2063.[9]

EU sanctions adopted in April 2026 ban imports of Russian refined copper, fully applicable from 25 July 2026, and were extended to copper ores in July 2026 with a wind-down period to 25 October 2026; copper wire was banned earlier.[10] Since August 2025 the United States has imposed Section 232 duties on semi-finished copper products and copper-intensive derivatives; since April 2026 they are levied on the full customs value (50% or

[3] KGHM Polska Miedź S.A., Management Board report 2025 (C1 cost, costs by nature); interim report for H1 2026; Najwyższa Izba Kontroli (NIK), analyses of the execution of the state budget for 2024 and 2025.

[4] Ustawa z dnia 21 listopada 2025 r. o zmianie ustawy o podatku od wydobycia niektórych kopalin oraz niektórych innych ustaw, Dz.U. 2025 poz. 1804; uzasadnienie projektu (ocena skutków regulacji); Ministerstwo Finansów, komunikat z 28 października 2025 r.

[5] Commission Delegated Decision (EU) 2019/708 (carbon-leakage list); Guidelines on certain State aid measures in the context of the system for greenhouse gas emission allowance trading post-2021 (2020/C 317/04), as amended by C/2026/196; ustawa z dnia 19 lipca 2019 r. o systemie rekompensat dla sektorów i podsektorów energochłonnych, t.j. Dz.U. 2026 poz. 807; Urząd Regulacji Energetyki, lists of beneficiaries.

[6] European Commission, COM(2025) 989 of 17 December 2025.

[7] Regulation (EU) 2024/1252 of 11 April 2024 establishing a framework for ensuring a secure and sustainable supply of critical raw materials, Art. 5 and Annexes I–II.

[8] Commission Decision C(2026) 8051 final of 9 October 2026, Annex, items 12 and 30; KGHM Polska Miedź S.A., press release of 9 October 2026.

[9] Uchwała nr 171 Rady Ministrów z dnia 2 września 2026 r. w sprawie ustanowienia programu wieloletniego pod nazwą „Krajowy program poszukiwań surowców krytycznych", M.P. 2026 poz. 909; projekt ustawy o zapewnieniu dostępu do surowców krytycznych (UC83); Polityka surowcowa państwa, M.P. 2022 poz. 371.

[10] Council Regulation (EU) 2026/506 of 23 April 2026; Council Regulation (EU) 2026/1848 of 23 July 2026; Council Regulation (EU) 2023/2878 of 18 December 2023.

25%, depending on the product list). Cathodes, concentrates and scrap are not subject to them, and no effect on Polish exports has been documented.[11]

2.4 Scrap, waste shipments and products

The Commission has monitored imports and exports of copper scrap through customs surveillance since July 2025. Its RESourceEU communication states that measures concerning copper scrap will be considered if necessary; at the cut-off date no EU measure specific to copper scrap had been proposed or adopted.[12] Under the Waste Shipments Regulation, new rules for exports of non-hazardous waste to non-OECD countries apply from 21 May 2027, and the list of countries to which such exports will be allowed was still in preparation.[13] The End-of-Life Vehicles Regulation (EU) 2026/1738 requires certain components to be removed before shredding, which facilitates the recovery of copper, but sets no recycled-content requirement for copper. Smelters must meet the best available techniques conclusions for the non-ferrous metals industries, which set emission levels for dust, sulphur dioxide and dioxins.[14]

[11] United States, Proclamation 10962 of 30 July 2025 (Adjusting imports of copper into the United States), as amended by Proclamations 11021 and 11032 of 2026.

[12] European Commission, DG TAXUD, news of 23 July 2025; European Commission, RESourceEU, COM(2025) 945, section 3.1.

[13] Regulation (EU) 2024/1157 of 11 April 2024 on shipments of waste, Art. 41(3) and Art. 82.

[14] Regulation (EU) 2026/1738 of 8 July 2026; Commission Implementing Decision (EU) 2016/1032 of 13 June 2016 establishing BAT conclusions for the non-ferrous metals industries.

03 The copper industry in Poland

The copper value chain in Poland is anchored by **KGHM Polska Miedź S.A.**, which integrates mining, concentration, smelting, refining and wire-rod production in Lower Silesia. In 2024 its Lubin, Polkowice-Sieroszowice and Rudna mines extracted 30.6 Mt of ore (dry) with an average grade of 1.48% copper and 50 g/t silver; the concentrators produced 1,776 kt of concentrate containing 400 kt of copper. The Głogów I and II smelters produced 466 kt and the Legnica smelter 123 kt of electrolytic copper, and the Cedynia plant 271 kt of wire rod and 16 kt of oxygen-free rod; KGHM also produced 1,316 t of silver, 87 thousand troy ounces of gold and 29 kt of refined lead. Around KGHM operate **scrap collectors and traders**, led by its subsidiary KGHM Metraco, **semi-fabricators and alloy producers** such as WMN Łabędy (KGHM Group) and WM Dziedzice (Boryszew Group), and **cable makers**, the largest of which, Tele-Fonika Kable, bought 50.6 kt of copper in 2024.

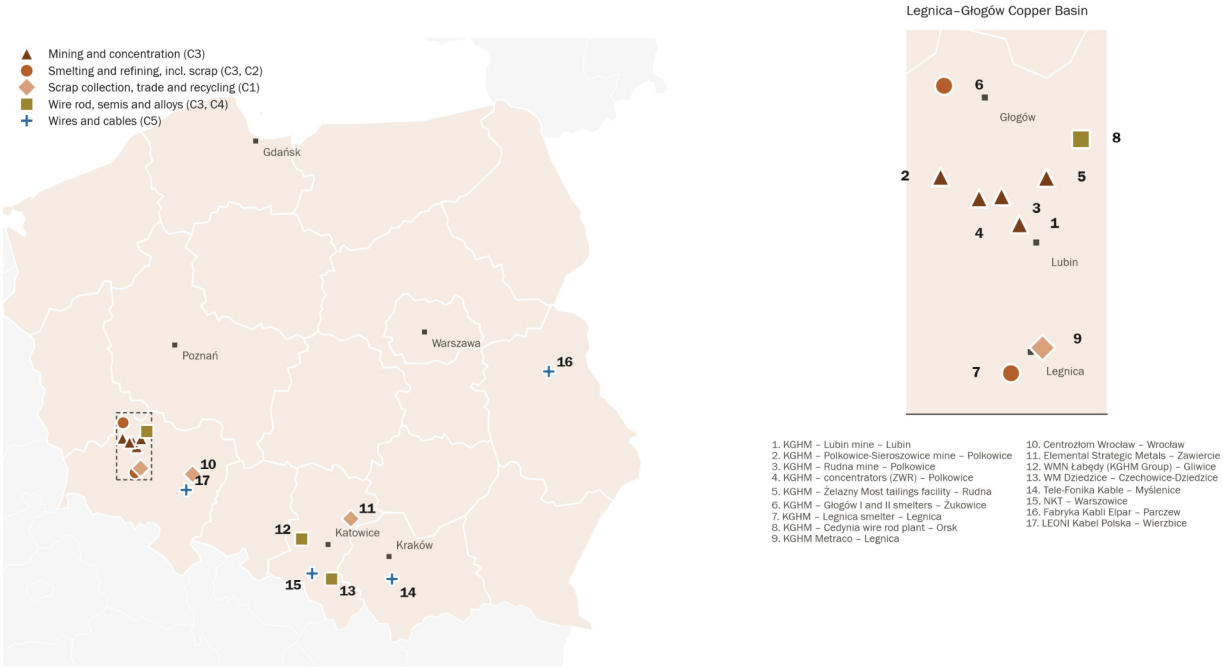
TABLE 3 KGHM Polska Miedź S.A. – key data, 2024

Item	2024	Unit
Ore mined (dry); copper grade	30.6; 1.48%	Mt; %
Copper in concentrate	400.1	kt
Electrolytic copper – total / from own concentrate / from purchased materials	588.7 / 383.7 / 205.0	kt
Electrolytic copper from scrap; copper scrap used (gross weight)	158.6; 158.9	kt
Imported concentrate (copper content)	123.9 (43.3)	kt
Wire rod and oxygen-free rod	287.2	kt
Silver; gold; refined lead	1,316 t; 86.8 koz; 28.8 kt	
Revenue (copper products; silver; gold)	29,894 (22,789; 4,917; 853)	PLN m
Adjusted EBITDA; employee benefit costs	4,463; 5,891	PLN m
Mineral extraction tax; current CIT	3,865; 1,031	PLN m
Average employment	18,885	FTE

Source: KGHM Polska Miedź S.A., separate financial statements and Management Board reports for 2024 and 2025, including the sustainability statement (ESRS E5-4: scrap used, gross weight) and the section on KGHM Metraco (copper from scrap). Parent company only; KGHM's Polish subsidiaries employed about 12,700 people in 2025 (IGMNiR calculation: group less parent company).

KGHM sells most of its output abroad – in 2025 only 24% of the parent company's revenue came from Poland – but it is also the main supplier of copper to Polish processors: long-term contracts cover wire rod for Tele-Fonika Kable and the NKT Group. Polish cable output reached 478 kt in 2024 according to GUS data reported by the trade press, and copper-alloy semis are produced mainly by WMN Łabędy and WM Dziedzice; the latter sold 20.2 kt of brass rods and tubes in 2024. Copper production at Hutmen in Wrocław has ended. The integrated recycling of cable waste is developing: Tele-Fonika's plant in Bukowno has capacity to process about 10 kt of cable waste a year.

FIGURE 4 Main copper mines, smelters, scrap processors, semi-fabricators and cable makers in Poland



Source: IGMNiR; KGHM Polska Miedź S.A. reports; company reports and websites (Boryszew, Tele-Fonika, NKT, Elpar, LEONI, Elemental); trade press; GISCO boundaries. Locations approximate. Numbers refer to Annex C.

