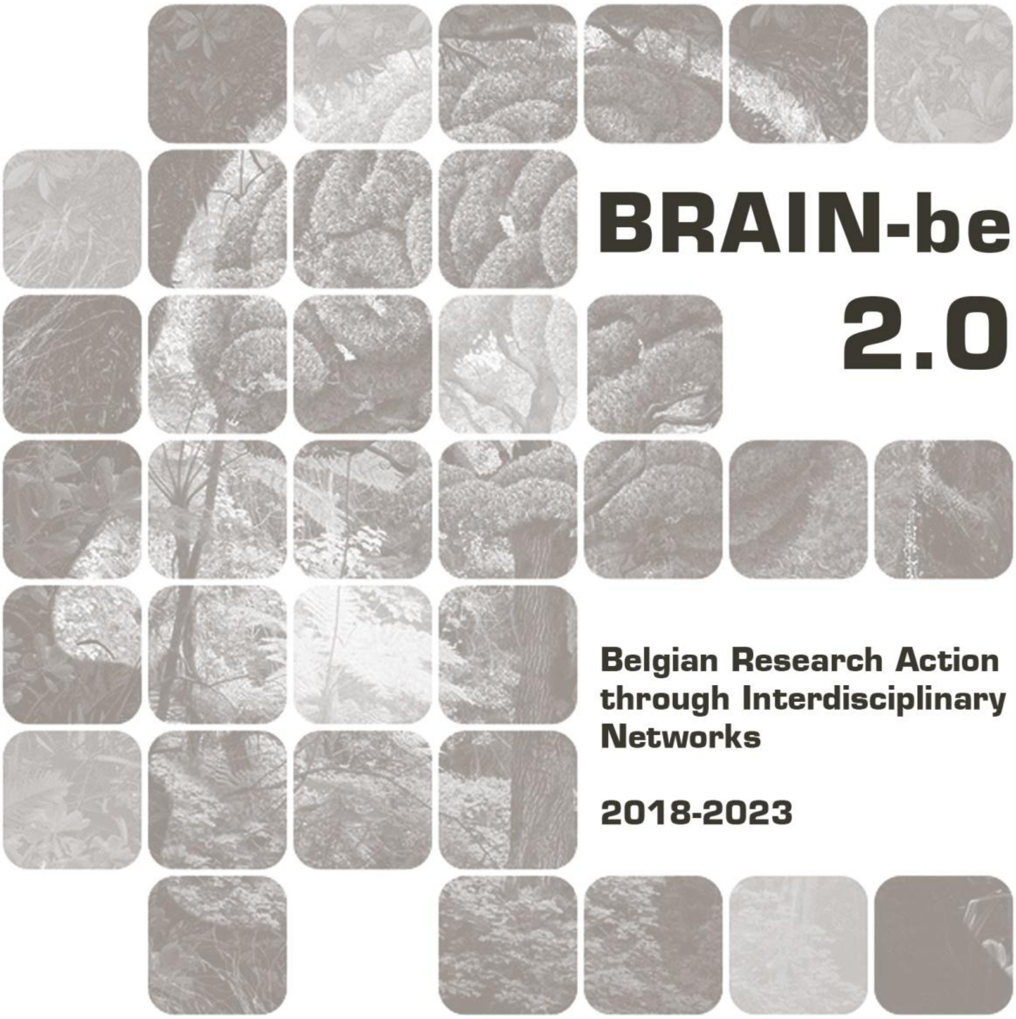

CAMBIUM

CirculAr Material flows in BelgIUM

WP4: Case studies on critical raw material flows

Mapping critical raw material flows in Belgium: focus on Platinum Group Metals (PGM), nickel, and phosphate rock

Dirk Nelen (VITO)

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Belgian Research Action through Interdisciplinary Networks

2018-2023

NETWORK PROJECT

CAMBIUM

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Contract - B2/223/P3/CAMBIUM

WP4: Case studies on critical raw material flows

Mapping critical raw material flows in Belgium: focus on Platinum Group Metals (PGM), nickel, and phosphate rock

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Published in 2023 by the Belgian Science Policy Office
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Nelen D., Margot C., Deckers J. (2025). ***Case study on critical raw material flows for Belgium. Mapping critical raw material flows in Belgium: focus on Platinum Group Metals (PGM), nickel, and phosphate rock.*** Final Report. Brussels: Belgian Science Policy Office 2023 (BRAIN-be 2.0 - (Belgian Research Action through Interdisciplinary Networks))

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ABSTRACT

CONTEXT

The European Commission (EC) criticality methodology assesses the criticality of raw materials for based on two main criteria: their **economic importance** to the EU and the risk associated with their supply. The **supply risk** is based on the concentration of supply of a particular raw material from countries with different levels of governance performance and includes aspects that hinder or facilitate trade with the supplying countries. Both governance performance and trading conditions vary over time, driven by geopolitical changes that affect a supplying country like internal shifts in political power and changing relationships with other countries or regions. These dynamics are accounted for by periodic revisions of raw materials' criticality, that have taken place every 3 years since 2010. The EC criticality methodology measures supply risks at the so-called bottleneck stage of the material, distinguishing raw material extraction and processing.

For raw materials that have been identified as critical, the EU supply chains not necessarily coincide with the globally most relevant suppliers. Moreover, even for individual EU Member States supply risks might deviate from the EU risk, depending on the specific countries from which the critical raw material is sourced. On the other hand, real world supply chains often consist of more than two stages, especially regarding the consecutive processing steps, which might take place in different facilities and countries, affecting the final supply risk.

OBJECTIVES

To provide a better understanding of the production chains based on critical raw materials (CRM) for Belgium, three of the earlier identified CRMs for Belgium (CRM_{BE}) are selected that represent high import values in absolute terms. Supply risks and import dependencies are a potential threat to the competitiveness of domestic industrial sectors that process these CRM_{BE} into products or feedstocks for manufacturing. When looking for recycled or renewable alternatives that can substitute imported primary CRM_{BE}, priority should be given to those imported raw materials that have a high economic value, and, at the same time, are demanded by industries that produce high net added values, achieve strong turnover, and create significant employment opportunities.

For the selected CRM_{BE}, a supply chain analysis was be conducted, containing the following elements: raw material (or its intermediates) sources and origins, mining methods and technologies, processing technologies and products or applications, environmental impacts, supply chain actors and companies, uses in Belgian processing and/or manufacturing industries, and downstream use chain actors and companies, market volatility, trade barriers and tariffs.

Emphasis is not solely on the information collected for this specific case, but primarily on the methodological foundation of the analysis. This report documents the methodology: the approach, data sources used, assumptions, limitations, and choices made in the scope. This should enable reproducibility with other CRMs.

KEYWORDS

Critical raw materials (CRM); Supply chain analysis; Platinum Group Metals (PGM); Nickel

1. INTRODUCTION

Building further the overview of state-of-the-art methodologies with a focus on frameworks, data sources, metrics and indicators available for Belgium, we aim to provide a better understanding of supply chains of CRM for Belgium (CRM_{BE}) and their implications for the supply risk.

The report starts with the selection of CRM_{BE} that combine a high supply risk–as was calculated for Belgium (SR_{BE})–with an elevated import value. This means that the economic consequences of possible disruptions in their supply also will be significant. On the other hand, if, in line with the principle of circular economy, we can substitute in the future these particular CRM_{BE}s with domestically sourced alternatives, preferably under the form of recycled or renewable resources, the avoided import value will also be considerable.

In the next chapters, a supply chain analysis is conducted for the selected CRM_{BE}, in four steps.

In the first step we have a closer look to the sources and origins of the imported raw materials. An inventory is presented of the countries that export the selected CRMs to Belgium. The main suppliers of CRMs for Belgium are ranked according to the total import value. The most important mining companies that produce the raw materials in the countries of origin are identified. We develop a case study with respect to the origin of CRM for those exporting countries that rely entirely or partially on imports from third countries.

In the second step, we assess whether the mineral’s origin, the mining method, and the applied extraction technologies can be traced, and we determine whether these factors are relevant for subsequent refining, processing, or manufacturing stages—specifically, whether they influence or impact the value-chain applications in Belgium.

In the next step, the production chains that rely on the imported CRMs are identified, together with the corresponding end products and applications. This assessment is done in monetary terms, which means that the turnover and net added value generated by each of the companies that are located in Belgium and that are (probably) using these CRMs as a feedstock in their manufacturing process, was quantified in euros.

Finally, we included for the selected CRMs some information on the short-term market volatility, trade barriers, and (eminent) tariffs. Yet, it is likely that these elements will add to the generic supply risk.

2. CRITICAL RAW MATERIAL SELECTION

The selection exercise starts from the supply risk (SR). The SR quantifies the risk of supply disruptions for a particular material based on import reliance, supply concentration, governance performance, trade restriction and agreements, existence, and criticality of substitutes. In the WP3 report, a SR was calculated for Belgium (SR_{BE}) by estimating the import reliance for Belgium (IR_{BE}) per raw material and the addition of a third Herfindahl-Hirschman Index (HHI_{BE}) used as a proxy for country concentration based on the World Governance Index and reflecting Belgium’s actual supply mix. In the original formula, two indexes are calculated, one using global supplies mix data and one using the mix of actual supplies to the EU. For all raw materials deemed critical for Belgium, IR_{BE} was found to be 1 reflecting the lack of domestic production.

A distinction was made between supply risks referring to the extraction/mining stage (stage I) and the processing/refining stage (stage II).

The CN trade codes that were considered per element are presented in Table 1.

