

CZECHIA

Decarbonisation of the Industrial Sector: Sustainable Finance as an Opportunity?



REVIEW OF THE
HARD-TO-ABATE
SECTOR'S
DECARBONISATION
IN CZECHIA

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CZECHIA

Executive Summary

Key moment for hard-to-abate industries in Czechia

Industry has been the focal point of the Czech economy for more than 100 years. The country is still more reliant on industrial production than other EU Member States. While the EU average of gross value added attributed to industry is around 19%, Czechia's industry contributes more than one third.¹

In 2022, the hard-to-abate industry sector faces an unprecedented situation. The price of coal and electricity, the main inputs for hard-to-abate industries, has increased two-fold and three-fold in past 12 months, respectively.²³ Meanwhile, in an attempt to control inflation, the Czech National Bank realized the highest rate hike in recent history⁴, reducing the investment appetite of firms.

Decarbonisation: long-term challenge

In addition to the short-term challenges, hard-to-abate industries, mainly steel and cement, must now completely rethink their 150-year-old production technology to comply with the European Green Deal targets. Carbon dioxide emissions are not only the result of fuel combustion but are also an integral part of the chemical reactions taking place in steel furnaces and cement kilns. After the European Trading Scheme (ETS) free allowances phase-out (currently planned for 2032), effective

In an attempt to control inflation, the Czech National Bank realized the highest rate hike in recent history, reducing the investment appetite of firms.

¹ Gross value added by economic activities, Eurostat, 2020: <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20211021-1>

² Rotterdam coal futures, Statista, 2022: <https://www.statista.com/statistics/1308104/weekly-api2-rotterdam-coal-futures/>

³ <https://www.kurzy.cz/komodity/cena-elektriny-graf-vyvoje-ceny/>

⁴ <https://www.cnb.cz/cs/menova-politika/mp-nastroje/>

Effective decarbonisation will be either an inevitable survival condition or a decisive competitive advantage for steel and cement making industry.

decarbonisation will be either an inevitable survival condition or a decisive competitive advantage for steel and cement making industry. Czech hard-to-abate industries must address how to significantly cut emissions by 2032.⁵

Risks of the investment in decarbonisation

Technologies are needed

Investment into decarbonisation is a high-risky endeavour though, as discussed further below. The following three technologies at different stages of development currently seem crucial to ensuring a successful transition:

- **Hydrogen** is needed for Hydrogen Direct Reduction of Iron (HDRI) technology in steelworks and as an alternative feedstock for the chemical industry. Only steel production in Czechia would require 270 kilo tonnes⁶ of hydrogen annually to switch to HDRI, but availability of such amount remains unknown.
- **Electric Arc Furnaces (EAF)** would increase electricity consumption by 2TWh, if fully deployed in steelworks (approx. 2.5% of the country's overall consumption).⁷ Installation of new Renewable Energy Sources (RES) is much slower though; production has only increased by an average of approx. 0.5 TWh annually in past 10 years.

⁵ European Parliament and Council adopt positions on ETS and CBAM proposals: next steps, White and Case, 2022: <https://www.whitecase.com/insight-alert/european-parliament-and-council-adopt-positions-ets-and-cbam-proposals-next-steps>

⁶ Decarbonizing primary steel production: Techno-economic assessment of a hydrogen based green steel production plant in Norway, Bhaskar, A. et al. 2022

⁷ Jak úspěšně dekarbonizovat ocelářství, Steel Union, 2022: <https://www.ocelarskaunie.cz/ak-uspesne-dekarbonizovat-ocelarstvi/>

- **Carbon capture, use and storage (CCUS)** has seen a dynamic expansion in the previous years, however its future development in Czechia remains unclear, as strategy for development of this technology has not yet been published.

Carbon price volatility

The carbon price volatility is a notable risk of decarbonisation. In 2022, the price of an emission allowance fluctuated between 58 and 98 EUR/allowance. Low carbon prices decrease the return on investment into decarbonisation technologies and could make the investment unjustifiable.

Pathways to risk mitigation

Country's policies awaiting revision

In order to decrease uncertainty in the development of the new technologies, Czechia should update its strategies related to decarbonisation. The National Energy and Climate Plan (NECP), the revision of which is due by 30 June 2023, should set increased ambitions for new RES deployment. The Hydrogen Strategy should declare a commitment of ensuring sufficient supply of competitively priced green hydrogen by 2032 and the Strategy of Decarbonisation of the Czech Economy could shed more light on the development of CCUS.

Market creation measures

Demand for low carbon products clearly motivates producers to decarbonise their production. The implementation of environmental metrics in state procurement guidelines would create significant demand for sustainable products from decarbonised industries. Also incorporating low emission types of cement in construction norms would enable their increased use in new buildings and growth in demand.

Public and private funding possibilities

Due to the large scale of decarbonisation investments, private finance from business needs to be complemented by public funding. Czech companies must be able to fully leverage the Innovation Fund. Czech institutions can also increase support for decarbonisation from national sources. If programmes of the National Development Bank included discounted interest-rate loans and guarantees for the modernisation of large companies' facilities in addition to SMEs, investment risk would drop significantly, and private funding would scale up.