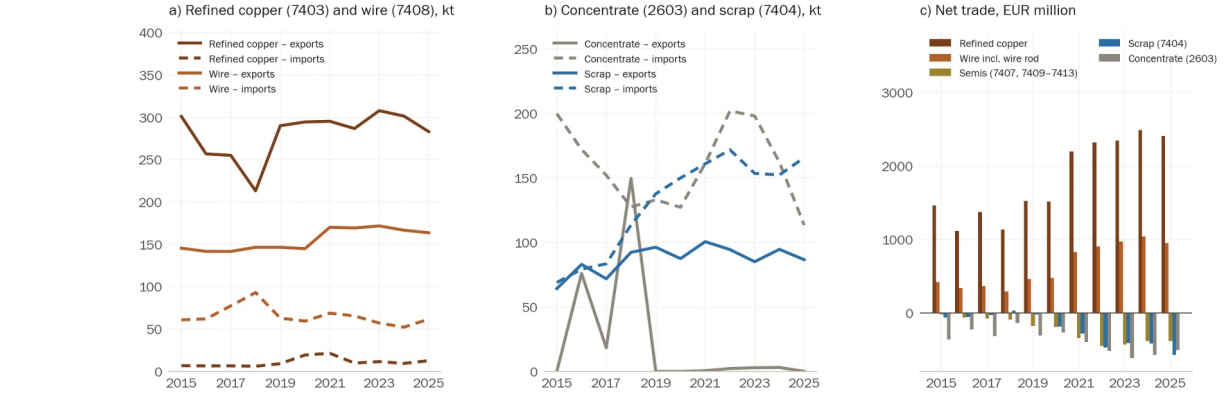
3.1 Official statistics

Eurostat structural business statistics for copper-ore mining (NACE 07.29, seven enterprises) and copper production (NACE 24.44, nine enterprises) in Poland are confidential. The residual of non-ferrous metal production other than precious metals, aluminium and lead-zinc-tin – mainly copper semis and alloys outside KGHM – amounted in 2024 to EUR 148 million of output, EUR 33 million of value added and 615 persons employed. Casting of other non-ferrous metals (NACE 24.54) employed 1,454 people, and the manufacture of other electronic and electric wires and cables (NACE 27.32) 7,992 people, with EUR 505 million of value added. KGHM itself is therefore modelled from its financial statements (Chapter 4). PRODCOM shows 300.6 kt of refined copper sold in 2024 – the cathodes not converted into wire rod – and 25.6 kt of winding wire; most other copper products are confidential.

3.2 Trade

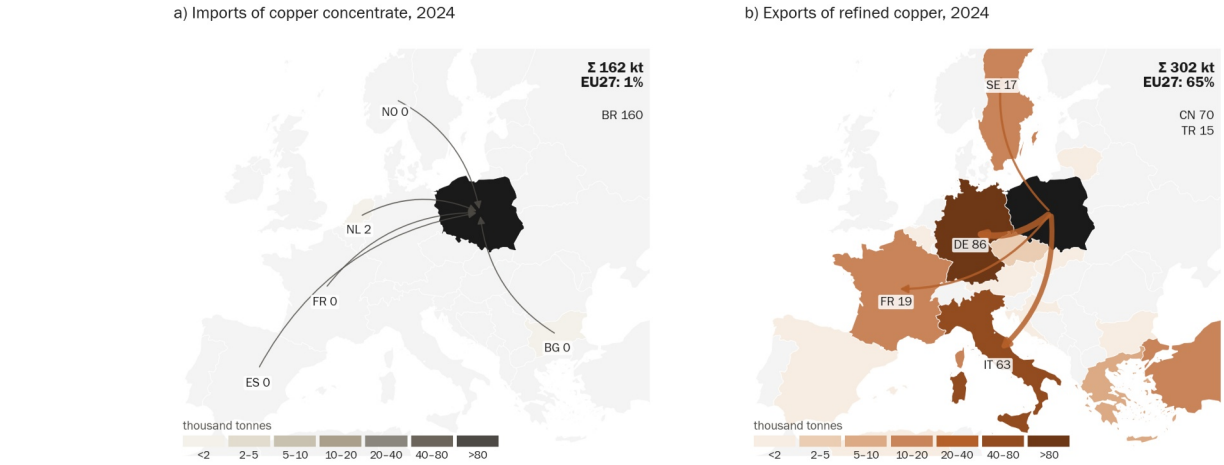
Poland is a large net exporter of refined copper and copper wire and a net importer of concentrate, scrap and semis. In 2024 it exported 302 kt of refined copper and alloys (CN 7403) and 167 kt of wire, mainly wire rod (CN 7408), against imports of 9 kt and 52 kt; the trade surplus was EUR 2,486 million for refined copper and EUR 1,042 million for wire. Refined copper went mainly to DE (28%), CN (23%), IT (21%), FR (6%). Imports of copper concentrate (CN 2603) amounted to 162 kt gross weight (balance EUR −571 million), mainly from BR (99%), NL (1%); Comext records the country of consignment for intra-EU trade and the country of origin for extra-EU imports. Trade in semi-finished products (CN 7407 and 7409–7413) showed a deficit of EUR 378 million.

FIGURE 5 Foreign trade in copper by stage of processing, 2015–2025



Source: Eurostat Comext DS-045409; IGMNiR CU-PL.

FIGURE 6 Origins of copper concentrate imports and destinations of refined copper exports, 2024



Source: Eurostat Comext (DS-045409), CN 2603 (gross weight) and 7403; GISCO boundaries; IGMNiR CU-PL. Countries outside the map are listed at the top right.

3.3 Collection and recycling of copper scrap

Copper scrap arises in manufacturing (process or new scrap) and at the end of a product's life (post-consumer or old scrap) – from cables, electrical equipment, vehicles and buildings. In Europe about half of the copper used comes from recycled material; post-consumer scrap accounts for roughly half of the scrap input.[15] KGHM produced 158.6 kt of electrolytic copper from scrap in 2024 (27% of its electrolytic copper) and 157.9 kt in 2025 (28%); according to its sustainability statements it used 158.9 kt of copper scrap (gross weight) in 2024 and 173.2 kt in 2025. The scrap used contained 150.4 kt of copper, about 8 kt less than the copper attributed to scrap. The figures relate to different reporting boundaries (Group and parent company) and processing periods; the difference, which can arise from stocks, intermediate materials and allocation conventions, cannot be reconciled from public data and is treated as an unresolved systematic uncertainty. CU-PL uses the production figure and covers the lower value in the parameter range; S = 167 kt is therefore a structural estimate, not a direct observation of total secondary copper production in Poland. Poland imported 152 kt of copper waste and scrap (CN 7404) in 2024 – 91% from EU countries – and exported 95 kt, 81% to EU countries;

[15] European Copper Institute (2023), *Copper recycling*; International Copper Study Group, *World copper factbook*.

the trade deficit in scrap was EUR 414 million. No national statistics specific to copper scrap are published, so CU-PL derives the scrap balance from copper recovered from scrap and trade (Table 4).

TABLE 4 Copper scrap balance of Poland, 2024 (kt)

Item	Status	kt	Basis
KGHM Group: copper scrap used, gross weight	O	158.9	KGHM 2024 report, Table 179
KGHM Group: copper contained in scrap used	O	150.4	KGHM 2024 report, Table 179
KGHM: electrolytic copper from scrap	O	158.6	KGHM 2024 report (KGHM Metraco); exceeds copper contained by about 8 kt – stocks, intermediate materials and allocation not reconciled in public data
Copper recovered from scrap in Poland (S)	E	167	KGHM 158.6 kt of electrolytic copper from scrap, plus foreign scrap remelted by copper-alloy producers (Annex B); not measured as a total
Copper recovered per t of scrap (y)	E	0.91	High-grade scrap at KGHM about 0.93–0.96; brass about 0.6
Scrap processed in Poland (C = S / y)	E	184	CU-PL; KGHM used 158.9 kt (gross weight)
Exports of copper waste and scrap (X), gross weight	O	95	Comext CN 7404, 2024
Imports of copper waste and scrap (M), gross weight	O	152	Comext CN 7404, 2024
Stock changes, re-exports, toll processing	–	0	Not observed; set to zero
Scrap collected in Poland (A = C + X − M)	E	126	CU-PL; excludes copper in e-scrap traded outside CN 7404
Copper recoverable from scrap collected in Poland (A × y)	E	114	CU-PL; basis of the collection-based environmental result
Apparent consumption of refined copper (output + imports − exports, CN 7403)	E	297	CU-PL; IGSMiE PAN: 297 kt

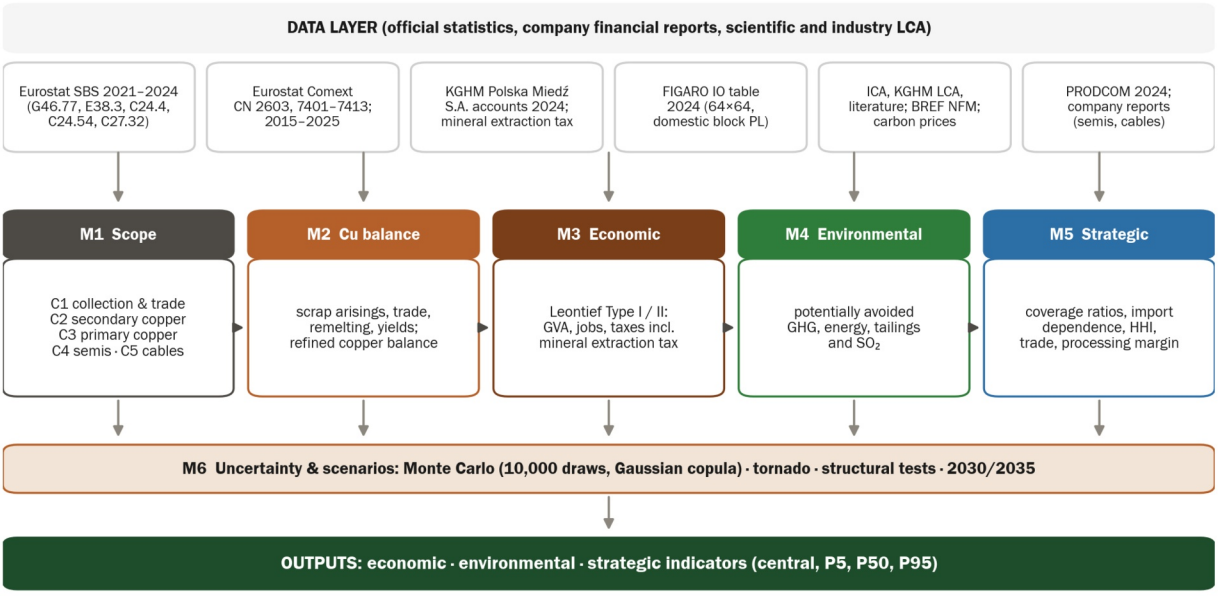
Source: IGMNiR CU-PL v1.2, module M2. Status: O observation, E estimate. Trade quantities are gross weight of scrap as shipped; an average yield is applied to all streams, so A is expressed in tonnes of scrap of average copper content. With stock changes, re-exports and toll processing unobserved, the direction of the total bias of the estimate of scrap collected is not verified.