Table 1: CN trade codes per element

Element	CN-code	Stage
Iridium, Ruthenium	CN 71104100	Stage II
Iridium, Ruthenium	CN 71104900	Stage II
Lithium	CN 28252000	Stage II
Lithium	CN 28369100	Stage II
Nickel	CN 28254000	Stage II
Nickel	CN 28273500	Stage II
Nickel	CN 28332400	Stage II
Nickel	CN 72026000	Stage II
Nickel	CN 75021000	Stage II
Nickel	CN 75022000	Stage II
Nickel	CN 75040000	Stage II
Niobium	CN 26159000	Stage I
Niobium	CN 72029300	Stage I
Palladium	CN 71102100	Stage II
Palladium	CN 71102900	Stage II
Phosphate Rock	CN 25101000	Stage I
Phosphate Rock	CN 25102000	Stage I
Rhodium	CN 71103100	Stage II
Rhodium	CN 71103900	Stage II
Ruthenium	CN 71104100	Stage II
Ruthenium	CN 71104900	Stage II
Titanium	CN 28230000	Stage II
Titanium	CN 72029100	Stage II
Titanium	CN 26209960	Stage II
Titanium metal[1]	CN 81082000	Stage II
Titianium	CN 8108	Stage II

For each of the raw materials critical for Belgium, CIF import values corresponding to the CN codes listed in Table 1, were retrieved for 2023, from the Eurostat database '**EU trade since 1988 by HS2-4-6 and CN8**'. The CIF (Cost, Insurance, and Freight) import value is the total value of an imported good, including the cost of the goods, insurance for the shipment, and freight charges to the destination port. It represents the landed value of the merchandise at the first port of arrival in the importing country and is used to determine customs value before import duties are applied. To select those critical raw materials (CRM) that combine high import values with an elevated supply risk, Table 2 presents the top 10 results of the CIF_{2023} import value in euros multiplied by the SR_{BE} for the same CRM.

[1] The import value referring to CN 8108200, titanium metal, was subtracted from the total value represented by CN 8108, as to avoid double counting.

Table 2: Selected CRMs for Belgium, prioritized according to CIF import value and supply risk for Belgium

Critical raw material	Stage	CIF import value 2023 (€)	SR_{BE}	CIF_{2023} *SR_{BE}
Platinum	II	285.141.530	1,6	456.226.449
Phosphate rock	I	213.930.370	2,1	449.253.776
Nickel	II	780.134.084	0,5	390.067.042
Rhodium	II	154.381.369	2,0	308.762.738
Palladium	II	288.983.856	0,8	231.187.085
Niobium	I	63.554.965	2,5	158.887.413
Titanium	II	121.564.655	1,3	158.034.052
Lithium	II	37.752.323	2,2	83.055.111
Iridium	II	31.404.626	2,2	69.090.178
Ruthenium	II	31.404.626	2,1	65.949.715
Total		**2.008.252.404**		

Orange highlight refers to platinum group metals (PGM)

The top 3 CRM_{BE} that combine a high CIF_{2023} import value in euros with an elevated SR_{BE}, consists of **platinum**, **phosphate rock** and **nickel**. The top 4 and 5 CRMs also belong to the so-called **platinum group metals** (**PGM**), like platinum itself. In many datasets, PGM are considered as a single material category. Moreover, it is observed that PGM are often a co-product of nickel mining. For these reasons, PGM, phosphate rock, and nickel were selected as priority CRM_{BE} to be targeted by circular CRM strategies and policies for Belgium.

Niobium, titanium, and lithium were not analysed for the present report, but there economic relevance and supply risk for Belgium make it worth to expand the scope of the CRM value chain analysis in future research.

A supply chain analysis was conducted for the selected CRM_{BE}.

3. SUPPLY CHAIN ANALYSIS

RAW MATERIAL SOURCES AND ORIGINS

PLATINUM GROUP METALS (PGMS) AND NICKEL

Platinum Group Metals (PGMs)—including platinum, palladium, iridium, ruthenium, and rhodium—are exceptional catalysts and essential for hydrogen technologies. They play a critical role in fuel cells and electrolysers, enabling the conversion between hydrogen and electricity. PGMs are obtained both through direct mining and as by-products of metals like nickel. The EU remains heavily dependent on imports, with current demand for platinum and palladium largely driven by catalytic applications. Looking ahead, fuel cells and electrolysers are expected to become major growth drivers, supported by the shift toward hydrogen energy and electric mobility.[2]

Nickel is primarily used in the production of various stainless and alloy steels. It also plays a key role in manufacturing superalloys and in metal plating to protect goods from corrosion. Moreover, the battery industry is becoming an increasingly significant driver of nickel demand, as it is a component in certain cathode materials for lithium-ion batteries. Economically important nickel deposits are mainly found in magmatic sulphide formations and lateritic environments, with sulphide ores currently being the main source of mined nickel.[3]

Table 3: Imports of raw materials with nickel and PGM from neighbouring countries

Product	Imports from neighbouring countries (in % of total imports)*	Neighbouring country CIF import value (in €)
Nickel, not alloyed, unwrought	68	471.213.466
Platinum, unwrought or in powder form	95	303.871.658
Palladium, unwrought or in powder form	88	235.277.289
Rhodium, unwrought or in powder form	92	131.486.042
Sulphates of nickel	72	79.695.786
Iridium, osmium and ruthenium, unwrought or in powder form	98	56.974.228
Ferro-nickel	32	42.950.454
Powders and flakes, of nickel	26	8.569.354
Unwrought nickel alloys	22	6.036.113
Platinum in semi-manufactured forms	96	2.978.565
Bars, rods, wire and sections; plates; sheets and strips of platinum	77	2.170.802
Nickel chloride	95	2.166.847
Nickel oxides and hydroxides	11	627.179
Palladium in semi-manufactured forms	79	509.062
Iridium, osmium and ruthenium, in semi-manufactured forms	69	17.293

[2] https://webgate.ec.europa.eu/circabc-ewpp/d/d/workspace/SpacesStore/5bdd0a11-fca7-4952-96d9-e53d2bf41a7c/download

[3] https://scrreen.eu/wp-content/uploads/2023/03/SCRREEN2_factsheets_NICKEL.pdf

Rhodium in semi-manufactured forms	100	11.705
		1.344.555.843

** Import shares > 2/3 are highlighted in green*

From Table 3, it is observed that **PGM** (dark grey) are imported mainly from neighbouring countries (Netherlands, France, United Kingdom, Germany, and Luxembourg) with import shares ranging from 69 to 100%.

To uncover indirect dependencies for primary PGM supply, it can be assessed which PGM producing countries are at the origin of the supply to the neighbouring countries that export to Belgium. Such exercise is done for phosphate rock in a next section.

A similar situation as for PGM can be seen for the different types of **nickel products** (light grey), except for nickel oxides and hydroxides, ferro-nickel, unwrought nickel alloys, and powders and flakes of nickel, for which the main supplying countries are respectively Philippines (47%), Brazil (65%), United States (75%), and Philippines (29%). **Neighbouring countries supplied nickel products for a total import value of more than 610 million euro in 2023**.

Nickel ores are extracted in roughly 25 countries across all continents and, in 2024, smelted or refined in about 26 countries. This means that the global supply originates from a geographically relatively diverse set of countries. Primary nickel is produced and utilized as ferronickel, nickel oxide, nickel pig iron (NPI), nickel sulphate, various chemical compounds, and in forms of nearly pure nickel metal[4].

- The **Philippines** has more than 30 nickel mines holding 4.8 MT of this metal. This country mines in the Taganito, Rio Tuba, Cagdianao, Carrascal and Adlay Cagdianao Tandawa locations. The Philippines had 12 new metal mine plans in the works as of 2022, most of which were for nickel. *Sumitomo Metal Mining* is one of the leading producers of nickel in the Philippines[5]. In 2023, Belgium imported nickel oxides and hydroxides as well as powders and flakes of nickel from the Philippines for a total value of more than 12 million euro.
- **Brazil** ranked eighth among the global nickel producing countries and supplied ferro-nickel to Belgium for an import value of almost 90 million euro in 2023. Leading producers of nickel in Brazil are *Anglo American* and *Vale*.[6]
- The **United States** were the main supplier of unwrought nickel alloys, representing an import value of almost 21 million euro in 2023. *Lundin Mining* is one of the leading producers of nickel in the US.[7]
- Finally, **Canada** is a relevant supplying country of unwrought, not alloyed nickel, and of nickel powders and flakes, with a total import value of about 135 million euro in 2023. Canada

[4] https://insg.org/wp-content/uploads/2024/09/publist_The-World-Nickel-Factbook-2024.pdf
[5] https://www.mining-technology.com/data-insights/nickel-in-the-philippines/?utm_source=lgp5&utm_medium=19-635519&utm_campaign=&cf-view
[6] https://www.mining-technology.com/data-insights/nickel-in-brazil/?utm_source=lgp5&utm_medium=19-635458&utm_campaign=
[7] https://www.mining-technology.com/data-insights/nickel-in-the-us/?utm_source=&utm_medium=19-670379&utm_campaign=

accounts for 4% of global nickel production. Leading producers of nickel in Canada are *Vale* and *Glencore*[8].

- About a quarter of the Belgian nickel oxide import value is provided by **Chinese** suppliers, with the state-owned enterprise *Jinchuan Group* being the leading nickel producer in Asia.