Decarbonisation: competitive advantage

In the event of successful decarbonisation, manufacturers of low carbon-footprint products will benefit from strong market demand from companies that will need to lower their own carbon footprint. Companies in hard to abate industries start to understand the market trend and are already taking initiative. As data from European steel association show, more than

60 decarbonisation projects are already planned with the goal to reduce emissions from steel production by more than one third by 2030. With the right policies and practices put in place, Czechia can lead the way in decarbonising its hard-to-abate industries and leverage the competitive advantage on the market moving towards sustainable production.

Having abundant reserves of brown and black coal, Czechia has attracted energy intensive industries for more than two centuries. However, with increasing decarbonisation requirements, the country faces remarkable and politically sensitive challenges. With its landlocked location in central Europe, the potential for renewable electricity generation is lower than in other European regions, and Czechia will have to plan its transition to low-carbon growth wisely to leverage its main advantages: its infrastructure and skilled, available workforce.

With almost one third of its value added from the industrial sectors in 2020, Czechia ranks second in the list of EU's most industry-dependent countries.⁸ Hard-to-abate industry, with its low margins, is not a major contributor to the added value itself. But it provides necessary raw materials to the country's most value adding sectors – automotive and construction. In addition, hard-to-abate industry is concentrated in the country's most socially-deprived regions – Moravskoslezský and Ústecký regions. With 120,000 employees in the supply chain, failure to maintain industrial competitiveness in decarbonising European markets risks creating major political volatility and potential backlash to decarbonisation or climate-friendly policies, while also exacerbating regional disparities in Czechia.

⁸ Gross value added by economic activities, Eurostat, 2020: <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20211021-1>

Steel production

The Czech steel industry faces multiple hurdles at both global and regional levels. Following a ramping up in production capacity in China beginning 2015, global steel facilities have been only utilised to 70% capacity⁹, leading to a global price competition and a race for survival in the industry. One of the two production sites in Czechia (Arcelor Mittal Ostrava) has struggled to maintain sufficient operating margins and was consequently sold to the UK-based Liberty Steel Group in 2019 as part of the sector consolidation (a precondition of the European Commission's approval of Arcelor's purchase of Ilva, an Italian steel-making facility). In the coming decades, the successful production decarbonisation will offer steel facilities a crucial competitive advantage. The race for survival will be won by those who manage to decarbonise swiftly and at relatively low cost.

As can be seen in Fig. 1, steel production was hit hard in the recession following the 2008 financial crisis. Not only is the sector closely tracking the business cycle, it also responds to commodity slumps. Due to the lower proportion of transportation costs in the final price, it pays to transport steel over longer distances – which differs for other hard-to-abate industry products such as cement. Therefore, global market is more integrated, and manufacturers tend to be more exposed to competition from producers based in other regions. After 2015, China began a massive increase in steel production¹⁰, which in the following years resulted in a subsequent and considerable drop in production in Czechia.

Most recently, the global COVID-19 pandemic resulted in an abrupt halt in production. Nevertheless, the Czech steel making industry promptly recovered. In 2021, the annual production increased by 8.7% to an overall 4.7 million tonnes of crude steel, the highest annual production since 2017.¹¹ Together with the peak value of 8.3 million tonnes imported, and a notable increase in export totalling 4.9 million tonnes in 2021 (see Fig. 1 below), the position of the Czech steel industry has improved in the time since the outbreak of the pandemic.

Imports and exports to and from Czechia differ in the product range. While steel products with low value added are imported, local manufacturers focus on higher value-added processes and merchandise: high-quality steel, seamless tubes, long products, etc.¹²

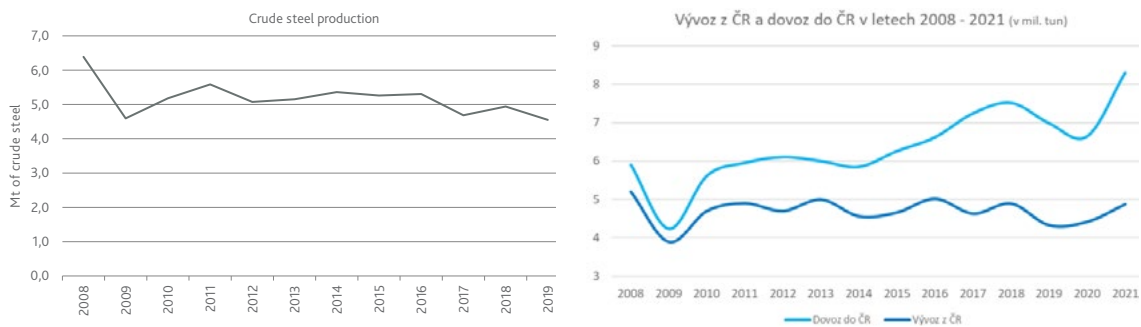
⁹ China capacity utilization, Trading Economics, 2022: <https://tradingeconomics.com/china/capacity-utilization>