Copper recovered from scrap in Poland therefore exceeds the copper contained in scrap collected in the country: the difference is covered by net imports of scrap. The estimate of scrap collected depends mainly on copper recovered from scrap and on the yield: with the extreme values of S and y in Annex B it ranges from 106 to 142 kt. Recoverable copper is not equally usable in all applications: high-grade scrap can be remelted directly into wire rod or alloys, while mixed and contaminated scrap, including much of the copper in electronic waste, must be smelted and electrolytically refined. Copper in electronic waste and waste electrical equipment exported outside CN 7404 is not included in A; this omission biases the collection-based results downwards, but with stocks and toll processing unobserved the direction of the total bias is not determined.

04 The CU-PL model

CU-PL follows the architecture of IGMNiR's integrated recycling-impact models and adapts it to copper, including primary production. It links six modules: scope and allocation (M1), a copper mass balance (M2), an input-output model of economic and fiscal effects (M3), an avoided-burden environmental module (M4), strategic indicators (M5) and an uncertainty and scenario module (M6).

FIGURE 7 Architecture of the CU-PL model



4.1 Scope and segments

The model distinguishes five segments. **C1** is the copper share of wholesale of waste and scrap (46.77) and materials recovery (38.3), allocated separately for value (16% and 10%) and employment (7% and 4.5%). **C2** (secondary copper) is modelled bottom-up from copper recovered from scrap, the copper price and value-added and labour ratios; 95% of it takes place in KGHM's smelters. **C3** (primary copper) is KGHM Polska Miedź S.A. – mining, concentration, smelting, refining, wire rod and by-products – built from its 2024 financial statements less the scrap-based part attributed to C2. **C4** is the residual of non-ferrous metal production in SBS attributable to copper (semis and alloys outside KGHM) plus the copper-alloy share of castings (24.54). **C5** is the copper-conductor share of wire and cable manufacturing (27.32). The **recycling chain** is C1+C2, the **copper industry** C1 –C4 and the **extended value chain** C1–C5.

4.2 Copper mass balance

The physical module links the scrap balance and the balance of refined copper. Scrap processed in Poland is derived as C = S / y, where S is copper recovered from scrap and y the copper recovered per tonne of scrap; scrap collected in Poland follows as A = C + X − M, where X and M are exports and imports of copper waste and scrap (CN 7404). Apparent consumption of refined copper is KGHM's electrolytic copper output plus imports

less exports of unwrought refined copper and alloys (CN 7403); wire rod made in Poland from domestic cathode is part of this consumption.

$$A = S / y + X - M \qquad \text{Apparent consumption} = R + (M_{7403} - X_{7403})$$

4.3 Economic, fiscal, environmental and strategic modules

Indirect and induced effects are computed with Leontief Type I and Type II multipliers from the domestic block of the Eurostat FIGARO input-output table for Poland (2024, 64 products), closed for households with the OECD tax wedge (34.1%) and a propensity to consume of 0.88. Purchases within the chain – scrap, concentrate, cathode and semis – are removed from the first-round demand. For KGHM, purchased copper-bearing materials account for 25% of revenue; after deducting the scrap feed attributed to C2, they account for 12% of the output of C3, and only the remaining non-metal intermediate inputs – energy, materials, services, repairs, transport – enter the first-round demand, with the input structure of mining excluding ores, metals and scrap. The same approach is used for semis and cables, with metal shares of 60% and 55% of output. The GVA of KGHM is measured by the income approach as adjusted EBITDA plus employee benefit costs plus other taxes on production (property tax and exploitation fee). The mineral extraction tax is levied per tonne of copper and silver in concentrate and is treated as a tax on products: it is excluded from output and value added at basic prices and is shown separately as public revenue; treating it as an other tax on production would raise the GVA of KGHM by EUR 898 million. Adjusted EBITDA is a management measure; a production-side calculation from KGHM's costs by nature is shown in the consistency checks (Table 11).

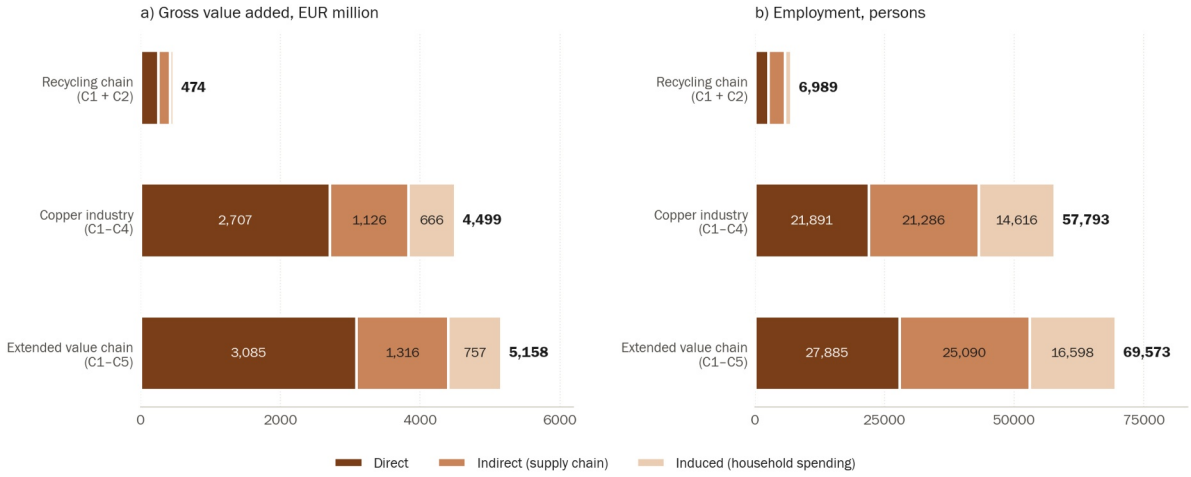
Taxes are estimated per segment: labour taxes and social contributions as the tax wedge applied to labour cost, corporate income tax on a share of operating surplus, and taxes on production from FIGARO coefficients. For KGHM the observed amounts are used: the mineral extraction tax (PLN 3,865 million), property tax and exploitation fee (PLN 419 million) and current corporate income tax (PLN 1,031 million), less the modelled corporate tax of KGHM's scrap-based activity attributed to C2. In C2 the value of the scrap feed is the residual of output after value added and non-metal inputs; it implies a scrap price of about EUR 6,690 per tonne, between the average Comext unit value of copper waste and scrap (EUR 6,200 per tonne, mixed grades) and the price of high-grade scrap implied by KGHM's purchase costs (about EUR 7,300 per tonne; IGMNiR calculation). The environmental module applies the avoided-burden method: recycled copper displaces primary cathode with a cradle-to-gate footprint of 3.64 t CO_2e/t (global average) against 1.00 t CO_2e/t for secondary copper, and avoids the flotation tailings and sulphur dioxide of the primary route. The headline is collection-based; the remelting-based perspective is an alternative and is never added. Strategic indicators include coverage ratios, import concentration (HHI), trade balances and an estimated processing margin.

Uncertainty is propagated by a Monte Carlo simulation of 10,000 draws from triangular distributions of all parameters in Annex B, with correlated groups linked by a Gaussian copula, and complemented by one-at-a-time and structural sensitivity analysis.

05 Economic and fiscal contribution

In 2024 the five segments of the extended copper value chain generated EUR 3,085 million of gross value added directly and employed about 27,900 people. The sum of their outputs was EUR 8,745 million; because part of the scrap, cathode and wire rod is sold between segments, output is not additive along the chain and value added is the appropriate measure of contribution. Purchases from Polish suppliers supported a further EUR 1,316 million of GVA and about 25,100 jobs, and the spending of wages added EUR 757 million and about 16,600 jobs. These are gross contributions at fixed input-output coefficients, not net effects.

FIGURE 8 Economic footprint of the copper value chain in Poland, 2024



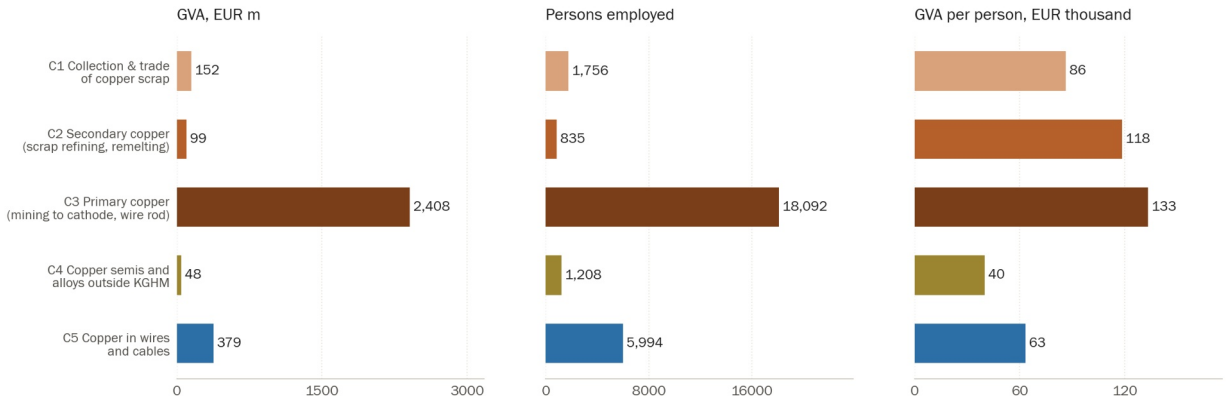
Source: IGMNiR CU-PL v1.2; KGHM Polska Miedź S.A. 2024 accounts; Eurostat SBS 2024, FIGARO 2024, Comext, PRODCOM; central estimate.

TABLE 5 Economic contribution by segment, 2024 (central estimate)

Segment	Output, EUR m	GVA, EUR m	Jobs	GVA Type I, EUR m	Jobs Type I	Taxes, EUR m
C1 Collection & trade	421	152	1,756	270	4,109	66
C2 Secondary copper	1,410	99	835	148	1,658	45
C3 Primary copper (KGHM)	4,705	2,408	18,092	3,364	36,168	2,071
C4 Semis and alloys	129	48	1,208	50	1,242	15
C5 Copper in wires and cables	2,080	379	5,994	569	9,798	151
Extended value chain	8,745	3,085	27,885	4,401	52,975	2,347

Source: IGMNiR CU-PL v1.2. Type I = direct + indirect (supply chain). Jobs: persons employed; C3 in full-time equivalents (KGHM). Output of the chain is the sum of segment outputs; GVA, jobs and taxes are additive. Taxes include direct, supply-chain and induced taxes; VAT is excluded. Totals may differ from the sum of segments because of rounding.