PHOSPHATE ROCK

Phosphate rock is mainly used to produce mineral fertilizer (86%), for the manufacturing of animal feed supplements and food additives (10%), and to produce detergents, chemicals, and food additives (4%)[9]. Most of phosphate rock supply is converted into phosphoric acid and then used to manufacture phosphate-based fertilizers[10] like diammonium phosphate (DAP) and monoammonium phosphate (MAP)[11]. The rest is converted into superphosphates, nitrophosphates, and white phosphorous[12].

Although the production of chemicals for industrial applications constitutes a smaller proportion of demand, it represents a strategically important and expanding use of products derived from phosphate rock. An example is given by the use of phosphate in lithium-iron-phosphate (LFP) batteries for energy storage and electric vehicle (EV) applications. The LFP battery chemistry substitutes nickel and cobalt used in nickel-manganese-cobalt (NMC) batteries by iron and phosphate, reducing battery production costs and environmental footprints. This way, phosphate has a strategic role in the energy transition.[10]

Phosphate rock is primarily sourced from sedimentary marine phosphorites, which undergo specialized refining based on their mineralogical, textural and chemical characteristics (e.g. ore grade, impurities), and local water availability. Although phosphorite resources occur globally, known reserves are extremely concentrated, with Morocco alone holding over 70%. The largest deposits are situated in North Africa, China, the Middle East, and the United States.

Table 4 lists the main primary phosphate rock producing countries globally.

Table 4: Primary phosphate rock mine production[13]

Country	Mine production in 2023 (*)	Country	Mine production in 2023 (*)
China	90.000	Kazakhstan	2.000
Morocco	35.000	Vietnam	2.000
United States	20.000	Algeria	1.800

[8] https://www.mining-technology.com/data-insights/nickel-in-canada/?utm_source=lgp5&utm_medium=19-635466&utm_campaign=&cf-view

[9] European Commission: Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. (2023). Study on the critical raw materials for the EU 2023: final report. Publications Office of the European Union. https://data.europa.eu/doi/10.2873/725585.

[10] https://www.afdb.org/sites/default/files/documents/publications/phosphate_factsheet_final_nov_21.pdf

[11] https://www.spglobal.com/energy/en/products-solutions/fertilizers/phosphates

[12] https://www.phosphorusplatform.eu/images/download/Persona%20Fertecon%20SP%20EU%20phosphate%20conundrum%2015_4_2025.pdf

[13] https://pubs.usgs.gov/periodicals/mcs2024/mcs2024-phosphate.pdf

Russia	14.000	South Africa	1.600
Jordan	12.000	India	1.500
Saudi Arabia	8.500	Togo	1.500
Brazil	5.300	Finland	950
Egypt	4.800	Uzbekistan	900
Peru	4.200	Syria	800
Tunisia	3.600	Turkey	800
Australia	2.500	Other countries	800
Israel	2.500	Mexico	500
Senegal	2.500		
Total			**220.050**

(*) Estimates, in thousand metric tons of marketable phosphate rock

Ground and unground phosphate rock are heavily traded between producing and processing countries. Most of the import value of phosphate rock supplied to Belgium corresponds to material supplies from countries that are not mining primary rock.

Table 5: 2023 CIF import value of phosphate rock to Belgium, in euro

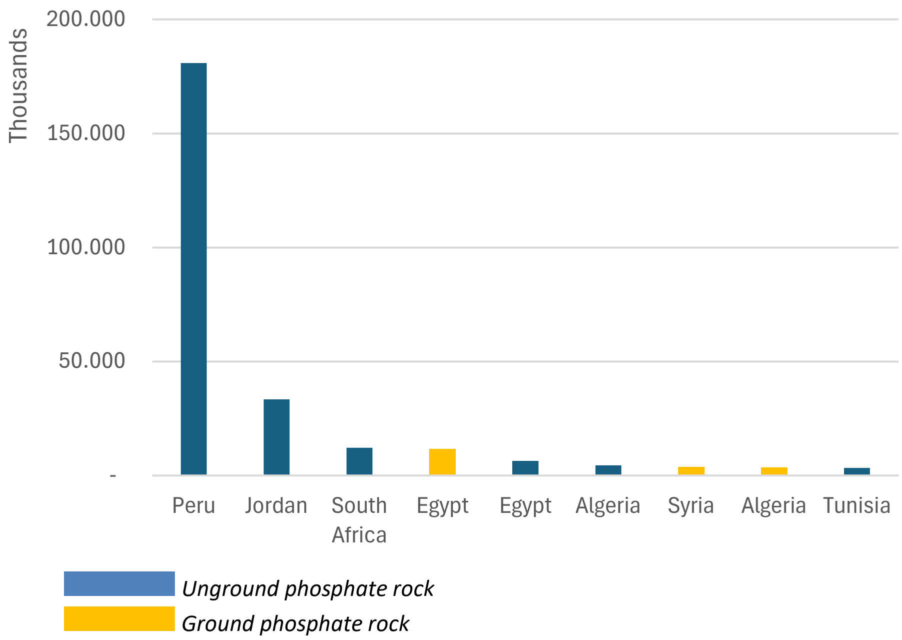
PRODUCT/PARTNER	Brazil	France	Netherlands	Russia	Senegal	South Africa
Phosphate rock, unground	-	9.772.665	104.204.382	-	1.182	6.443.653
Phosphate rock, ground	5.025.902	479.937	194.368	53.507.503	19.284.007	-

From Table 5, it is observed that phosphate rock, unground, is imported mainly from neighbouring countries (Netherlands, France) with an import share from the Netherlands of 85%. In 2023, Russia was the main provider of phosphate rock**,** ground, accounting for 65% of the total import value. The value (CIF) of the total yearly imports of phosphate rock to Belgium was over 200 million euro.

For each of the countries that export phosphate rock to Belgium, the phosphate rock import value was obtained, using the UN Comtrade Database (https://comtradeplus.un.org/).

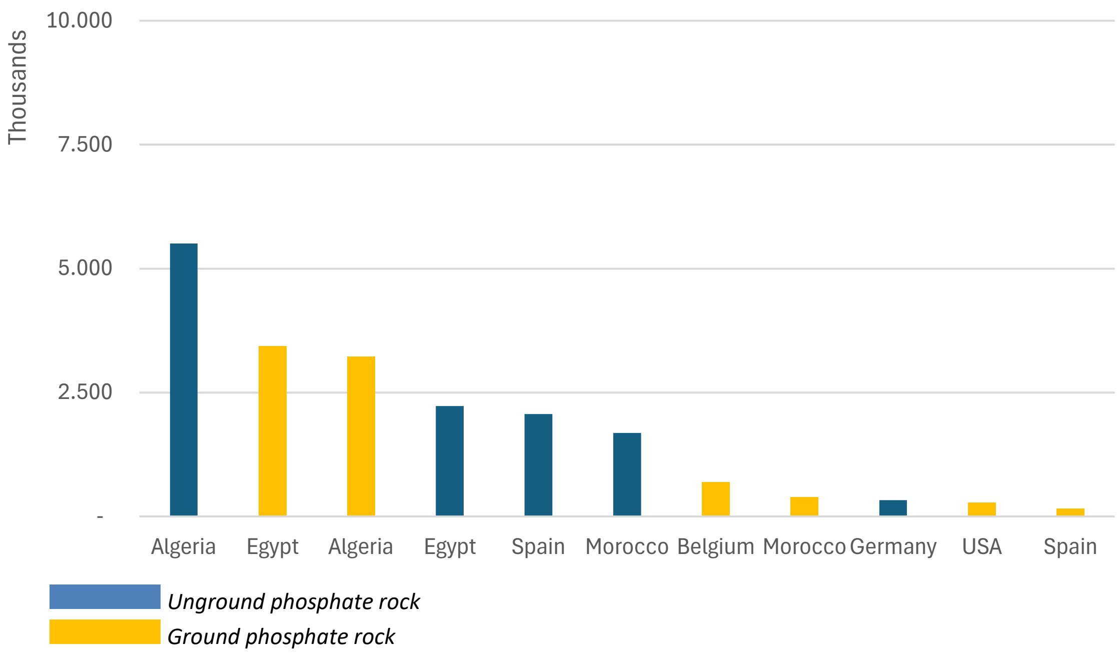
- **Brazil** produces primary phosphate rock itself (see Table 4) but also imported unground rock from Peru representing a value of more than 180 million dollars in 2023 (see Figure 1). In the same year, Brazil exported only for about 5 million euro of ground phosphate rock to Belgium.