¹⁰ Crude steel production in China, Statista, 2022: <https://www.statista.com/statistics/448752/crude-steel-production-in-china/>

¹¹ Výrobě oceli se v ČR v roce 2021 dařilo, Ocelářská Unie, 2022: <https://www.ocelarskaunie.cz/vyrobe-oceli-v-cr-se-v-roce-2021-darilo/>

¹² Konkurenceschopnost, Svaz Průmyslu a Dopravy ČR, 2022: https://www.spcr.cz/images/mat_Konkurenceschopnost.pdf

Fig. 1: Production and consumption (2008–2019), export and import (2008–2021) of steel in Czechia (million tonnes)



Source: *Steelmakers Union, 2022¹³*, Note: Dovoz do ČR = Import into Czechia, Vývoz z ČR = Export from Czechia

Fig. 1 above depicts development of production and consumption (the left-hand chart) compared to export and import (the right-hand chart) from 2008 in megatons. As highlighted previously, import into the country has grown significantly since the increase in China's production in 2015. With exports remaining stable and local production decreasing, imports were mostly feeding the increased consumption in the country and replacing local production.

Future development and margins in the steel production market will be largely influenced by developments in GDP. Economic slowdown or the Czech National Bank's interventions to tackle inflation could result in lower construction rates and have an impact on automotive industry, both of which are the main customers of Czech steel products.

Regarding market structure, the steel sector is dominated by two major companies – Třinecké Železárny, with annual production around 2.4 million tonnes¹⁴, and Liberty Ostrava with annual production totalling around 2.315 million tonnes of crude steel. While the former is a Czech-owned enterprise, the latter is a part of the multinational UK-based Liberty Steel Group with many facilities based mostly in the EU. These differences in ownership influence each company's approach towards decarbonisation, as identified later in this report.

Steel industry emissions: Two main producers emit 99% of emissions

Fig. 2 shows the total amount of emissions in 2020. The vast majority (73%) of European Trading Scheme (ETS) emissions are caused by the category "Combustion of fuels"¹⁶, which includes all the powerplants running on fossil fuels. The second most emitting category is "Production of pig iron or steel", in which there are two facilities – Liberty Steel and

¹³ Ocelářská Unie, 2022: <https://www.ocelarskaunie.cz/ocelarstvi/statistiky/>

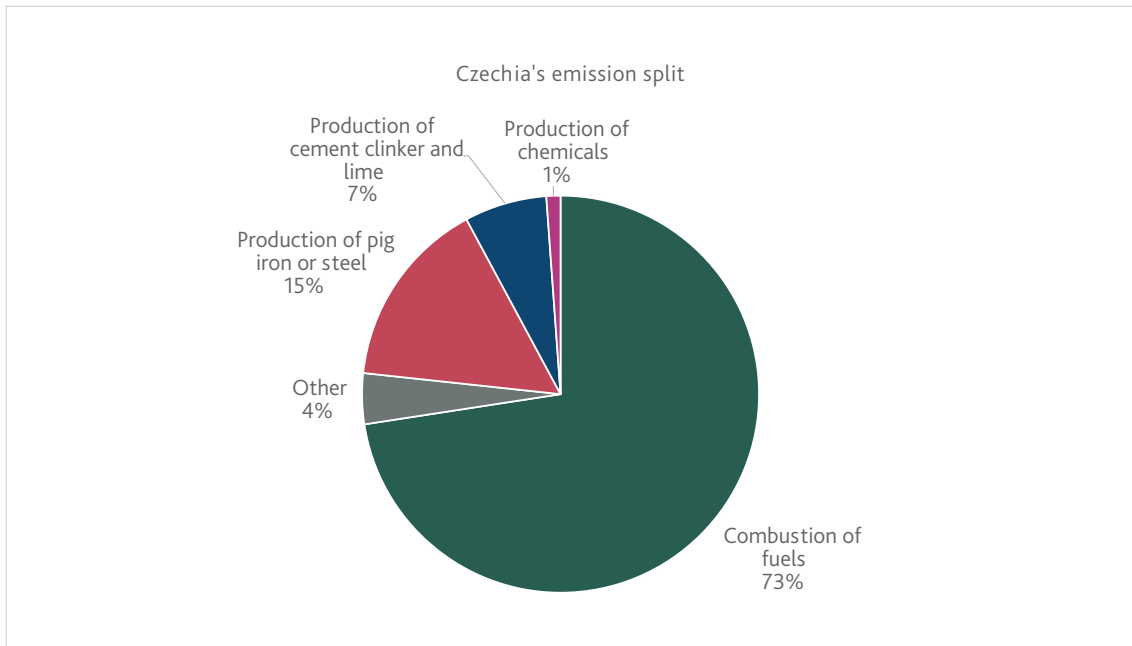
¹⁴ S globalizací jsme to přehnali, výroba bude více lokální, říká šéf Třineckých Železáren Jan Czudek, E15, 2022: <https://www.e15.cz/rozhovory/s-globalizaci-jsme-to-prehnali-vyroba-bude-vic-lokalni-rika-sef-trineckych-zelezaren-jan-czudek-1387288>