FIGURE 9 Direct GVA, employment and productivity by segment, 2024



Source: IGMNiR CU-PL v1.2; KGHM Polska Miedź S.A. 2024 accounts; Eurostat SBS 2024, FIGARO 2024, Comext, PRODCOM; central estimate.

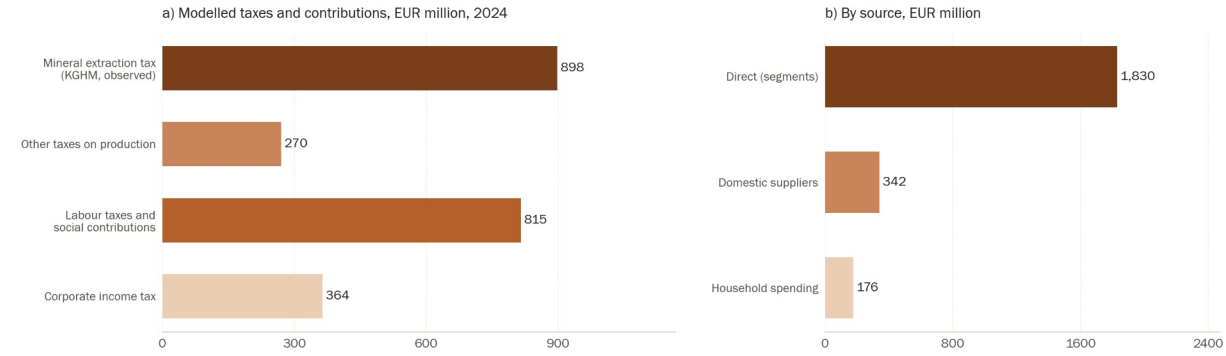
Primary copper is the economic core of the chain: KGHM's mining, smelting and refining account for 78% of direct value added and 65% of direct jobs, with value added of about EUR 133 thousand per FTE – a figure that excludes the mineral extraction tax but reflects the value of silver and other by-products. Copper in wires and cables adds 12% of value added and 21% of jobs. Secondary copper is material-intensive: the value of copper in scrap absorbs most of its output, and it generates EUR 99 million of value added with about 835 jobs. The ratios used for secondary copper are assumptions (Annex B); the scrap-based part of KGHM is not reported separately.

The Type I GVA multiplier of the extended chain is 1.43 and the Type II multiplier 1.67; for employment they are 1.90 and 2.49. The GVA multipliers are lower than in processing industries because a large part of KGHM's value added is direct and part of its purchases – concentrate, scrap, equipment – is imported or bought within the chain.

5.1 Taxes and public revenue

Taxes and contributions linked to the extended chain, its suppliers and household spending amount to an estimated EUR 2,347 million a year (PLN 10,108 million; VAT excluded): EUR 1,830 million from the direct activity of the five segments, EUR 342 million from Polish suppliers and EUR 176 million from household spending. The mineral extraction tax charged to KGHM – EUR 898 million (PLN 3,865 million) – is the largest single item, ahead of labour taxes and social contributions (EUR 815 million), corporate income tax (EUR 364 million) and other taxes on production (EUR 270 million). Except for KGHM's observed taxes, these are model estimates, not recorded receipts. KGHM was also granted PLN 151.9 million of compensation for its 2024 indirect emission costs, which is not deducted.

FIGURE 10 Taxes and contributions linked to the copper value chain, 2024



Source: IGMNiR CU-PL v1.2; KGHM Polska Miedź S.A. financial statements 2024 (mineral extraction tax); OECD tax wedge; FIGARO 2024. Model estimate except the mineral extraction tax; VAT excluded.

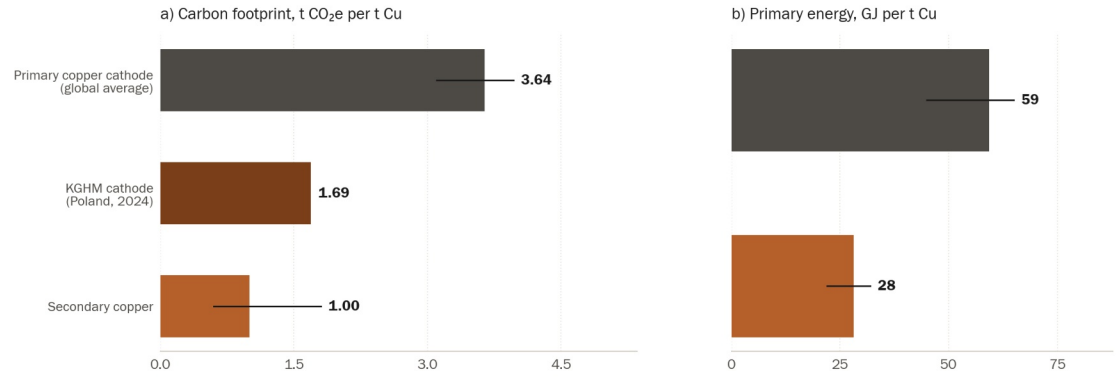
The mineral extraction tax depends on metal prices and on the statutory coefficient. At 2024 prices and output, the coefficients adopted for 2026 and 2027–2028 would lower it to EUR 781 million and EUR 718 million a year, reducing total taxes linked to the chain to EUR 2,231 million and EUR 2,168 million. Because the tax is not deductible for corporate income tax, a change in it leaves the corporate tax base unchanged and raises profit after tax; under the tax-on-products treatment used here it raises KGHM's output and GVA at basic prices by the same amount (a static calculation without behavioural response). This is an accounting effect of that convention, not an increase in physical copper output; the classification of the tax in national accounts (ESA 2010 D.214 or D.29) remains to be confirmed. Under D.214, as here, GVA including supply chains rises by EUR 116 million (2026) and EUR 180 million (2027–2028); under D.29 the tax would be part of KGHM's GVA (EUR 898 million more in 2024) and a lower tax would only shift income from taxes to operating surplus, leaving GVA unchanged. The Ministry of Finance estimated the reduction at about PLN 500 million in 2026 and PLN 750 million a year in 2027–2028; the model gives PLN 500 million and PLN 773 million at 2024 prices and output. The investment relief from 2029 is not modelled. Higher copper and silver prices, as in 2025 and 2026, raise the tax considerably: in 2025 it reached PLN 4,693 million. The tax and the value added of KGHM therefore vary strongly with prices, which the results at 2024 prices and volumes in this report do not show.

Supply-chain effects are model results. If the domestic first-round purchases of all segments were 20% lower or higher, GVA including supply chains would be EUR 4,138–4,665 million; with a share of purchased metal in KGHM's revenue of 22% or 28%, it would be EUR 4,283–4,512 million. With the FIGARO table for 2023 instead of 2024 it would be EUR 4,409 million. The OECD tax wedge describes a single worker at the average wage and is an approximation for the industry.

06 Environmental contribution

According to the International Copper Association, a tonne of copper cathode produced worldwide carries a cradle-to-gate footprint of about 3.64 t CO_2e (2023 data; 3.96 t with 2019 data), dominated by mining, concentration and smelting. Refining copper scrap to cathode, including scrap preparation, carries about 1.00 t CO_2e per tonne (range 0.60–1.80), and direct remelting of clean scrap considerably less. Primary energy demand is about 59 GJ against 28 GJ per tonne. Secondary copper thus saves 73% of emissions and 53% of primary energy; the two indicators come from different data sources. The primary route also generates about 94 t of flotation tailings and 31 kg of sulphur dioxide per tonne of cathode on average.

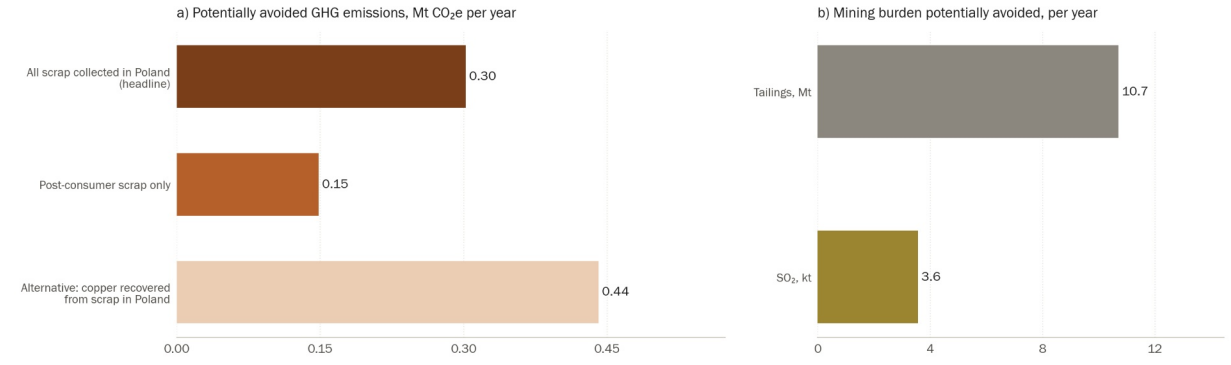
FIGURE 11 Carbon and energy footprint of primary and secondary copper



Source: International Copper Association (2023 data); KGHM LCA report (IGSMiE PAN, 2024 data); literature values for secondary copper. Central values; ranges in Annex B. KGHM: economic allocation to silver and by-products.

Applied to the 114 kt of copper recoverable from scrap collected in Poland, recycling potentially avoids about 302 kt CO_2e a year (90% band 213–329), 3.6 PJ of primary energy and 10.7 Mt of tailings. Because Poland imports more copper scrap than it exports, the remelting-based perspective is larger: copper recovered from scrap in Poland potentially avoids 441 kt CO_2e. Crediting only post-consumer scrap gives 148 kt. Most of these emissions and burdens would occur at primary producers outside Poland; they are not reductions of the national inventory, and results for different countries must not be added. At the 2024 EU ETS price the potentially avoided emissions are worth EUR 20 million, and EUR 63 million at the EIB shadow cost of carbon (rebased from 2016 to 2024 prices); these are illustrative counterfactual valuations, not revenue or value added.

FIGURE 12 Potentially avoided emissions and mining burden of the copper recycling chain, 2024



Source: IGMNiR CU-PL v1.2, module M4; avoided-burden estimate, 1:1 substitution of primary cathode (global average, ICA); mostly outside Poland. The three bars in a) are alternative attributions and are not additive.