Figure 1: Phosphate rock CIF import value Brazil, in 2023, in US$



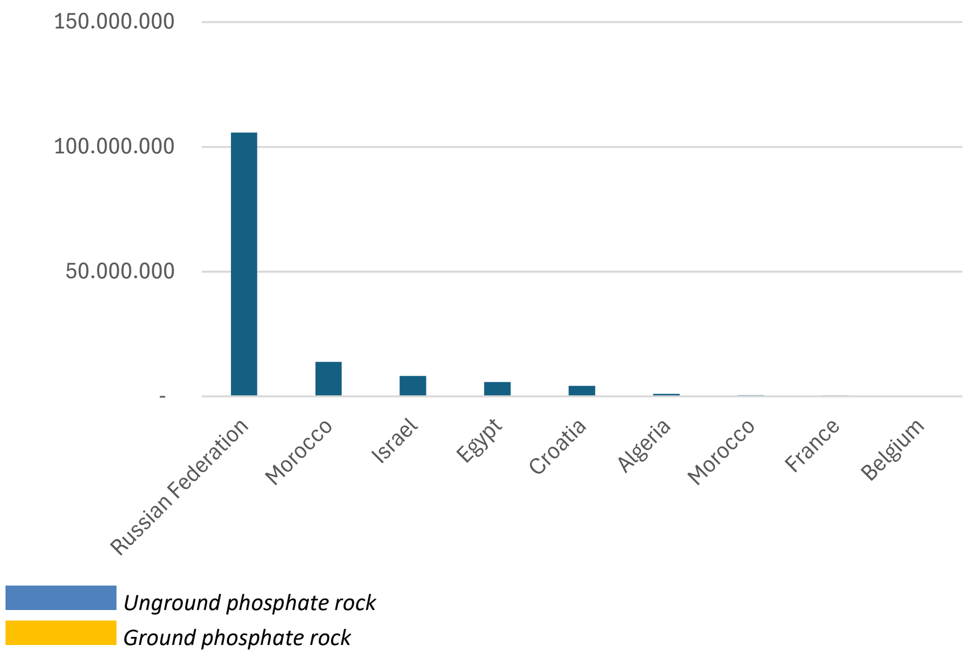
- There is no phosphate rock mining in **France**, that exported both unground and ground phosphate to Belgium in 2026, for total values of almost 10 million and 0,5 million euro respectively. Ground and unground phosphate rock is supplied to France from countries with phosphate rock mining activity (see Table 4), such as Algeria, Egypt, Morocco and the US. However, phosphate rock is also imported in France from EU Member States where no phosphate mining is taking place, like Spain, Belgium, and Germany, albeit representing modest values.

Figure 2: Phosphate rock CIF import value France, in 2023, in US$



- **Netherlands** is not a producer of any phosphate rock but represents by far the most relevant source of phosphate rock for Belgium. Almost all the phosphate rock that enters the Netherlands has been mined in and supplied by Russia. In 2025, the European Commission proposed introducing tariffs on phosphate imports from Russia[14] [15], beginning at 13% until June 2026, increasing twofold in 2027, and ultimately reaching 100% by June 2028. This measure was expected to cause major disruptions in the EU's phosphate supply chain, given that Russia provided 24% of the EU's total phosphate imports and delivered USD 1.07 billion in phosphorus products in 2024[16]. For Belgium, it means that together with the direct ground phosphate rock imports from Russia, approximately 80% of the total phosphate rock supply, expressed in euro, originated in Russia.

Figure 3: Phosphate rock CIF import value Netherlands, in 2023, in US$



- **Senegal** and **South-Africa** are phosphate rock producing countries, from which Belgium imported about 25,7 million euros of mostly ground rock.

MINING METHODS AND TECHNOLOGIES

NICKEL

Nickel is found in two main ore types:

a) laterite (oxide) ores, which occur mainly in tropical and subtropical regions, and
b) sulfide ores, typically located in temperate to sub-Arctic zones.

Laterite ores are mostly present as surface deposits. Two laterite ore types can be distinguished:

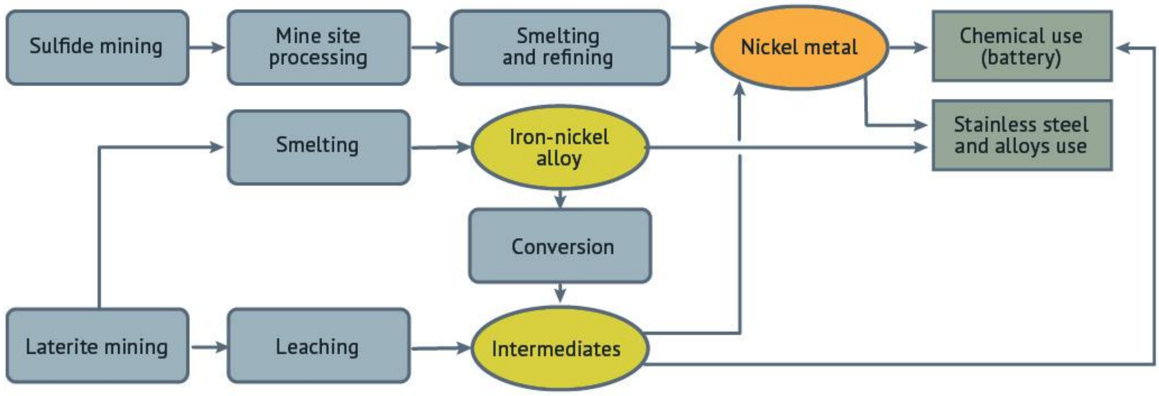
[14] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202501227
[15] https://trade.ec.europa.eu/access-to-markets/en/news/eu-increases-tariff-duties-russian-and-belarusian-imports-agricultural-products-and-fertilizers
[16] https://www.coherentmarketinsights.com/industry-reports/phosphate-rock-market

- Limonites: Lower nickel, high iron, often contain cobalt. Processed by hydrometallurgy (acid leaching) to produce nickel-cobalt intermediates for refining or battery use.
- Saprolites: Higher nickel, low iron. Processed by pyrometallurgy (smelting) into iron-nickel alloy for stainless steel; sometimes converted to nickel matte for refining.

Sulphide ores can either be found near surface or deep underground, and often hold valuable by-products, such as copper and PGM. Typically upgraded at the mine into a shippable nickel concentrate.

Typical routes for nickel from laterite and sulphide ores are visualized in Figure 4.

Figure 4 Typical processing routes for nickel suplphide and laterite ores



Currently, more than half of global nickel production comes from Indonesia. While ore is often processed near the mine site, there is considerable regional and international trade in nickel laterite ores and, to a lesser extent, in nickel sulphide concentrates.[17]

It is noted that various types of nickel ores are extracted from a range of mining operations–both surface and deep underground– located across multiple geographic regions and climate zones, and that the required concentration and refining steps rely on distinct technologies that ultimately yield intermediate products tailored to specific end uses. This implies that **supply risks**, intermediate product prices, and the associated environmental value-chain risks and impacts will **vary widely across nickel applications**.

The latter means that, to dimension and judge supply risks– as well for making environmental considerations–in-depth knowledge about the source, origin, mining and processing technologies, and of the targeted end use is required.

Platinum Group Metals (PGMs)

PGMs are commonly associated with base metal sulphide minerals. Most of the PGM production results as a **co-product of nickel mining of sulphide ores**. PGM-rich ore mines operate sometimes deep (between 500 to 2.000 meter), narrow tabular orebodies (0,9–2,1 metres), requiring labour-

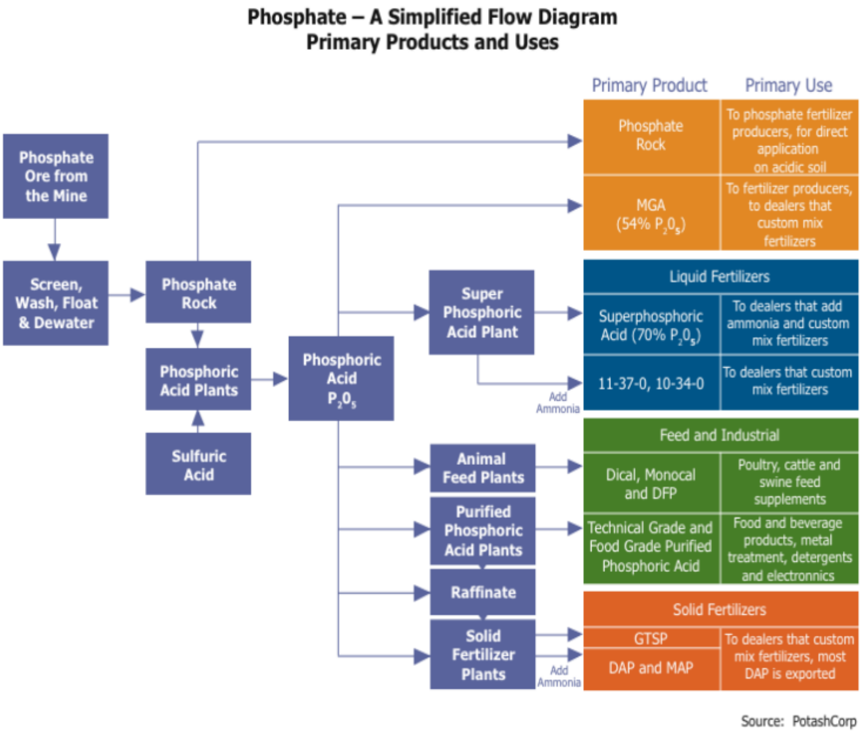
[17] https://nickelinstitute.org/en/blog/2024/may/nickel-industry-part-1-processing-nickel-laterites-and-sulfides/

intensive drilling and blasting. Ore is broken with explosives and hauled mechanically to the surface, with high electricity use for haulage, pneumatic drills, and refrigeration due to the rock's thermal gradient. At the surface, ore is crushed, milled, and processed by froth flotation to produce a concentrate, then dried and smelted in electric furnaces above 1.500 °C. The resulting matte is converted to remove iron and sulphur, then PGMs are separated from base metals (often nickel, copper, cobalt) and refined to high purity using solvent extraction, distillation, and ion exchange.[18] Both the mining and refining processes are resource and energy-intensive, and therefor come with considerable environmental impacts.