¹⁵ Liberty Ostrava loni zvýšily objem výroby oceli o 33 procent, Ekonomický deník, 2022: <https://ekonomickydenik.cz/hute-liberty-ostrava-loni-zvysily-objem-vyroby-oceli-o-33-procent/>

¹⁶ Emission trading scheme

Třinecké Železárny. Together, they create almost 15% of the emissions recorded in the ETS for Czechia (overall emissions: 55 Mt, Třinecké Železárny + Liberty Steel: 8,4 Mt).¹⁷ “Production of cement clinker and lime” is next (7%, 3,7 Mt) with emissions more than 50% lower than the steel industry. Therefore, the steel making industry presents an obvious target for Czech policy makers in their effort to decarbonise the hard-to-abate industries.

Fig. 2: Steel industry emissions



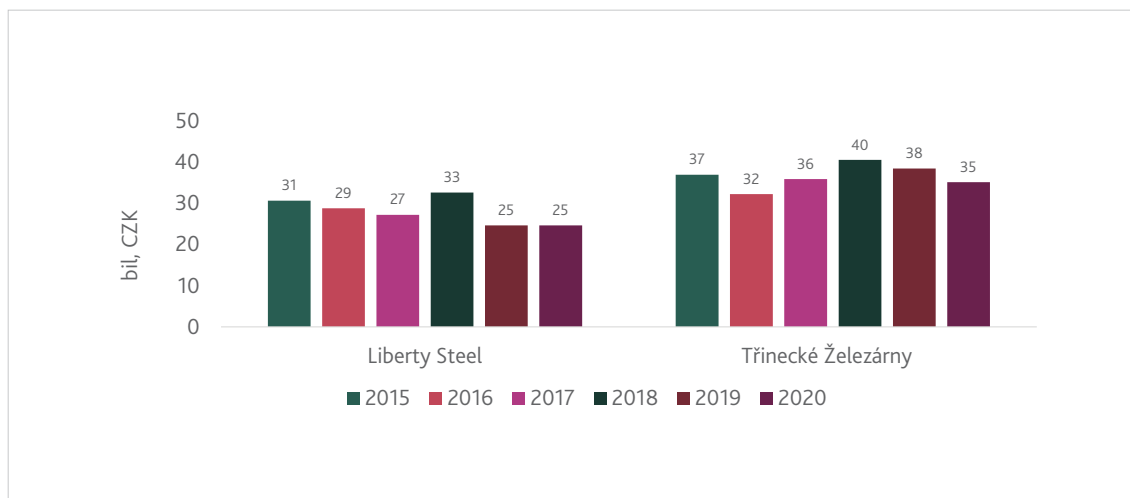
Source: ISFC based on the ETS data

Financial condition: Low operating margins in the sector

Due to the afore-mentioned oversupply from different regions (predominantly China), competition in the steel market has become fiercer and this was reflected in the sales of both Czech steel producers. In the case of Třinecké Železárny, the compound annual growth rate (CAGR) of sales between 2015 and 2021 was at a low 3%, while Liberty Ostrava's sales plummeted, with the CAGR reaching -4% for the same period.

¹⁷ Emission trading scheme

Fig. 3: Sales of steel making companies



Source: ISFC based on the company annual reports

With regard to a business profitability, EBITDA and profit after tax are the usual measures:

- EBITDA shows operating profitability of the company's main business eliminating the effects of company's capital, financing, depreciation and tax entity structure. It compares how much money the company receives for sale of its products and how much operating cost it has to pay to produce them. It allows the comparison of profitability of operations between companies and sectors.
- Profit after tax takes into consideration all relevant sides of the business operation, including the cost of its liabilities.

Profitability of the Czech steel sector is waning. EBITDA margins (before sales/purchases of allowances) of both companies were positive in 2015, with Třinecké Železárny reaching 11%, and Arcelor Mittal (prior to GFG alliance acquisition) around 4%.¹⁸ In 2020, the EBITDA dropped to 2% and -3% respectively (see Fig. 4).

That said, the COVID-19 years were marked by a low demand for steel products, hence sales and profits are expected to bounce back. Sales and EBITDA (before sales/purchases of allowances) of Třinecké Železárny grew by 24% and 125% year over year in 2021, respectively. In the medium term, there are multiple factors which are likely to impact profitability (see Box 1).

¹⁸ Due to the afore-mentioned acquisition, Liberty Ostrava chose to prolong its financial reporting period to 18 months, stretching from 1.1.2019 to 30.6.2020. This biased 2020 results, however all the metrics were recalculated to 12 months period to ensure its comparability with other analysed companies.