KGHM's own operations generate about 29 Mt of flotation tailings a year (ore milled less concentrate; IGMNiR calculation), deposited mainly at the Żelazny Most facility, produce about 1.1 Mt of slag – part of which is sold as aggregate – and 660 kt of sulphuric acid, and emitted 1.4 Mt CO_2e of Scope 1 emissions in 2024. These are the burdens of domestic primary production, which secondary copper does not carry.[16]

6.1 Structural sensitivity

TABLE 6 Structural sensitivity of potentially avoided greenhouse-gas emissions, kt CO_2e (2024)

Case	Collection-based	Remelting-based
Base case (global primary cathode, 1:1 substitution, all scrap collected)	302	441
Substitution factor 0.8	219	319
Substitution factor 0.5	94	137
Post-consumer scrap only credited	148	216
Displaced primary = ICA profile with 2019 data (3.965 t CO_2e/t)	339	495
Displaced primary = KGHM cathode 2024 (1.69 t CO_2e/t, mass allocation)	79	115
Secondary copper 0.6 t CO_2e/t	348	508
Secondary copper 1.8 t CO_2e/t	211	307

Source: IGMNiR CU-PL v1.2. The substitution factor expresses how much primary copper one tonne of recycled copper actually displaces. The KGHM footprint comes from a life-cycle assessment that allocates the smelting burden by mass to slag and sulphuric acid; it is not comparable with the global average and is shown only as a structural alternative.

6.2 Boundaries and comparability

TABLE 7 System boundaries of the footprints compared

Item	Value	Boundary	Source
Primary copper cathode, global average	3.64 t CO_2e/t	Cradle to gate: mining, concentration, smelting, refining; includes some secondary input in the global dataset	ICA (2023 data, via Aurubis 2026); ICA profile 2023
Secondary copper	1.00 t CO_2e/t	Scrap collection and preparation, smelting and electrolytic refining of scrap; scrap enters free of burden	Aurubis Lünen; literature; IGMNiR
KGHM cathode (structural case only)	1.69 t CO_2e/t	Cradle to gate; smelting burden allocated by mass to slag and sulphuric acid (13–17% to copper at Głogów)	IGSMiE PAN LCA of KGHM products (2024 data)
Primary energy, primary / secondary	59 / 28 GJ/t	Matched pair from one study; historical data	Nuss and Eckelman (2014)
Functional unit	1 t cathode	Refined copper at plant gate, before semi-fabrication	CU-PL

Source: IGMNiR CU-PL v1.2. Because the global cathode dataset includes some secondary production, using it as displaced primary copper tends to understate the avoided burden.

The headline credits all scrap collected in Poland, including process (new) scrap; the post-consumer-only variant (148 kt CO_2e) avoids duplicating benefits already attributed to manufacturing. The choice of the displaced primary copper changes the result more than the parameter band, in both directions: 339 kt with the ICA profile based on 2019 data and 79 kt against the KGHM footprint, which rests on a mass allocation of most of the smelting burden to slag and acid and is not comparable with the global average.

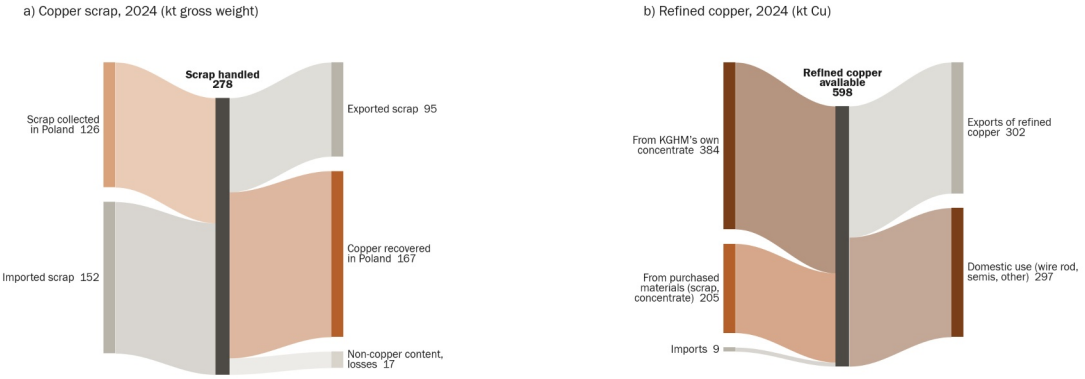
[16] KGHM Polska Miedź S.A., Management Board report 2025, sustainability statement (ESRS E1, E5); IGMNiR calculation from ore and concentrate output.

07 Strategic contribution

Poland is one of the few EU countries with significant copper mining. KGHM's mines supplied 400 kt of copper in concentrate in 2024, and Polish refined copper output of 589 kt corresponded to 198% of apparent consumption of refined copper (297 kt); copper recovered from scrap (167 kt) corresponded to 56% of it. These are coverage ratios, not measures of self-sufficiency of Polish processors: cathode and wire rod are exported in large volumes, and semis are imported. Apparent consumption is of the same order as the cathode used by KGHM's wire-rod plant in Cedynia (about 288 kt). Balance resources of copper ore amounted to 3.5 billion tonnes containing 55.4 Mt of copper at the end of 2025, and KGHM's main mining concessions are valid until 2063.

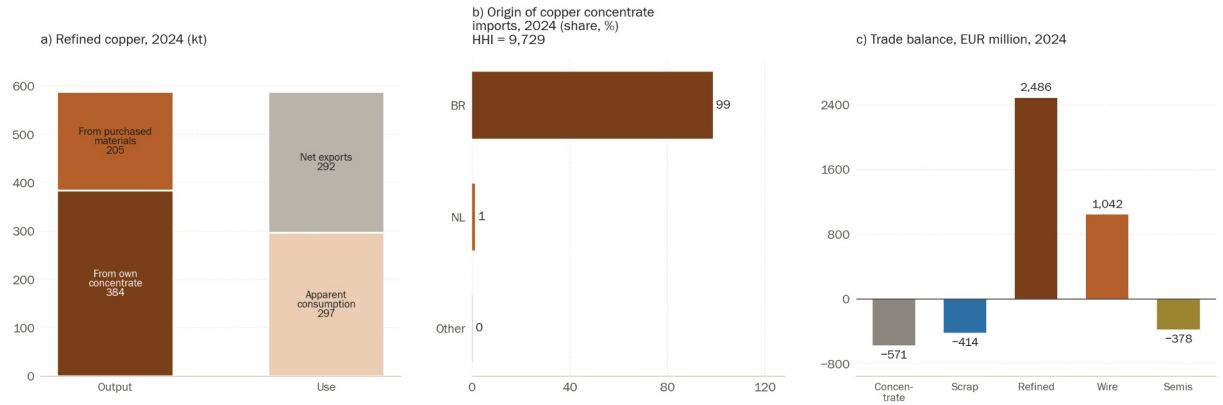
Purchased materials supplied 205 kt of KGHM's cathode output in 2024 – 158.6 kt from scrap, about 41.5 kt from imported concentrate and 4.9 kt from other materials. Imports of copper concentrate came mainly from BR (99%), NL (1%), BG (0%); the import concentration index was 9,729 (HHI by partner country, 2024). Upstream, copper mining and refining are concentrated worldwide, with Chile and China leading mining and refining respectively, which makes domestic mining and recycling capacity relevant for European supply.

FIGURE 13 Copper scrap and refined copper in Poland, 2024



Source: IGMNiR CU-PL mass balance (M2); Eurostat Comext 2024 (CN 7403, 7404); KGHM production data 2024. Scrap collected derived as remelting + exports − imports; refined copper converted into wire rod in Poland is included in domestic use.

FIGURE 14 Supply security indicators for copper, 2024



Source: IGMNiR CU-PL v1.2; KGHM; Eurostat Comext (DS-045409). HHI: Herfindahl–Hirschman index of partner countries (0–10,000).

TABLE 8 Strategic indicators for the copper value chain

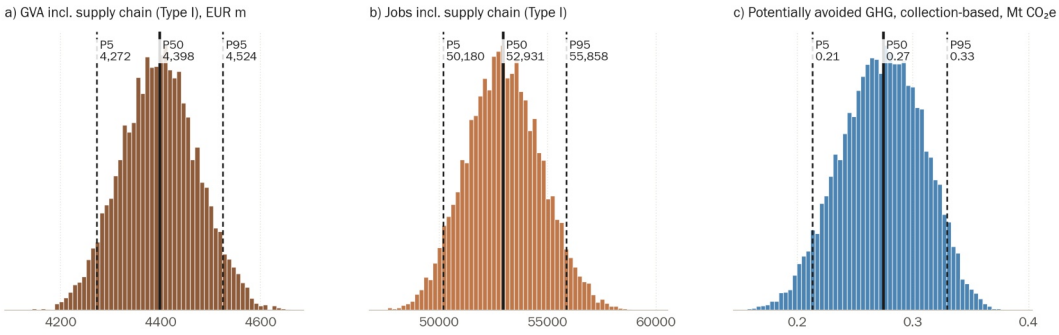
Indicator	Value	Source
Coverage ratio: refined output / apparent consumption of refined copper	198%	KGHM; Comext; CU-PL
Coverage ratio: copper from scrap / apparent consumption	56%	CU-PL; Comext
Imports of copper concentrate (kt gross weight)	162	Comext 2024
Import concentration, copper concentrate (HHI, 2024)	9,729	Comext
Trade balance, refined copper and wire (EUR m)	3,529	Comext 2024
Trade balance, copper scrap (EUR m)	−414	Comext 2024
Estimated processing margin of secondary copper (EUR m)	168	CU-PL

HHI by partner country as recorded in trade statistics (country of consignment for intra-EU trade, origin for extra-EU imports); the thresholds of competition guidelines do not translate directly into vulnerability to supply shocks. The processing margin is the value of copper recovered from scrap less the value of the scrap feed and of imported non-metal inputs; it is an estimate that depends on the assumed value-added ratio of secondary copper and is neither value added relative to another use of the scrap nor a cash foreign-exchange flow.