PHOSPHATE ROCK

Phosphate rock is mined and the ore undergoes beneficiation through a wet process to remove impurities. The resulting material is then dried, typically in a rotary dryer designed for heavy-duty, high-capacity operation. After drying, the ore is converted into so-called ammoniated phosphates by first reacting it with sulfuric acid to produce phosphoric acid[19]. The phosphoric acid feedstock is thereto combined with ammonia and granulated to produce dry solid fertilizers such as diammonium phosphate (DAP) and monoammonium phosphate (MAP). The same acid feedstock can also be concentrated to produce merchant-grade phosphoric acid (MGA) or further concentrated to form superphosphoric acid (SPA). In addition, it can be combined with limestone or phosphate rock to manufacture animal feed products, or purified through solvent extraction to yield industrial-grade phosphoric acid.[20]

Figure 5: Typical processing and refining routes for phosphate ores



[18] https://ipa-news.de/assets/pdfs/primary-production-fact-sheet-lr.pdf
[19] https://feeco.com/processing-phosphates-for-use-in-the-fertilizer-industry/
[20] https://fox-river.ca/wp-content/uploads/2021/09/Fox-River-Long-Presentation-2021-09.pdf

PROCESSING IN BELGIUM

The statistical **classification of products by activity**, abbreviated as CPA, classifies goods that have common characteristics, at the level of the European Union (EU). These CPA product categories can then be linked to activities as defined by the statistical **classification of economic activities in the European Community** (NACE)[21]. NACE (Nomenclature statistique des Activités économiques dans la Communauté Européenne) is the European Union's standard classification system for economic activities. It is used for statistical, regulatory, and administrative purposes.

For the next sections, it was examined which products, with their corresponding CPA code, are made as a result from:

- the further processing of nickel and PGM bearing raw materials;
- the production and processing of stainless steel;
- the processing of phosphate rock.

For each of the identified products, the corresponding NACE code was used to find the companies in Belgium that have this code as their primary NACE code, i.e., as the code that represents the organization's main activity, that generates the most turnover.

PROCESSING OF PLATINUM GROUP METALS (PGMS) AND NICKEL

The largest consumer of **nickel** in Belgium is **stainless steel** production. Austenitic stainless steels, characterized by their durability and corrosion resistance, are produced for use in construction, kitchen equipment, medical instruments, and industrial machinery. Although the use of nickel for stainless steel production in the EU has declined strongly between 2010 and 2020, the sector still absorbs about half of the nickel. Other important first uses in the EU are the production of **nickel and copper-based alloys** (23%) and of **alloy steel and casting** (18%)[22]. Nickel-based alloys are used for manufacturing high-temperature and corrosion-resistant components like turbine blades, exhaust systems, valves, and chemical processing equipment. Other applications of nickel include nickel plating for metal finishing, improving corrosion resistance and aesthetics, important for machinery parts, automotive components, and electronics. Although Belgium hosts significant activity in nickel-containing battery cathode active material (CAM) production, the corresponding industrial undertakings mostly rely on the recycling of nickel from nickel-rich waste flows.

Refined platinum group metals (**PGM**s) are further processed into products through steps like creating highly pure PGM salts from solutions, which are then converted into high-purity metal powders or forms through thermal reduction. These pure metals are then used to manufacture products like **catalytic converters**, **jewellery**, and **industrial components**, sometimes via powder metallurgy, and in some cases, **alloys** are formed to create specialized products.

[21] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Statistical_classification_of_products_by_activity_(CPA)#:~:text=Enter%20search%20term-,Statistical%20classification%20of%20products%20by%20activity%20(CPA),the%20NACE%20at%20all%20levels.

[22] https://scrreen.eu/wp-content/uploads/2023/03/SCRREEN2_factsheets_NICKEL.pdf

Table 6 provides a list of nickel and PGM containing products that result from the processing of the nickel and PGM-bearing raw materials, with the corresponding NACE codes.

It is noted that the CPA and corresponding NACE codes that belong to groups with number 9 as the three-digit numerical (light grey in Table 6) in general refer to other products in the same division that could not be elsewhere classified. These were not further considered for the analysis, since, in general, they are composed of too heterogeneous products or activities.

Table 6: Classification of Products by Activity (CPA) of nickel and PGM containing products, excluding stainless steel production, and the corresponding NACE codes

CPA Division	CPA Code	Product notes	NACE Code	NACE Description
CPA 24 – Basic Metals	24.41: Precious metals	Includes platinum and palladium in unwrought or semi-manufactured forms, specifically: • Platinum, unwrought or in semi-manufactured forms, or in powder form • Base metals clad with silver and base metals, silver or gold clad with platinum, not further worked than semi-manufactured • Platinum, unwrought or in semi-manufactured forms, or in powder form • Base metals clad with silver and base metals, silver or gold clad with platinum, not further worked than semi-manufactured	24.41	Production of precious metals
	24.45: Other non-ferrous metal	Nickel for stainless steel and alloy production, including: • Nickel, unwrought • Nickel mattes, nickel oxide sinters and other intermediate products of nickel metallurgy • Nickel powders and flakes • Nickel bars, rods, profiles and wire • Nickel plates, sheets, strip and foil • Nickel tubes, pipes and tube or pipe fittings	24.45	Other non-ferrous metal production

CPA Division	**CPA Code**	**Product notes**	**NACE Code**	**NACE Description**
CPA 20 – Chemicals and Chemical Products	20.13: Other inorganic basic chemicals	PGMs are widely used in industrial catalysts for (petro)chemical processes (e.g., nitric acid, ammonia oxidation, petroleum refining)	20.13	Manufacture of other inorganic basic chemicals
		Chemical intermediates like nickel sulphate, nickel carbonate, nickel ammonium sulphate, for catalysts and plating solutions		
CPA 25 – Fabricated metal products, except machinery and equipment	25.51: Coating services of metals	Nickel electroplating and corrosion-resistant coatings	25.51	Coating of metals
	25.99: Other fabricated metal products	Nickel alloy components	25.99	Manufacture of other fabricated metal products n.e.c.
CPA 26 – Computer, Electronic and Optical Products	26.11: Electronic components	PGMs in connectors, hard disks, thick-film circuits for their stable electrical properties and, and sensors	26.11	Manufacture of electronic components
	26.70: Optical instruments, magnetic and optical media and photographic equipment	PGMs in specialized coatings and components	26.70	Manufacture of optical instruments, magnetic and optical media and photographic equipment
CPA 32 – Other Manufacturing	32.12: Jewellery and related articles	Platinum and palladium remain major materials for high-end jewellery	32.12	Manufacture of jewellery and related articles
	32.50: Medical and dental instruments	PGMs in implants and dental alloys	32.50	Manufacture of medical and dental instruments and supplies
		Medical and dental instruments often contain or are made from stainless steel		
CPA 28 – Manufacture of machinery and equipment n.e.c.	28.25: Non-domestic air conditioning equipment	Automotive catalytic converters, categorized under CPA as '*machinery and apparatus for filtering or purifying gases*' dominate global PGM demand for emission control (platinum, palladium, rhodium);	28.25	Manufacture of non-domestic air conditioning equipment
CPA 27 – Electrical equipment	27.20: Batteries and accumulators	Nickel-cadmium, nickel metal hydride, lithium polymer, nickel-iron and other	27.20	Manufacture of batteries and accumulators

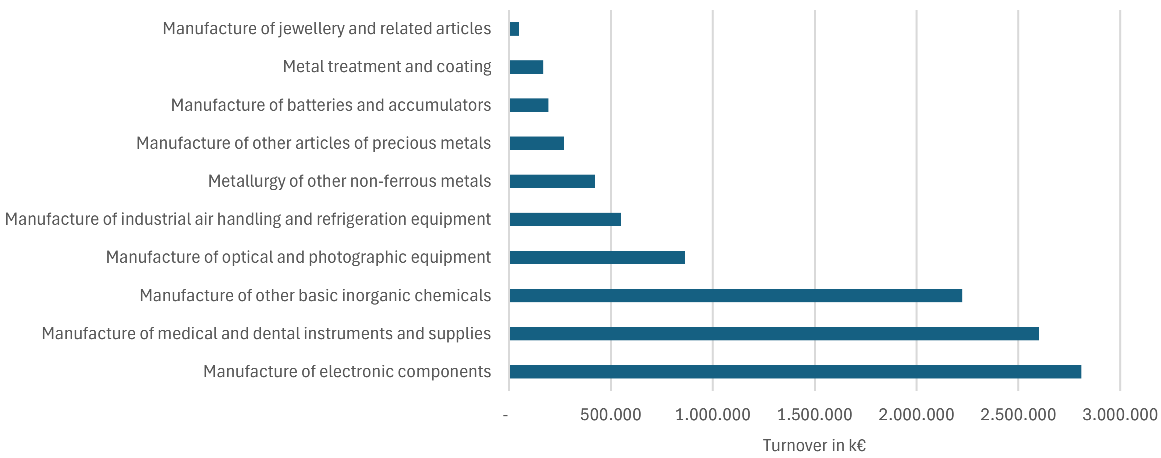
CPA Division	CPA Code	Product notes	NACE Code	NACE Description
		electric accumulators, including batteries for EVs and electronics		
	27.90: Other electrical equipment	PGMs in contacts and electrochemical devices; Fuel cell stacks and hydrogen technologies use platinum and iridium extensively in electrodes and membranes	27.90	Manufacture of other electrical equipment

In the next step, a search[23] in the Bel-first database[24] was performed to identify the companies in Belgium with the NACE codes listed in Table 6 as primary NACE code, i.e., as the code(s) that represent(s) the organization's main activity or activities.

For nickel and PGM, this search identified 7.657 companies with different '*status of activity*'[25], of which 277 had a known turnover, of which 180 showed one of the listed NACE Codes as the first activity code, excluding code 32121, corresponding to diamond cutting. These 180 companies realized an aggregated turnover of about 10,2 billion euro in the last known year and a net added value of 2,3 billion euro.