Box 1: Factors impacting future profitability of Czech steel mills

Threat: Consequences of the war in Ukraine and high energy prices:

- Approximately 75% of the iron ore used for steel production in Czechia is imported from Ukraine.¹⁹ With the mines located in the east of the country, supply chains will most probably be interrupted.
- The prices of all energy mediums (i.e., coal, electricity, gas) have increased rapidly. If the price remains at current levels, competitiveness of energy intensive industries will be jeopardised (for more information, see chapter “Indirect cost compensation”).

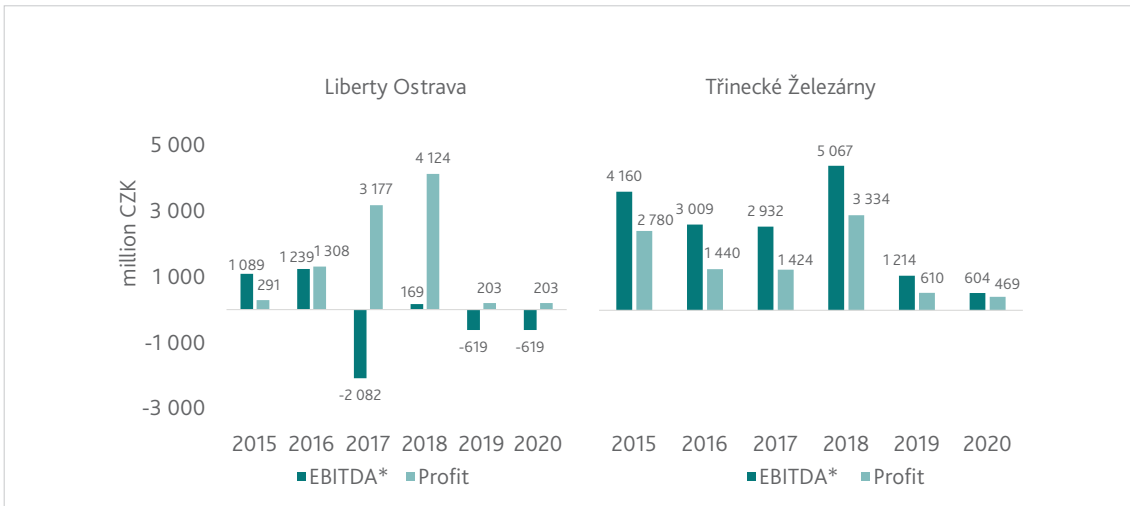
Threat: International trade developments

- Future production level in China and India will have a major impact on global trading prices. If production remains at current levels or increases, Asian steel will be even more competitive, mainly thanks to low input prices (personnel and energy costs).

Opportunity: Financial and policy framework for decarbonisation

- Providing global business models move towards more sustainability integration, the EU will have a distinct competitive advantage in steel industry, as the majority of decarbonisation initiatives take place in the EU.

Fig. 4: EBITDA and profit of steel making companies



Source: Annual reports, ISFC, *Note: EBITDA before sales/purchases of allowances.

Emission allowance trading can also play a key role in financial results. In the last few years, Czech steel sites have accumulated a significant amount of ‘spare’ emission allowances.²⁰ Due to the current high allowance prices, trading of the surplus allowances is expected to

¹⁹ Dovoz železné rudy z Ukrajiny se zastavil, válka doléhá na největší hutě v Česku, E15, 2022: <https://www.e15.cz/valka-na-ukrajine/dovoz-zelezne-rudy-z-ukrajiny-se-zastavil-valka-doleha-na-nejvetsi-hute-v-cesku-1388066>

²⁰ Emission allowances are assigned based on emissions of the 10% of the most carbon-efficient companies.

be a material source of additional income in the years to follow. According to its annual report, Liberty Ostrava owned 8,726,811²¹ emission allowances at the closing date of their latest annual report, 30th of June 2020.²² With the 2020 average price of EUR 80/allowance, the value of the allowances on the books was more than EUR 698 million (compare to the cost of their ongoing decarbonisation project – EUR 750 million). This is even after a sale of undisclosed number of allowances that generated an additional revenue of approx. EUR 130 million in 2019/20. A direct comparison to the annual profit, reported in 2020 as EUR 8 million, shows how substantial the income generated by the emission trading allowances is. Emission allowances thus act as the main decarbonisation incentive: lowering emissions potentially generates spare allowances.

Třinecké Železářny also leveraged their surplus of free allowances. The company sold emission allowances amounting to EUR 44 million²³ in 2020 (net profit: EUR 18 million). Free allowances will remain a crucial source of income, provided that both companies manage to further decrease their carbon-intensity. Any changes in free emission allowance allocation (lower number of allowances or removal of free allowances) would present a financial challenge for both companies.

Decarbonisation efforts: Active progress

One of the initiatives common for both companies in the Czech steel making industry is leveraging of scrap steel. It is estimated that recycling saves around 75%²⁴ of the energy otherwise needed to produce new steel. According to the information from the Steelmakers union²⁵, Czech steelworks reuse around 30% of scrap metal. The role of recycling in relation to decarbonisation initiatives in Czech steelworks is discussed more in detail below.