08 Uncertainty, checks and limitations

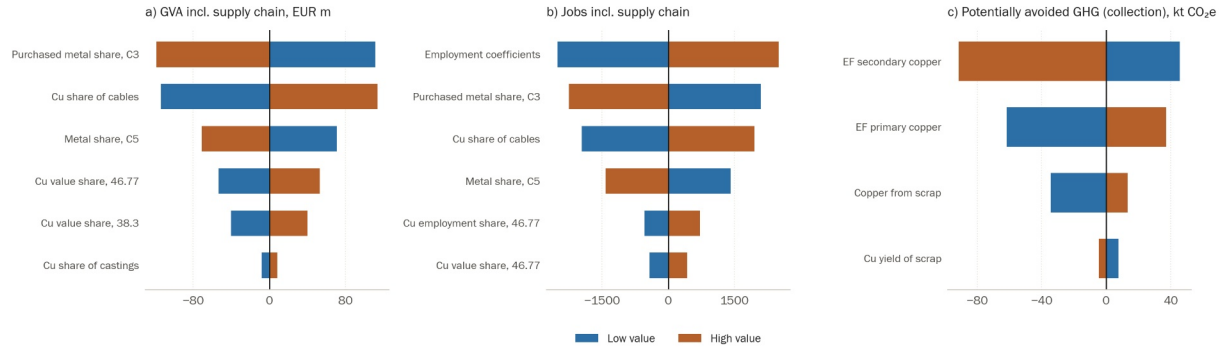
The 90% parameter-uncertainty band for GVA including supply chains is EUR 4,272–4,524 million, for jobs 50,200–55,900 and for potentially avoided emissions 213–329 kt CO_2e. The direct results for primary copper rest on KGHM's financial statements and are not part of the parameter band; supply-chain effects depend in addition on the purchased-metal shares and on the copper shares of scrap trading and cable manufacturing. The band does not cover the full uncertainty of the input-output structure. The environmental result depends above all on the footprints of the displaced primary and the secondary copper; structural choices matter more than parameter ranges (Table 6). The central values are deterministic runs with modal parameter values; for GVA the median of the simulation is close to the central value (4,398 against 4,401 EUR million), while for potentially avoided emissions the median (274 kt) is lower than the central value because the range of the secondary footprint is skewed upwards. With two other random seeds and with 20,000 draws on a third seed, P5, P50 and P95 of the headline indicators change by at most 0.8%. Structural choices widen the range further: across the cases in Table 6 the collection-based result lies between 79 and 348 kt CO_2e.

FIGURE 15 Monte Carlo distribution of key results



Source: IGMNiR CU-PL v1.2, module M6; 10,000 draws, triangular distributions with Gaussian copula (Annex B), seed 20261118. Parameter-uncertainty band, not a statistical confidence interval.

FIGURE 16 Sensitivity of results to individual parameters



Source: IGMNiR CU-PL v1.2, module M6; one-at-a-time sensitivity on Annex B ranges; extended value chain.

The band reflects the specified distributions and correlations, not observed frequencies of parameter values; it is not a statistical confidence interval for the true contribution. Its sensitivity to the statistical design was tested with 4,000 draws each: without correlations, with all correlations within groups set to 0.95, and with PERT instead of triangular distributions. The scrap feed of secondary copper, derived as a residual, implies a scrap price of EUR 6,310–6,920 per tonne across the draws (P5–P95); no draw produces negative masses.

TABLE 9 Robustness of the uncertainty band to the statistical design

Design (4,000 draws)	GVA I P5	P50	P95	GHG P5	P50	P95
Reference: triangular, correlations as in Annex B	4,270	4,397	4,523	215	274	329
No correlations	4,267	4,397	4,526	215	274	329
Correlations within groups 0.95	4,288	4,396	4,501	215	274	329
PERT distributions	4,281	4,399	4,515	235	288	339

Source: IGMNiR CU-PL v1.2. GVA including supply chains (Type I) in EUR million; potentially avoided emissions (collection-based) in kt CO_2e. Seed 7 for all designs. Correlations do not change the emission band because the parameters that determine it are not correlated with one another.

TABLE 10 Structural tests of the economic, fiscal and physical results

Case	GVA I, EUR m	Jobs I	Taxes, EUR m	Mineral tax, EUR m	Scrap collected, kt	GHG, kt CO_2e
Base case	4,401	53,000	2,347	898	126	302
Domestic first-round purchases −20%	4,138	48,000	2,270	898	126	302
Domestic first-round purchases +20%	4,665	58,000	2,424	898	126	302
Input-output table FIGARO 2023	4,409	52,800	2,352	898	126	302
Purchased metal share of KGHM 22%	4,512	55,100	2,380	898	126	302
Purchased metal share of KGHM 28%	4,283	50,700	2,312	898	126	302
Copper from scrap 154 kt	4,402	53,000	2,348	898	112	268
Copper from scrap 172 kt	4,401	53,000	2,347	898	131	315
Mineral tax coefficient 0.74 (2026)	4,518	53,000	2,231	781	126	302
Mineral tax coefficient 0.68 (2027–2028)	4,581	53,000	2,168	718	126	302

Source: IGMNiR CU-PL v1.2. One assumption changed at a time; deterministic runs at 2024 prices and output. The mineral tax cases apply the statutory coefficients for 2026 and 2027–2028 to the 2024 tax.

8.1 Consistency checks

TABLE 11 Consistency checks of the CU-PL model

Check	Model	Reference	Reference source
Apparent consumption of refined copper, kt	297	297	IGSMiE PAN (2025)
Refined copper exports vs PRODCOM cathode sold, kt	302	300.6	Comext; PRODCOM 2024 (24441330)
GVA of C3 + KGHM part of C2 vs KGHM income-approach GVA, EUR m (by construction)	2,502	2,502	KGHM 2024 accounts
Scrap processed in Poland vs recovery of all non-ferrous metal waste, kt	184	729	Eurostat env_wastrt W062, 2024
Scrap processed in Poland vs KGHM scrap intake, kt	184	158.9	KGHM 2024
KGHM cathode from purchased materials vs copper from scrap + imported concentrate, kt	205.0	200.1	KGHM 2024; Comext
Implied price of scrap in C2 vs Comext unit value CN 7404, EUR/t	6,690	6,200	Comext 2024
KGHM GVA: income approach (adjusted EBITDA) vs production approach (output − mineral tax − intermediate consumption), EUR m	2,502	2,565	KGHM 2024, costs by nature

Source: IGMNiR CU-PL v1.2. Row 3 is a reconciliation by construction. The scrap-recovery statistic W062 covers all non-ferrous metals and is an upper bound only. PRODCOM cathode sales exclude cathode converted into wire rod at KGHM. The difference in row 6 (about 5 kt) corresponds to other purchased copper-bearing materials; the implied scrap price in row 7 lies between the unit value of mixed scrap and the price of high-grade scrap. Rows 1–2 use partly the same production and trade data as the model and are consistency checks rather than independent validation; CN 7403 exports and PRODCOM sales are not identical by definition. In row 8 the production approach is higher by EUR 63 million; the difference is fully explained by other taxes and charges in costs by nature that the income approach treats as costs (PLN 267 million, including emission-allowance costs of PLN 126 million) and by net inventory write-downs (PLN 6 million); the model uses the lower, income-approach value.

8.2 Limitations

- **Results are gross contributions** at fixed input-output coefficients, not net effects: some of the labour and capital would be employed elsewhere if the activity did not exist.
- **KGHM is modelled from company accounts** for 2024, a year of moderate prices; value added and the mineral extraction tax vary strongly with copper and silver prices, the attribution of scrap-based activity within KGHM is an assumption, and the mineral extraction tax is treated as a tax on products outside GVA.
- **Scrap collected in Poland** is derived from copper recovered from scrap and from trade, with an average yield for all streams; stock changes, re-exports, toll processing and the share of process scrap are not observed directly.
- **Copper shares** of scrap trading, castings and cable manufacturing are allocations, not observations.
- **Potentially avoided emissions** are conditional on 1:1 substitution of the global average primary cathode and occur mostly outside Poland; they are not reductions of the national inventory. Crediting process scrap is debated; the post-consumer-only variant is shown.
- **Representativeness of LCA data.** Footprints of secondary copper differ by route and electricity mix, and product footprints of primary copper depend strongly on the allocation method.
- **Input-output specification.** Supply-chain effects rest on one input-output table (FIGARO 2024) and on the specification of first-round purchases; alternative tables were not tested beyond the structural cases shown.
- **Statistical design.** Triangular distributions were used for all parameters; alternative distributions were tested only for the headline indicators, and the parameter band does not include structural choices (Table 6).
- **Input-output aggregation.** The FIGARO table for 2024 was used; for the latest year Eurostat partly estimates it, and with the 2023 table the results differ by less than 1% (Table 10). Excluding whole CPA products traded within the chain can also remove purchases from external suppliers in the same product group and understate indirect effects.
- **Comparability of footprints.** The primary footprint is a global average, not the producer actually displaced at the margin; footprints of primary and secondary copper differ in geographical scope, reference year and allocation.

09 Scenarios to 2035

Three scenarios explore how the contribution of the copper chain could change. They are what-if calculations in constant 2024 prices and at the 2024 statutory coefficient of the mineral extraction tax, not forecasts; the investment relief from 2029 is not modelled. Labour productivity is assumed to grow by 2% a year, and the footprints of both routes decline as electricity decarbonises. KGHM's cathode output is limited to about 601 kt from 2030 – Głogów about 466 kt and Legnica about 135 kt after the Integrated Recycling Smelter – of which up to about 195 kt from scrap (IGMNiR assumption); additional copper from scrap first displaces imported concentrate. Additional scrap is assumed to be of lower grade (15–60% copper; 0.40 t of copper recovered per tonne), with a footprint 20% above that of the 2024 scrap mix and no decline.