In Figure 6 and Figure 7, the industrial activities that use raw materials with product classifications (CPA) corresponding to nickel and PGM, excluding stainless steel production, are ranked according to their turnover and net added value, expressed in k€ for the latest year available.

Figure 6: NACE sector turnover (in k€; sectors with turnover > 50.000 k€), for nickel and PGM-intensive sectors, excluding stainless steel production

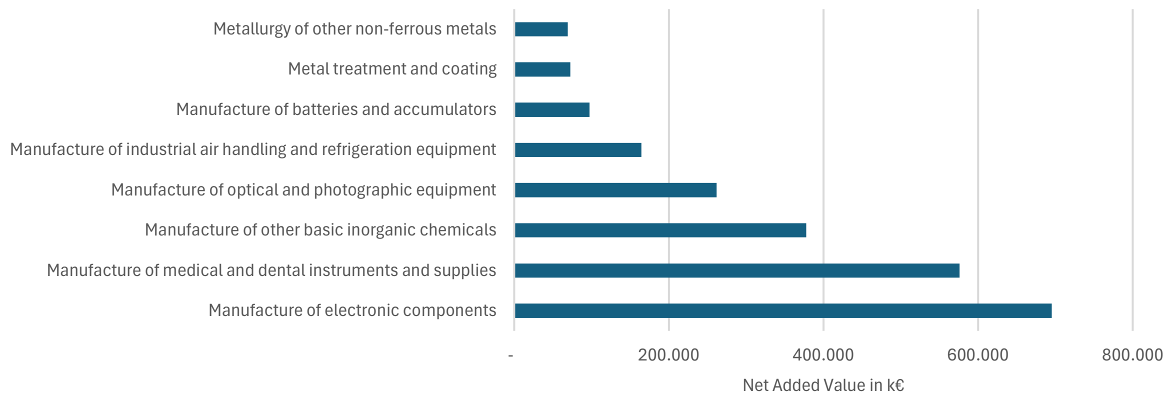


[23] Search strategy: '*NACE-BEL 2008, Alleen primaire codes: 2013 - Vervaardiging van andere anorganische chemische basisproducten, 2441 - Productie van edelmetalen, 2445 - Productie van andere non-ferrometalen, 2561 - Oppervlaktebehandeling van metalen, 2611 - Vervaardiging van elektronische onderdelen, 2670 - Vervaardiging van optische instrumenten en van foto- en filmapparatuur, 2720 - Vervaardiging van batterijen en accumulatoren, 2825 - Vervaardiging van machines en apparaten voor de koeltechniek en de klimaatregeling, voor niet-huishoudelijk gebruik, 3212 - Bewerken van edelstenen en vervaardiging van sieraden, 3250 - Vervaardiging van medische en tandheelkundige instrumenten en benodigdheden*'

[24] Bel-first (from Moody's Analytics/Bureau van Dijk) is a comprehensive database with detailed financial and administrative data on Belgian and Luxembourg companies and associations. It includes up to 10 years of financial history, annual accounts, shareholder structures, mandate holders, and NACE codes, often used for financial research and credit analysis.

[25] Status: Active enterprises, Case file in legal transition period, Unknown.

Figure 7: NACE sector net added value (in k€; sectors with net added value >50.000 K€), for nickel and PGM-intensive sectors, excluding stainless steel production



The top 10 Belgian companies that process nickel and PGM-based materials as their main activity, with respect to turnover, are listed in Table 7.

Table 7: Top 10 companies with respect to turnover (in k€ for the latest year available), in nickel and PGM-intensive sectors, excluding stainless steel production

Company	Work-force	Turnover (k€)	Net Added Value (k€)	NACE sector
Melexis Technologies	257	951.307	245.756	Manufacture of electronic components
Prayon	1080	925.632	163.597	Manufacture of other basic inorganic chemicals
Terumo Europe	775	761.120	149.318	Manufacture of medical and dental instruments and supplies
Stellantis E-Transmissions	513	708.057	-53.481	Manufacture of electronic components
Barco	1264	695.909	178.630	Manufacture of optical and photographic equipment
Tessenderlo Group	690	530.358	93.409	Manufacture of other basic inorganic chemicals
Molymet Belgium	155	381.493	19.387	Manufacture of other basic inorganic chemicals
Siemens Healthcare	300	379.334	62.803	Manufacture of medical and dental instruments and supplies
Eli Lilly European Clinical Trial Services	32	279.426	25.120	Manufacture of medical and dental instruments and supplies
Edelmetaalmarkt Be	n.b.	267.513	7.872	Manufacture of other articles of precious metals

PRODUCTION AND PROCESSING OF STAINLESS STEEL

Since most of the nickel metal and iron-nickel alloys will be used to produce stainless steel and manufactured products from stainless steel, the corresponding product and NACE codes were identified as a separate product class in Table 8.

Table 8: Classification of Products by Activity (CPA) of stainless-steel production and products, and the corresponding NACE codes

CPA Division	CPA Code	Product notes	NACE Code	NACE Description
CPA 24 – Basic metals	24.10	Basic iron, steel and ferro-alloys, including: • Stainless steel in ingots or other primary forms and semi-finished products of stainless steel • flat rolled products of stainless steel, not further worked than hot rolled, of a width => 600 mm • Flat rolled products of stainless steel, not further worked than hot rolled, of a width of < 600 mm • Flat rolled products of stainless steel, not further worked than cold rolled, of a width of => 600 mm • Bars and rods, hot rolled, in irregularly wound coils, of stainless steel • Other bars and rods of stainless steel, not further worked than forged, hot rolled, hot-drawn or extruded, but including those twisted after rolling • Open sections, not further worked than hot rolled, hot-drawn or extruded, of stainless steel	24.10	Manufacture of basic iron and steel and of ferro-alloys
	24.31	Cold drawn bars, including cold drawn bars and solid profiles of stainless steel	24.31	Cold drawing of bars
	24.33	Cold formed or folded products, including open sections cold formed or folded of stainless steel	24.33	Cold forming or folding
	24.34	Cold drawn wire, including cold drawn wire of stainless steel	24.34	Cold drawing of wire
CPA 25 – Fabricated metal products, except	25.61	Cutlery	25.61	Manufacture of cutlery

machinery and equipment				
CPA 32 – Other Manufacturing	32.50: Medical and dental instruments	Medical and dental instruments often contain, or are made from stainless steel	32.50	Manufacture of medical and dental instruments and supplies

Again, a search[26] in the Bel-first database was performed to identify the companies in Belgium with the NACE Codes listed in Table 8 as primary NACE code, i.e., as the code that represents the organization's main activity, that generates the most turnover.

For stainless steel, this search identified 2.709 companies with different '*status of activity*', of which 151 had a known turnover, of which 106 showed one of the listed NACE Codes in Table 8 as the first activity code, excluding *Arcelor Mittal* whose product portfolio (flat carbon steel, long steel, wire products, plates) with certainty does not include stainless steel. In 2011, all assets comprising *ArcelorMittal*'s stainless and specialty steels businesses were transferred to a spin-off company, *Aperam SA*[27].

These remaining 106 companies realized a turnover of about 8,2 billion euro in the last known year and a net added value of 1,5 billion euro. Since it is likely that companies other than *Arcelor* that are categorized under the selected NACE codes might also not develop activities related to stainless steel, these numbers are an overestimation.

In Figure 8 and Figure 9, the industrial activities that use raw materials with product classifications (CPA) corresponding to stainless steel, are ranked according to their turnover an net added value, expressed in k€ for the latest year available.

Figure 8: NACE sector turnover (in k€; sectors with turnover > 50.000 k€), for sectors of stainless-steel production and processing

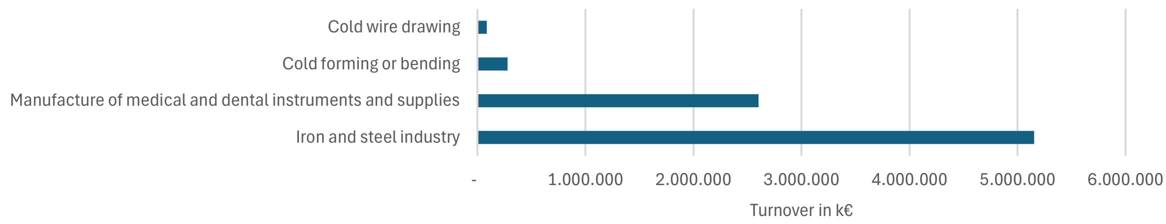
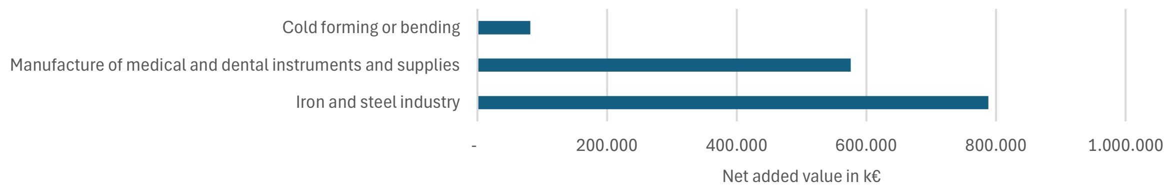


Figure 9: NACE sector Net Added Value (k€; >50.000 k€), for sectors of stainless-steel production and processing



The top 10 Belgian companies that, based on the identified CPA are likely to produce or process stainless steel as their main activity, with respect to turnover, are listed in Table 9. In practice, it seems

[26] Search strategy: '*NACE-BEL 2008, Alleen primaire codes: 2410 - Vervaardiging van ijzer en staal en van ferrolegeringen, 2431 - Koudtrekken van staven, 2433 - Koudvervormen of koudfelsen, 2434 - Koudtrekken van draad, 2571 - Vervaardiging van scharen, messen, bestekken, enz., 3250 - Vervaardiging van medische en tandheelkundige instrumenten en benodigdheden*'

[27] https://www.aperam.com/sites/default/files/documents/Annual%20Report%202019.pdf

that the stainless-steel sector in Belgium is concentrated in two metallurgical companies only, accounting for 46% of the total here assumed stainless steel sector turnover. Manufacturing of medical and dental instruments represents another 32% of the total turnover. The company *Voestalpine Sadef* that is categorized in the iron and steel industry, provides solutions in cold-formed metal profiles, including from stainless steel, for application in building, automotive and HVAC. Apart from *Arcelor*, several other companies that are also categorized under the iron and steel industry NACE code 2410, are mainly manufacturing carbon steel goods, and might not produce, process, or use stainless steel.