Liberty Ostrava: The promise of electrification

Liberty Ostrava plans to become fully decarbonised by 2030²⁶. This would be accomplished partly by constructing two state-of-the-art hybrid electric arc furnaces (which can be loaded with both steel scrap and primary reduced iron ore). Operations are planned to be by the end of 2025 and should cut CO₂ emissions by 70% by 2027²⁷. The total innovation cost is estimated at EUR 350 million. New electric technology also helps with ramping up steel scrap use, which brings another complexity to the supply chain, as steel scrap is a resource high

²¹ Liberty Steel, Annual report 2020

²² Liberty has not published its 2020-2021 Annual report by September 2022.

²³ Třinecké Železářny, Annual report 2020

²⁴ Recyklace oceli v Česku ušetří ročně tolik energie, kolik se jí za stejnou dobu vyrobí z obnovitelných zdrojů, Ocelářská unie, 2019: <https://www.ocelarskaunie.cz/recyklace-oceli-v-cesku-usetri-rocne-tolik-energie-kolik-se-ji-za-stejnou-dobu-vyrobi-z-obnovitelnych-zdroju/>

²⁵ Ze stare haly nové auto? Proč ne!, Steel Union, 2019: <https://www.ocelarskaunie.cz/ze-stare-haly-nove-auto-proc-ne/>

²⁶ ČEZ Esco a Liberty spolupracují na dekarbonizaci Liberty Ostrava, Liberty Ostrava, 2022: <https://libertysteelgroup.com/cz/news/cez-esco-a-liberty-spolupracuji-na-dekarbonizaci-liberty-ostrava/>

²⁷ <https://libertysteelgroup.com/cz/news/liberty-zahajuje-historickou-investici-do-transformace-os-travske-huti-ve-vyrobcе-zelene-oceli/>

in demand. Securing a stable supply of steel scrap could therefore present a challenge, since almost 60% of scrap steel is exported from the country.

Second important element of the switch to EAF is a high voltage power lines: 400kV lines are planned to be constructed by 2025 and will allow to produce steel from 100% scrap when needed. Power lines with high enough voltage are often one of the main obstacles of installing the EAFs, as they have to be arranged with the grid manager many years in advance and require going through a complex permitting process.

Altogether, Liberty Group plans to invest a total of EUR 750²⁸ million in the development of its Ostrava plant over the course of ten years. It remains unclear if any public funding will be obtained for the investment. With such a low profit margin rate, the sales of emission allowances form an important source of income. As mentioned above, the total value of allowances held by Liberty Ostrava is EUR 698 million, which could cover almost the entire cost of decarbonisation.

Třinecké Železárny: remains to be seen

As of September 2022, Třinecké Železárny have not published any plan on emission reduction. According to its website, the company will “use renewable electricity, change technology of steel production and make primary production more ecological”.²⁹ Based on the media statements of company representatives³⁰, utilisation of hydrogen direct reduction is currently unrealistic: in order to produce enough green hydrogen for the company’s 2,5 Mt of crude steel annual production, it would require about 15 TWh of clean electricity, equal to about 20% of the country’s electricity production. As will be discussed further in this paper, the country’s hydrogen strategy does not include plans for such a large scale-up within the next decade, meaning hydrogen import would be necessary. However, Hydrogen strategy does not elaborate on any plans to construct infrastructure needed. The only way for Třinecké Železárny to significantly reduce their emission output would be via the electric arc furnace with utilisation (partial or complete) of steel scrap. With steel scrap utilisation as the go-to option for decarbonisation of steel making in the EU, availability of secondary steel is likely to pose a challenge for companies (see Box 2 for more information).

²⁸ Liberty zahajuje historickou investici do transformace ostravské huti ve výrobce zelené oceli, Liberty Ostrava, 2022: <https://libersteeelgroup.com/cz/news/liberty-zahajuje-historickou-investici-do-transformace-os-travske-huti-ve-vyrobce-zelene-oceli/>

²⁹ Třinecké železárny, 2022: <https://www.trz.cz/uhlikova-neutralita/155/uhlikova-neutralita>

³⁰ Poručit větru a dešti už tu jednou chtěli, Ocelářská Unie, 2022: <https://www.ocelarskaunie.cz/porucit-vetru-a-desti-uz-tu-jednou-chteli/>

Box 2: Availability of steel scrap in Czechia

Scrap steel is set to become a crucial input for all steelmakers opting for secondary steel production in electric arc furnaces. However, as recent research by Climate and Company states, more than half (58%) of this material is currently exported from Czechia. This is in stark contrast to the wider region, as the overall share of scrap steel exported from EU countries stands at 13%.³¹ While this is a notably better ratio, EUROFER (European steel makers association) is pointing out that scrap steel should be exported to regions that observe same environmental regulations (more than two thirds – 67% – of European scrap steel was exported to Turkey), as this could be understood as another form of carbon leakage.³²

³¹ European steel in figures, Eurofer, 2022: <https://www.eurofer.eu/assets/publications/brochures-booklets-and-factsheets/european-steel-in-figures-2022/European-Steel-in-Figures-2022-v2.pdf>