TABLE 12 Scenario assumptions (change versus 2024)

Scenario	Copper from scrap	Scrap collected	Primary (KGHM)	Semis	Cables	Narrative
S1 Continuity 2030	+15%	+15%	0%	+5%	+10%	Recycling smelter in Legnica ramps up; stable mining; grid investment
S2 Circular copper 2035	+22%	+30%	−3%	+10%	+20%	KGHM scrap processing near capacity; lower ore grades; electrification
S3 Stress 2030	0%	0%	−15%	−10%	−10%	Lower mine output and weaker demand

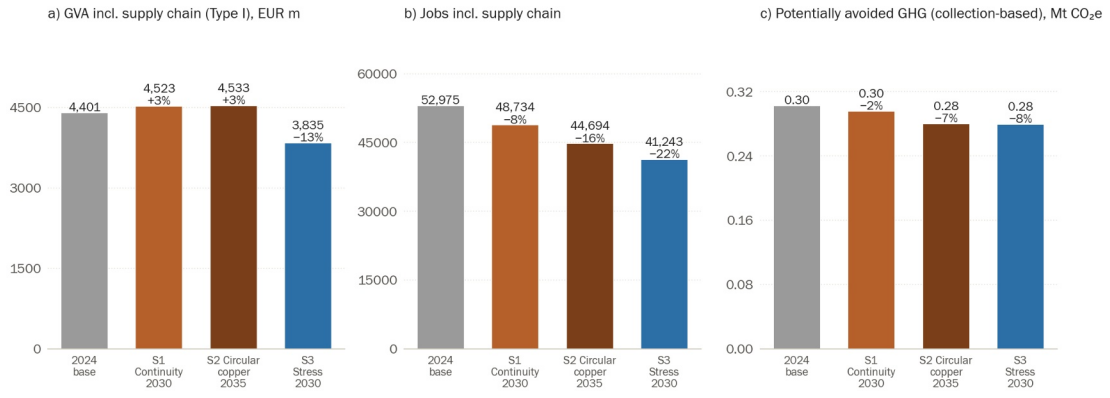
The footprint of primary copper declines by 7% by 2030 and 15% by 2035, that of secondary copper from the 2024 scrap mix by 5% and 10%. Additional KGHM copper from scrap first displaces imported concentrate within the capacity limit; primary output follows the scenario index. Apparent consumption follows a weighted index of cables (60%) and semis (40%). Higher copper recovery from scrap presupposes pre-treatment of complex scrap and sufficient collection.

TABLE 13 Scrap balance and refined output in the scenarios (kt)

Scenario	Copper from scrap S	Scrap processed C	Scrap exports X	Scrap imports M	Scrap collected A	Refined output R
2024 base	167	184	95	152	126	589
S1 Continuity 2030	192	246	109	210	145	601
S2 Circular copper 2035	204	275	123	235	164	601
S3 Stress 2030	167	184	95	152	126	531

Source: IGMNiR CU-PL v1.2. Collection follows the scenario index; the export share of scrap collected is held at its 2024 level and imports close the balance (M = C + X − A). The yield of the 2024 scrap mix and stocks are unchanged; additional scrap is of lower grade. Refined output is KGHM's cathode output within its capacity. The scenarios are single-year what-if calculations, not annual paths.

FIGURE 17 Scenario results: change versus 2024



Source: IGMNiR CU-PL v1.2; constant 2024 prices; assumptions in the scenario table; labour productivity +2% a year; footprints of both routes decline over time.

In S2 the chain reaches EUR 4,533 million of GVA including supply chains; because productivity rises faster than output, the number of jobs supported falls to about 44,700. Potentially avoided emissions fall to 280 kt CO_2e: more scrap is collected, but the footprint of primary copper declines and the additional scrap is of lower grade. Scrap imports grow to 235 kt gross weight: of the additional 92 kt of scrap processed, 38 kt come from higher collection in Poland and 54 kt from higher net imports. Recycling in Poland would thus grow faster than the recovery of copper from domestic material. S3 shows the exposure of the chain to mine output and demand: GVA including supply chains would fall by EUR 567 million and the mineral extraction tax by EUR 135 million.

10 Conclusions and recommendations

The Polish copper industry is a large, integrated and export-oriented value chain built on domestic ore. Primary copper at KGHM dominates its value added and public revenue, with the mineral extraction tax as the largest single item; recycling adds a growing secondary supply processed largely in the same smelters, and cable makers and semi-fabricators link the chain to domestic manufacturing. The recommendations below are normative: they draw on the description of the industry and its regulatory environment, not on a quantitative assessment of the costs and benefits of individual instruments.

01 **Keep the fiscal and energy framework predictable** – apply the mineral extraction tax amendment of 2025 with clear rules for the investment relief, and align the national scheme for compensating indirect emission costs with the EU guidelines that now cover mining of non-ferrous metal ores (NACE 07.29).

02 **Build recycling capacity for complex scrap** – support the Integrated Recycling Smelter in Legnica and pre-treatment of cable, electronic and mixed scrap, which determine how much copper can be recovered from post-consumer waste.

03 **Implement the Critical Raw Materials Act efficiently** – adopt the national implementing act and use the strategic-project status of Retków-Grodziszcze and the Legnica smelter to shorten permitting while keeping environmental standards.

04 **Make permitting predictable** – shorten and digitalise procedures for environmental permits for smelting, recycling and sorting plants and for notifications of waste shipments under Regulation (EU) 2024/1157, with clear deadlines for the competent authorities.

05 **Treat the chain as one system** – in industrial, raw-materials and energy policy, consider mining, smelting, recycling, semi-fabrication and cable manufacturing together, including the demand for copper from grid investment.

A Data sources and trade

TABLE 14 Main data sources of the CU-PL model

Domain	Source	Use in CU-PL
Company accounts	KGHM Polska Miedź S.A., separate financial statements and Management Board reports 2024–2025	C3: revenue, EBITDA, employee costs, employment, taxes incl. mineral extraction tax
Structural business statistics	Eurostat sbs_ovw_act, 2021–2024	Output, GVA, employment, labour costs (46.77, 38.3, 24.4, 24.54, 27.32)
Input-output	Eurostat FIGARO naio_10_fcp_ip4, 2024	Domestic technical coefficients, value added, household demand
National accounts	Eurostat nama_10_a64(_e), 2023–2024	Employment and output by industry
Foreign trade	Eurostat Comext DS-045409, 2015–2025	CN 2603, 7401–7413
Industrial production	Eurostat PRODCOM DS-056120, 2024	Refined copper, semis, wire, castings
Mineral resources	PIG-PIB balance of mineral resources; IGSMiE PAN	Ore output, resources, apparent consumption
LCA and residues	ICA, KGHM LCA (IGSMiE PAN), literature, BREF NFM	Footprints, energy, tailings, SO_2
Valuation	KOBiZE, EIB	Carbon prices

TABLE 15 Foreign trade in copper by product, 2024

CN	Product	Imports, kt	Exports, kt	Imports, EUR m	Exports, EUR m	Balance, EUR m
2603	Copper ores and concentrates	162.2	3.1	573	2	−571
7403	Refined copper and alloys, unwrought	9.4	301.5	62	2,549	2,486
7404	Copper waste and scrap	152.4	94.7	977	563	−414
7407	Bars, rods and profiles	24.9	20.7	215	186	−29
7408	Wire, incl. wire rod	52.2	166.7	450	1,492	1,042
7409	Plates, sheets and strip	11.8	2.1	114	25	−89
7410	Foil	10.9	0.3	146	4	−142
7411	Tubes and pipes	20.0	8.2	205	81	−124
7412	Tube or pipe fittings	19.6	11.9	302	326	24
7413	Stranded wire and cables, not insulated	8.4	6.4	85	67	−18

Source: Eurostat Comext (DS-045409), 2024. Quantities in gross weight (concentrate and scrap include non-copper content). Flows include re-exports.

TABLE 16 Specification of the input-output module

Element	Specification
Table	Eurostat FIGARO, product-by-product, 2024 (naio_10_fcp_ip4, edition of July 2026); 2023 table as a structural test; domestic block (origin PL), 64 CPA products
Multipliers	Type I: $L = (I - A_d)^{-1}$; Type II: households endogenised – labour income × (1 − tax wedge) × propensity to consume, spent with the domestic household consumption structure of FIGARO
Employment	Persons employed 2024 (nama_10_a64_e) per unit of output, by CPA product
C1 first round	Input structure of CPA_G46 (46.77) and CPA_E37-39 (38.3), scaled to output minus GVA of the copper share
C2 first round	Bottom-up vector (6% of output): energy, fuels, chemicals and fluxes, refractories, transport, storage, repairs and services, with domestic shares (model parameter file); the scrap feed is the residual of output after GVA and these inputs and is excluded

Element	Specification
C3 first round (KGHM)	Non-metal intermediate inputs = output at basic prices (revenue − mineral extraction tax) − GVA − purchased copper-bearing materials not attributed to C2; distributed with the all-origin structure of CPA_B (mining) excluding ores and metals; only the domestic part enters
C4 and C5 first round	Non-metal intermediate inputs = output − GVA − metal share × output; structure of CPA_C24 (C4) and CPA_C27 (C5) excluding ores and metals
Excluded products	CPA_G46, CPA_E37-39, CPA_C24 (within the chain); CPA_B (ores) for C3–C5
Taxes	Tax wedge × labour cost; CIT 19% × taxable share of operating surplus (KGHM: observed current CIT less the modelled CIT of its part of C2); taxes on production from FIGARO coefficients (KGHM: observed property tax and exploitation fee); mineral extraction tax observed, treated as a tax on products outside GVA; VAT excluded

Model package. The CU-PL package archived by IGMNiR contains the model modules M1–M6 (Python), all input data with extraction dates and dataset codes, the parameter file with sources and ranges (Annex B), scenario definitions, automated consistency checks and the run log. A replication set of machine-readable files is exported with each run: the source register, the 2024 copper balance with the status of each flow, the first-round demand vectors of all segments, the parameters with ranges and correlations, and the scenario balances. The results in this report correspond to run ID CUPL-1.2-6389701a82 with random seed 20261118. The package is available from IGMNiR on request.

B Parameters and uncertainty ranges

Each uncertain parameter is described by a triangular distribution (low, central, high) within one dataset family; alternative datasets are treated as structural cases (Table 6). Reliability classes: A – official statistics, scientific literature or company financial statements; B – industry or company data; C – IGMNiR assumption or derived value. Observed KGHM data for 2024 (Table 3) are fixed inputs.