Table 9: Top 10 companies with respect to turnover (in k€ for the latest year available), that produce or process stainless steel

Naam	**Work-force**	**Turnover (k€)**	**Net Added Value (k€)**	**NACE sector**
Aperam Stainless Belgium	2050	2.990.969	313.010	Iron and steel industry
Terumo Europe	775	761.120	149.318	Manufacture of medical and dental instruments and supplies
Industeel Belgium	916	758.068	160.682	Iron and steel industry
Thy Marcinelle (*)	470	382.249	14.888	Iron and steel industry
Siemens Healthcare	300	379.334	62.803	Manufacture of medical and dental instruments and supplies
Eli Lilly European Clinical Trial Services	32	279.426	25.120	Manufacture of medical and dental instruments and supplies
Nlmk La Louviere (*)	582	242.327	96.227	Iron and steel industry
Forges De Clabecq (*)	2100	239.658	82.015	Iron and steel industry
Voestalpine Sadef	577	227.558	71.424	Cold forming or bending
Materialise	622	180.552	99.760	Manufacture of medical and dental instruments and supplies

(*) companies that are currently not producing, using, or processing stainless steel, but instead mainly manufacture carbon steel goods

PROCESSING OF PHOSPHATE ROCK

Unground **phosphate rock** first must be ground to be further processed into intermediate and end products, as illustrated in Figure 5. End products consist of solid and liquid fertilizers, animal feed, phosphoric acid as a feedstock for the manufacturing of food and beverage products, treated metals, detergents and electronics.

Table 10 provides a list of products that result from the processing of phosphate rock, with the corresponding NACE codes.

Table 10: Classification of Products by Activity (CPA) of phosphate rock-based products, and the corresponding NACE codes

CPA Division	CPA Code	Product notes	NACE Code	NACE Description
CPA 20 – Chemicals and Chemical Products	20.13: Other inorganic basic chemicals	Phosphoric acid-based chemicals, including: • Diphosphorus pentaoxide; other inorganic acids • Phosphinates, phosphonates, phosphates, polyphosphates and nitrates (except of potassium) • Phosphides, carbides, hydrides, nitrides, and azides	20.13	Manufacture of other inorganic basic chemicals
	20.14: Other organic basic chemicals	Phosphoric acid-based chemicals, including phosphoric esters and their salts, and their halogenated, sulphonated, nitrated or nitrosated derivatives	20.14	Manufacture of other inorganic basic chemicals
	20.15: Fertilisers and nitrogen compounds	Phosphorus containing fertilizers, including: • Phosphatic fertilisers, mineral or chemical • Superphosphates • Other phosphatic fertilisers • Fertilisers containing three nutrients: nitrogen, phosphorus and potassium • Diammonium phosphate • Monoammonium phosphate • Fertilisers containing two nutrients: nitrogen and phosphorus • Fertilisers containing two nutrients: phosphorus and potassium • Mineral or chemical fertilisers containing at least two nutrients (nitrogen, phosphate, potash) n.e.c.	20.15	Manufacture of fertilisers and nitrogen compounds

CPA Division	CPA Code	Product notes	NACE Code	NACE Description
CPA 8 – Other mining and quarrying products	08.91: Chemical and fertiliser minerals	Phosphorus containing fertilizers, including natural calcium or aluminium calcium phosphates	08.91	Mining of chemical and fertiliser minerals

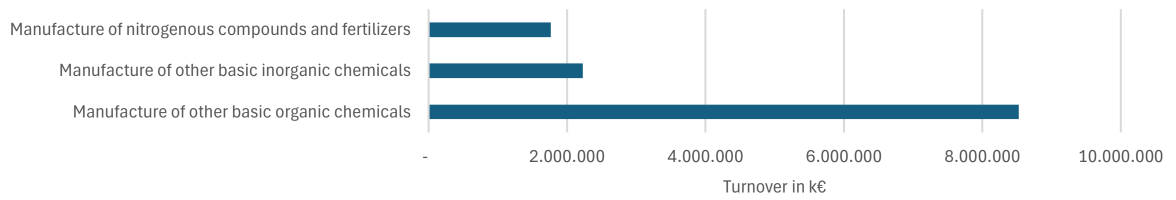
Also here, a search[28] in the Bel-first database was performed to identify the companies in Belgium with the NACE Codes listed in Table 10 as primary NACE code, i.e., as the code that represents the organization's main activity, that generates the most turnover.

For phosphate rock-derived products, this search identified 563 companies with different '*status of activity*', of which 123 had a known turnover, of which 94 showed one of the listed NACE Codes in Table 10 as the first activity code. In 2015, *Umicore* sold its shares in the joint venture *beLife* to its partner *Prayon*. *beLife* was established to demonstrate its production technology for LFP (lithium iron phosphate) cathode materials at an industrial scale and to have these products qualified by several major global lithium-ion battery manufacturers [29]. *Umicore* still produces nickel–phosphorus electroplating materials[30], but the share of these products in the total company's turnover seems to be modest. *BASF* produces phosphates for the cosmetics industry, but it is not clear whether the corresponding production facilities are located in Belgium. *Covestro* produces polycarbonates, polyurethanes, coating, adhesive and specialty raw materials, and thermoplastic polyurethane elastomers[31], but to our knowledge, does not use or produce phosphate-based products in Belgium. For these reasons, *BASF*, *Umicore*, and *Covestro* were not retained as top producers or processors of phosphate-based chemicals in Belgium.

The remaining 91 companies realized a turnover of about 12,5 billion euro in the last known year and a net added value of 2,7 billion euro. Since it is likely that companies other than *BASF*, *Umicore*, and *Covestro* that are categorized under the selected NACE codes might also not develop activities related to phosphate, these numbers are an overestimation.

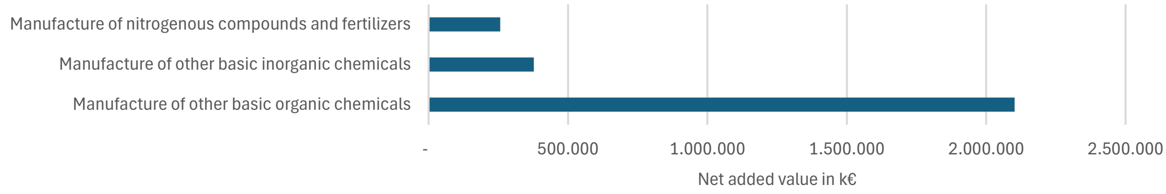
In Figure 10 and Figure 11, the industrial activities that use raw materials with product classifications (CPA) corresponding to phosphate-based products, are ranked according to their turnover an net added value, expressed in k€ for the latest year available.

Figure 10: NACE sector turnover (in k€; sectors with turnover > 50.000 k€), for sectors with phosphate-based products manufacturing



[28] Search strategy: '*NACE-BEL 2008, Alleen primaire codes: 089 - Winning van delfstoffen, n.e.g., 2013 - Vervaardiging van andere anorganische chemische basisproducten, 2014 - Vervaardiging van andere organische chemische basisproducten, 2015 - Vervaardiging van kunstmeststoffen en stikstofverbindingen*'
[29] https://engineeringnet.be/nl/nieuws/item/9633
[30] https://mds.umicore.com/en/electroplating/products/product-finder/niphos-966-nickel-phosphorus-electrolyte-as-alternative-to-electroless-nickel
[31] https://www.covestro.com/en/company/covestro-worldwide/belgium

Figure 11: NACE sector Net Added Value (k€; >50.000 k€), for sectors with phosphate-based products manufacturing



The top 10 Belgian companies that, based on the identified CPA are likely to produce or process phosphate rock-based products as their main activity, with respect to turnover, are listed in Table 11. In practice, the NACE codes referring to the manufacture of other basic chemicals are very broad, and the companies with activities in the corresponding sectors offer a very large range of chemicals, most of which are not phosphor-based. *Tessenderlo Group* was a major producer of feed phosphates and phosphate-based fertilizers, but they closed a major phosphate unit in Flanders in 2013. The companies that probably do not produce or process phosphate-based products in Belgium (anymore) are presented in light grey in Table 11.