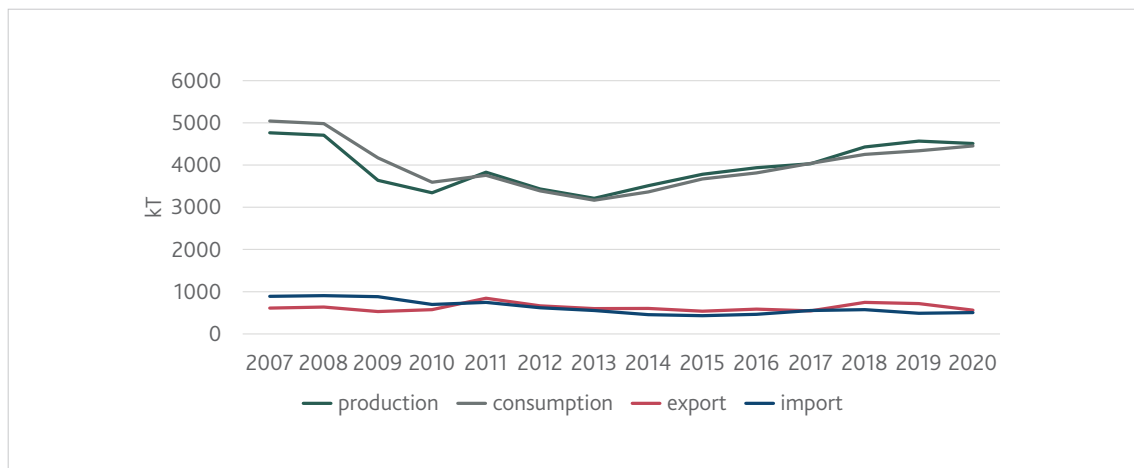
³² Stop waste and scrap export to countries not meeting EU environmental and social standards, asks EUROFER, EUROFER, 2022: <https://www.eurofer.eu/press-releases/stop-waste-and-scrap-export-to-countries-not-meeting-eu-environmental-and-social-standards-asks-eurofer/>

Cement production

Efforts to decarbonise cement production are challenged primarily by the low range of available decarbonisation technologies. Emissions can be partially cut by introducing circularity practices into cement production, but the only other available technology to reduce emissions further is the installation of Carbon Capture, Use and Storage (CCUS).

As with the steel market, development of the cement production in Czechia is closely linked to levels of construction activity. From the production of 5,000 tonnes of cement in 2008, the market dropped by almost one third to 3,200 kilo tonnes in 2013 (see Fig. 5). This was followed by a steady increase until 2020, when production reached almost pre-financial crisis levels.

Fig. 5: Production, consumption, export and import of cement in CZE



Source: ISFC based on the Cement producers' association data

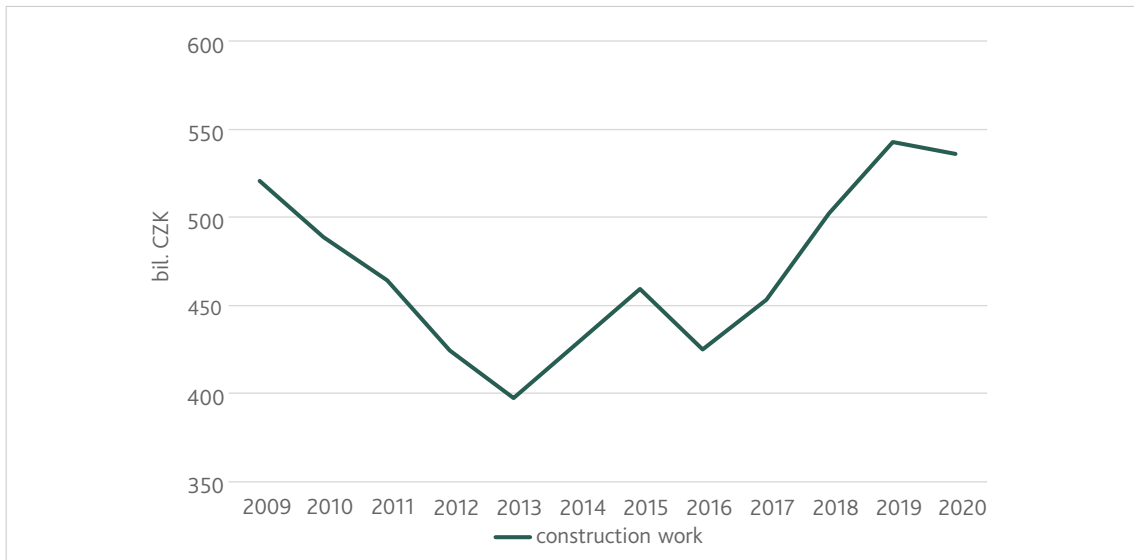
Cement international trade is less intensive, than steel. While production and export of steel from Czechia is on comparable levels (4,5 million tonnes), cement export is approximately 15% of country's production.³³ This is due to the different parameters of the product – in contrast with steel, long-haul transportation of cement is uneconomical. Low volumes of international trade also mean we must use a different definition of market competition for cement compared to steel. While steel producers compete (in sales, but also in decarbonisation) with corporations based in other regions with different policy frameworks, the main competitors of Czech cement companies are located in the surrounding countries with an EU policy framework. On the one hand, the competition is fairer with all actors 'playing by the same rules', while on the other hand, it might be harder to create a competitive advantage through a more successful decarbonisation.