TABLE 17 CU-PL parameters

Parameter	Central	Low	High	Class	Basis and source
Copper value share, NACE 46.77	0.160	0.110	0.210	A/C	NF share of 46.77 value (0.40, IGMNiR NF-REC-PL) x copper share of NF scrap value handled in PL 2024 (0.40; Comext unit values CN 7404 ~6,200 EUR/t x scrap remelted and exported)
Copper employment share, NACE 46.77	0.070	0.040	0.110	C	NF employment share of 46.77 (0.24) x copper share of NF scrap tonnage handled (~0.3)
Copper value share, NACE 38.3	0.100	0.060	0.140	C	NF share of 38.3 value (0.24) x copper value share (0.40); cable stripping and WEEE dismantling
Copper employment share, NACE 38.3	0.045	0.025	0.070	C	NF share of 38.3 employment (0.15) x ~0.3
Copper recovered from scrap, kt	167	154	172	A/B/C	copper from scrap 2024, kt Cu: KGHM electrolytic copper from scrap 158.6 kt (27% of output; Management Board report 2024) plus foreign scrap remelted by copper-alloy producers, $_{7\text{-}12\ kt\ Cu\ (WM\ Dziedzice\ brass\ 20.2\ kt\ x}$ 0.6 Cu, less own process scrap); low end: copper contained in scrap used by the KGHM Group 150.4 kt (Table 179, 2024 report) x $_{0.98\ recovery\ +}$ 7 kt
Copper recovered per t of scrap	0.910	0.860	0.940	B/C	copper recovered per t of scrap (gross): high-grade scrap at KGHM $_{0.93\text{-}0.96;\ brass}$ 0.6; weighted
Copper price, EUR/t	8,446	8,000	8,800	A	LME copper 2024 average USD 9,142/t (World Bank Pink Sheet) at EUR/USD 1.0824
GVA/output ratio, C2	0.070	0.050	0.090	C	GVA/output of scrap-based copper: refining margin over the value of copper in scrap
Persons per kt, C2	5.0	3.0	8.0	C	persons per kt Cu from scrap: scrap share of Legnica/Glogow smelter staffing and remelters
Labour cost per person, C2, EUR k	72.0	62.0	80.0	A/C	labour cost per person, EUR k: KGHM employee benefits PLN 5,891 m / 18,885 FTE (2024 accounts)
Share of C2 inside KGHM	0.950	0.920	0.970	B/C	share of C2 taking place in KGHM smelters (158.6 of 167 kt)
Purchased metal share of revenue, C3 (KGHM)	0.249	0.220	0.280	A	purchased copper-bearing materials (imported concentrate, scrap, other) / revenue: PLN 7,439 m / 29,894 m (KGHM 2024, costs by nature); the scrap part attributed to C2 is deducted in the model

Parameter	Central	Low	High	Class	Basis and source
Copper share of SBS residual 24.44/24.45	0.850	0.700	0.950	C	copper share of the SBS residual NACE 24.44 + 24.45 (24.4 less 24.41, 24.42, 24.43)
Copper-alloy share of castings 24.54	0.500	0.350	0.650	C	copper-alloy share of non-ferrous castings other than light metals (NACE 24.54; rest mainly zinc)
Metal share of output, C4	0.600	0.500	0.680	A/C	metal share of output of copper and brass semis and copper-alloy castings: PRODCOM 2024 unit values (bars and rods EUR 8,150/t, tubes EUR 13,200/t) vs metal ~EUR 6,000-8,400/t; bounded by intermediate consumption of 73% of output (SBS)
Copper share of wire and cable manufacturing	0.750	0.600	0.900	C	copper-conductor share of activity of NACE 27.32 (wires and cables; rest aluminium conductors)
Metal share of output, C5	0.550	0.450	0.650	A/C	copper share of output value of wires and cables: implied copper content 135 kt (m5 x output / LME price), within domestic availability of wire rod of 145-160 kt (output 287 kt less net exports, less winding wire)
Propensity to consume	0.880	0.800	0.950	C	average propensity to consume out of net labour income
Tax wedge	0.341	0.330	0.355	A	OECD Taxing Wages 2025: single worker at average wage, Poland 2024
Scale of employment coefficients	1.0	0.9	1.1	C	uncertainty of FIGARO employment coefficients
Taxable share of operating surplus	0.450	0.300	0.600	C	operating surplus net of production taxes, depreciation, interest and losses
Carbon footprint, primary copper, t CO_2e/t	3.64	3.10	3.96	B/A	primary copper cathode, global average: ICA (2023 data, via Aurubis EFD 2026) 3.64; ICA profile 2023 (2019 data) 3.965; Nuss & Eckelman 2014 3.1
Carbon footprint, secondary copper, t CO_2e/t	1.00	0.60	1.80	B/C	secondary copper, scrap refining to cathode incl. scrap preparation: Aurubis Lünen ~1.0-1.4 with grid; 100% recycled cathode 0.63; Nuss & Eckelman 2014 1.8
Primary energy, primary copper, GJ/t	59.3	45.0	65.0	A	primary energy, primary copper, GJ/t (Nuss & Eckelman 2014)
Primary energy, secondary copper, GJ/t	28.1	22.0	32.0	A	primary energy, secondary copper, GJ/t (Nuss & Eckelman 2014)
Share of post-consumer scrap	0.490	0.350	0.600	B	share of post-consumer (old) scrap in copper scrap input, EU (European Copper Institute 2023)
Tailings per t of primary copper, t	93.5	84.0	103.0	B/C	t of flotation tailings per t of primary cathode: ICA global 93.5, +/-10%
SO_2 per t of primary copper, kg	31.2	15.0	35.0	B	kg SO2 per t of primary cathode, ICA global LCI
EU ETS price 2024, EUR/t	64.8	60.0	74.0	A	EU ETS average 2024 (EEA; KOBiZE Polish auctions 64.80)
EIB shadow cost of carbon, EUR/t (2024 prices)	208	164	314	A	EIB shadow cost of carbon 2025, EUR 165/t (130-250) in 2016 prices, rebased to 2024 prices with the euro-area HICP (126.07/100.23, Eurostat prc_hicp_aind)

Correlated groups (Gaussian copula): allocation shares (ρ = 0.8); primary footprint and energy (0.7); secondary footprint and energy (0.7); cable shares (0.3). Fixed inputs for the scenarios: KGHM cathode capacity 601 kt and scrap-processing capacity 195 kt from 2030; additional scrap 0.40 t Cu per t with a footprint 1.2 × secondary copper.

C Installations of the copper value chain

TABLE 18 Main copper installations in Poland

No.	Installation	Town	Activity	Key figure (2024)	Source
1	KGHM – Lubin mine	Lubin	Underground copper and silver ore mine	70.9 kt Cu in ore	KGHM MB report 2025 (A)
2	KGHM – Polkowice-Sieroszowice mine	Polkowice	Underground copper and silver ore mine	200.2 kt Cu in ore	KGHM MB report 2025 (A)
3	KGHM – Rudna mine	Polkowice	Underground copper and silver ore mine	180.4 kt Cu in ore	KGHM MB report 2025 (A)
4	KGHM – concentrators (ZWR)	Polkowice	Ore flotation (Lubin, Polkowice, Rudna)	1,776 kt concentrate; 400 kt Cu	KGHM MB report 2025 (A)
5	KGHM – Żelazny Most tailings facility	Rudna	Flotation tailings storage	~29 Mt tailings a year	KGHM (B)
6	KGHM – Głogów I and II smelters	Żukowice	Smelting and refining; scrap processing	466.1 kt cathode	KGHM MB report 2025 (A)
7	KGHM – Legnica smelter	Legnica	Smelting and refining with high scrap share; CRMA strategic project (recycling smelter)	122.6 kt cathode	KGHM MB report 2025; Decision C(2026) 8051 (A)
8	KGHM – Cedynia wire rod plant	Orsk	Wire rod (Contirod) and OFE rod	271.0 kt wire rod; 16.2 kt OFE	KGHM MB report 2025 (A)
9	KGHM Metraco	Legnica	Copper scrap purchasing and trade for KGHM	revenue PLN 5,601 m	KGHM MB report 2024 (A)
10	Centrozłom Wrocław	Wrocław	Ferrous and non-ferrous scrap	revenue PLN 666 m	KGHM MB report 2024 (A)
11	Elemental Strategic Metals	Zawiercie	WEEE, printed circuit boards, non-ferrous scrap	n/a	company (B)
12	WMN Łabędy (KGHM Group)	Gliwice	Copper and copper-alloy strip, sheet and plate	>180 staff	company (B)
13	WM Dziedzice	Czechowice-Dziedzice	Brass rods and tubes from scrap and cathode	20.2 kt; PLN 456 m	Boryszew report 2024 (B)
14	Tele-Fonika Kable	Myślenice	Power, telecom and mining cables; cable-waste recycling (Bukowno)	50.6 kt Cu bought; 2,063 staff	company ESG report 2024 (B)
15	NKT	Warszowice	Low-voltage and installation cables	n/a	trade press (C)
16	Fabryka Kabli Elpar	Parczew	Copper and aluminium power and control cables	623 staff (2023)	trade press (C)
17	LEONI Kabel Polska	Wierzbice	Automotive and charging cables	n/a	trade press (C)

Locations at town level. The list covers major installations identified in company reports, company websites and the trade press (2023–2026); it is not exhaustive for scrap yards, small foundries and cable makers. Source classes: A – annual reports and official decisions; B – company websites and press releases; C – trade press and directories; the operating status of entries marked C was not independently confirmed.

D Glossary

- **Avoided burden** – environmental credit for displacing primary production with recycled material.
- **C1 cost** – cash cost of producing copper in concentrate, including the mineral extraction tax and net of by-product credits (KGHM definition).
- **Cathode / wire rod** – refined copper from electrolytic refining / continuously cast and rolled copper rod for wire drawing.
- **Coverage ratio** – output relative to apparent consumption; not a measure of self-sufficiency.
- **GVA** – gross value added: output minus intermediate consumption; for KGHM estimated as EBITDA plus employee costs plus taxes on production.
- **Gross contribution / net effect** – activity associated with the chain at fixed coefficients / change that would result from a policy or shock after resources are reallocated; the report shows gross contributions only.
- **HHI** – Herfindahl–Hirschman index of concentration (0–10,000).
- **Mineral extraction tax** – Polish tax on the copper and silver contained in concentrate, with a price-dependent rate; charged to KGHM and not deductible for corporate income tax; treated in CU-PL as a tax on products, outside GVA at basic prices.
- **New (process) scrap / old (post-consumer) scrap** – scrap generated in manufacturing / from products at the end of their life.
- **Observation / estimate / model result (O/E/M)** – status of a figure: published data / data combined with allocations or calibrated parameters / result depending on counterfactual assumptions.
- **Persons employed / FTE** – number of people working in the activity / full-time equivalents (used by KGHM).
- **Tailings** – fine waste from ore flotation, stored in tailings facilities.
- **Type I / Type II effects** – direct plus supply-chain effects / plus effects induced by household spending.
- **Processing margin** – value of copper recovered from scrap minus the value of the scrap feed and of imported non-metal inputs used to produce it.

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Izba Gospodarcza Metali Nieżelaznych i Recyklingu

CU-PL is a transparent, reproducible model linking official Polish and EU statistics, company financial reports and the process metallurgy of copper. It estimates the gross economic and fiscal contribution of the copper industry in Poland – collection and trade of scrap, secondary copper, mining, smelting and refining, semis and cables – the emissions and mining burden that copper recycling can potentially avoid, and the industry's importance for the security of supply.

SUGGESTED CITATION

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