Prayon produces purified phosphoric acids for food, pharmaceutical, and electronic grades, phosphate salts for baking and food preservation, horticultural fertilizers like monoammonium phosphate (MAP) and monopotassium phosphate (MKP), as well as iron phosphate precursors for Lithium Iron Phosphate (LFP) batteries[32]. *EuroChem Antwerpen* is a producer of complex fertilizers where phosphorus is a primary nutrient, of nitrophosphoric acid (by reacting phosphate rock with nitric acid), and of recycled phosphorus from sewage sludge ash for use in circular fertilizers[33].

Table 11: Top 10 companies with respect to turnover (in k€ for the latest year available), that possibly produce or process phosphate rock-based products

Naam	Work-force	Turnover (k€)	Net Added Value (k€)	NACE sector
Prayon	1080	925.632	163.597	Manufacture of other basic inorganic chemicals
Vynova Belgium	553	884.093	10.723	Manufacture of other basic organic chemicals
Eurochem Antwerpen	404	734.172	90.877	Manufacture of nitrogenous compounds and fertilizers
Evonik Oxeno Antwerpen	95	720.565	61.756	Manufacture of other basic organic chemicals
Oleon	571	713.437	110.463	Manufacture of other basic organic chemicals
Envalior	774	694.882	168.000	Manufacture of other basic organic chemicals
Ineos	463	691.363	171.868	Manufacture of other basic organic chemicals
Evonik Antwerpen	940	601.650	222.696	Manufacture of other basic organic chemicals

32 https://www.prayon.com/en/
33 https://www.eurochemgroup.com/

Tessenderlo Group	690	530.358	93.409	Manufacture of other basic inorganic chemicals
Rain Carbon	182	388.365	49.927	Manufacture of other basic organic chemicals

MARKET VOLATILITY, TRADE BARRIERS, AND TARIFFS

PLATINUM GROUP METALS

Although in this report indirect or secondary import dependencies with respect to PGM (and nickel) were not further examined, the impact of global market trends will be felt by Belgian processors and manufacturers of PGM-bearing products, like catalysts.

For 2026, analysts [34] expect higher platinum and palladium prices driven by tighter mine supply, ongoing tariff uncertainty, and shifts in investor behaviour as capital may move away from gold. Platinum prices are supported by continued supply shortages, uncertainty surrounding Chinese futures, and lower jewellery demand after inventory build-ups. Tariff-related uncertainty remains a key factor, with possible new U.S. tariffs on critical minerals potentially disrupting trade flows. Palladium faces added concern due to U.S. discussions on tariffs targeting imports from Russia, one of its main producers.

The International Platinum Group Metals Association warns that EU retaliatory tariffs on U.S.-origin PGMs would also disrupt Europe's recycling-based supply chains and weaken feedstock security essential for Belgian refining and manufacturing [35].

Johnson Matthey, a British multinational speciality chemicals and sustainable technologies company, reports[36] that the palladium's outlook is further influenced by debates over the speed of EV adoption, as expectations of declining catalytic-converter demand weigh on sentiment. Even if EV growth slows, the risk of faster uptake remains. The transition from ICE to EVs probably will continue driving demand fluctuations for both metals, complicating planning for Belgian catalyst and automotive suppliers. Automotive platinum and palladium use is expected to fall as battery-electric powertrains gain market share in both cars and trucks.

The Johnson Matthey 2025 PGM Market Report also assumes that platinum and rhodium markets are likely to stay in deficit due to structural issues in South Africa, such as operational restructuring, weather disruptions, and plant maintenance. Although Belgium does not import PGMs directly from South Africa, neighbouring suppliers may do so, creating indirect dependencies like for the phosphate rock case. These links could amplify price volatility with consequences for Belgian refiners and industrial users.

[34] https://www.reuters.com/business/analysts-raise-2026-price-forecasts-platinum-palladium-after-2025-rally-2025-10-27/#:~:text=The%20median%20forecast%20from%20a,market%20is%20awaiting%20this%20month.&text=Palladium%20has%20another%20layer%20of,of%20the%20opposite%20still%20happening
[35] https://ipa-news.com/index/policy/tariffs.htm
[36] https://matthey.com/media/2025/johnson-matthey-publishes-2025-pgm-market-report

NICKEL

Nickel market reports[37] indicate that Indonesia, that accounted for up to 69% of global nickel output in 2025, with a 21% production surge early that year, is significantly contributing to a global oversupply of nickel. This oversupply depresses prices but increases volatility due to rapid swings tied to Indonesian policy changes (e.g., quota restrictions, export rules).

Belgium's heavy reliance on imported nickel—especially from jurisdictions affected by tariffs or geopolitical shifts—creates elevated exposure to global price turbulence, structural supply shocks, and rapidly changing international tariff regimes. Market analysts expect that volatility will impact Belgian manufacturers by complicating procurement planning and increasing hedging costs.

PHOSPHATE ROCK

Regulation (EU) 2025/1227 amends the customs duties applied to imports of certain agricultural goods and fertilizers originating in or exported from Russia and Belarus. Under this regulation, an additional 50% ad valorem duty on top of the existing Common Customs Tariff rais imposed on all remaining Russian agricultural imports, ensuring that every such product becomes subject to EU tariffs. For certain nitrogen-based fertilizers, including those that contain phosphorus as a nutrient, a 6.5% tariff will apply in combination with fixed duties beginning at €40 to €45 per ton for the 2025–2026 period, rising progressively to as much as €430 per ton by 2028.[38]

Since a significant share of the phosphate rock imports to Belgium comes from the Netherlands, that depends on supplies from Russia, it is likely that a continuation or further deterioration of the geopolitical situation will affect the industrial activities in Belgium that rely on imported phosphate rock.

[37] https://alloy-ronsco.com/blogdetail/Navigating-the-Nickel-Market--Oversupply--Tariffs--and-Strategic-Shifts

[38] https://www.ey.com/en_be/technical/tax/tax-alerts/2025/ey-belgiums-customs-and-excise-update-june-2025#:~:text=For%20certain%20nitrogen%2Dbased%20fertilizers,430%20per%20ton%20by%202028

4. CONCLUSION

The supply chain analysis focused on three different critical raw materials or raw material groups that were found to combine high supply risks for Belgium (SR_{BE}) with high import values in absolute terms. The CRM_{BE} were ranked according to these criteria. The top ten CRMBE represented a total import value (CIF) of more than 2 billion euro. The CRM_{BE} that were selected from this top ten were platinum group metal (PGM) and nickel, as case studies for stage II CRMs, for which the supply risks refer to the processing/refining stage. Phosphate rock was selected as an example of a stage I CRM, with supply risks mainly originating in the extraction/mining stage.

NICKEL AND PGM

About 180 Belgian companies active in nickel- and PGM-intensive manufacturing generated a combined turnover of roughly €10.2 billion in the most recent year, with €2.3 billion in net added value. Besides nickel-based stainless-steel production and further processing, the most relevant consuming sectors include electronic components and medical and dental instruments. Within stainless-steel production and processing—the main outlet for nickel—106 companies accounted for about €8.2 billion in turnover and €1.5 billion in added value.

These figures provide only a preliminary indication of Belgium’s industry CRM import dependency, as a closer examination of individual firms showed that many identified companies are not or only partially reliant on nickel and PGM inputs. At the same time, for those that clearly rely on these CRMs, it remains difficult to determine how much of their turnover and added value depends on them. Only a small number of stainless-steel producers and processors were confirmed to rely mainly on imported nickel. While PGM imports are largely sourced through neighbouring countries, nickel is more frequently imported from non-EU suppliers dominated by a limited number of global mining companies.

Nickel ores are extracted from a wide variety of mining operations—both open-pit and underground—across diverse regions and climate zones. The subsequent concentration and refining steps use distinct technologies that produce intermediate products tailored to specific applications. As a result, supply risks, intermediate product prices, and associated environmental impacts vary significantly across different Belgian nickel value-chain segments.

PHOSPHATE ROCK

For phosphate rock-derived products, a search for companies with activities that include the production and processing of phosphate rock-based products, yielded 91 companies in Belgium that realized a turnover of about 12,5 billion euro in the last known year and a net added value of 2,7 billion euro. However, after studying in more detail the identified companies’ activities, these numbers proofed to be an overestimation of the selected industrial sector’s dependency on imported phosphate rock. Only two companies could be confirmed as having their turnover and net added value heavily dependent on imported phosphate rock

The case studies on nickel, PGM, and phosphate rock illustrate how Belgium’s industry exposure to supply risks is shaped less by direct sourcing at the extraction stage than by its position within highly interconnected European processing and trading networks. The strong reliance on neighbouring countries for refined and semi-manufactured products points to Belgium's role as a downstream processor and user, while simultaneously masking upstream dependencies that remain geographically distant and geopolitically sensitive.

The analysis of Belgian industry dependence–complemented with a short overview of aspects of market volatility, trade barriers, and tariffs–highlights how material criticality cannot be fully understood through trade statistics alone. Processing technologies, by-product relationships, e.g. between Platinum Group Metals (PGMs) and nickel, and the concentration of specific refining steps introduce structural vulnerabilities that are not captured at aggregate EU level. These vulnerabilities are particularly relevant in light of expected demand growth from hydrogen technologies, batteries, and advanced manufacturing, where even small disruptions can propagate rapidly through value chains.

From a methodological perspective, the approach demonstrates the added value of combining criticality indicators with a detailed supply chain perspective tailored to national circumstances. Such an approach supports more targeted policy discussions on resilience, diversification, recycling, and industrial strategy, and provides a replicable framework for assessing other critical raw materials relevant to Belgium's economy. Limitations of the approach include the imperfect correspondence between classification systems like NACEBEL8, CPA, HS and CN, and between datasets like Eurostat and COMTRADE.