³³ <https://www.svcement.cz/data/data-2014/>

Construction market

As the majority of cement is used for construction, the developments in the cement market have largely tracked the increasing construction activity in the country. As seen in Fig. 6, the construction market experienced a drop by almost 25% in years 2009–2013 and a steady increase afterwards (with a small correction in 2016).

Fig. 6: Construction in Czechia – investment



Source: ISFC based on the Czech statistical office data³⁴

Future development in the cement market will be influenced by two main drivers:

- The Czech National Bank’s efforts to tackle two-digit inflation by increasing central bank interest rates, while also tightening conditions for mortgages. This is likely to result in lower construction rates.
- Fiscal policy of central government and municipalities, as government contracts account for approximately 40% of the cement market on average (see Fig. 7).

Fig 7: Ratio of public contracts in the construction market



³⁴ Czech Statistical Office: https://www.czso.cz/csu/czso/souhrnna_data_o_ceske_republice

Cement industry emissions: Four key players in Czechia

Emissions in the lime and cement industry are shared by four companies spread across the country with an emission share of over 15% of the country's total emissions. The biggest emitter is Českomoravský cement, with its two installations located in Mokrý and Radotín (32% of the industry's emissions), followed by other companies with a balanced split, namely Cemex, Cement Hranice, Lafarge (15%, 15%, 13% respectively).

Table 1: Cement emissions (kt of CO₂)

	Emissions 2020	Emissions 2020 (% of cement industry)	Owner
CEMEX	565 801	15%	Cemex
Cement Hranice	544 348	15%	Dyckerhoff
Lafarge Cement, a.s.	476 623	13%	LafargeHolcim
Českomoravský cement	1 161 362	32%	Heidelberg
Total	2 748 134	100%	

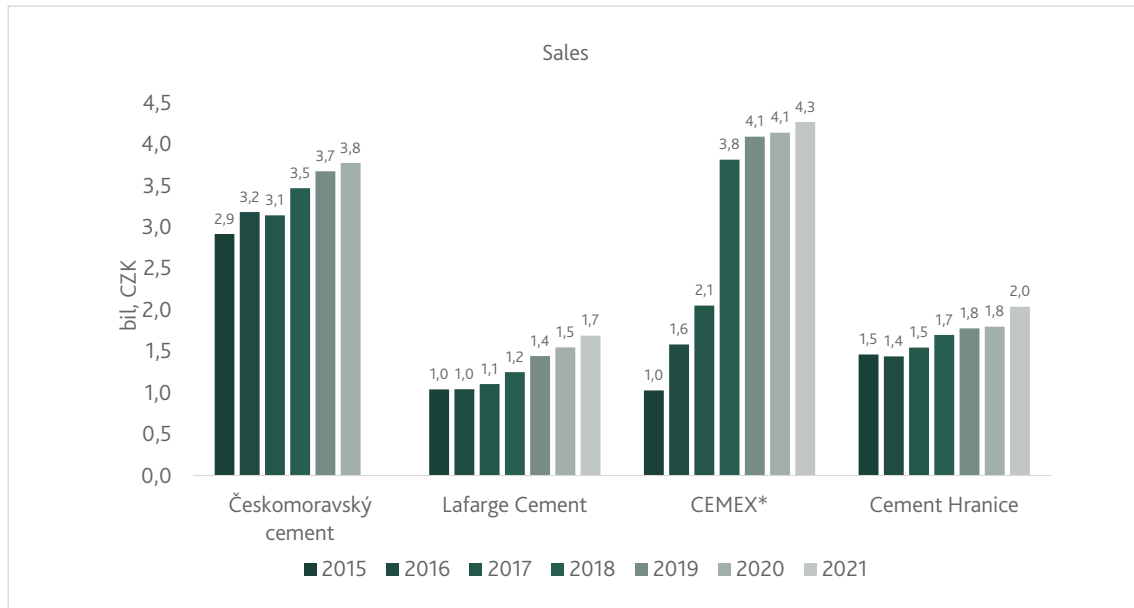
Source: ISFC based on the ETS data

All cement producers in Czechia are subsidiaries of multinational corporates. As discussed later, most of the decarbonisation initiatives are driven by headquarters located abroad (like product range improvements and circularity efforts).

Financial condition: Medium-term positive trend

Financial statements reflect the positive developments in the cement market during previous years. The sales of all four companies show a visible positive trend, as visible in Fig. 8.

Fig. 8: Sales and EBITDA margin of cement companies



Source: ISFC based on company annual reports, *Note: CEMEX's financials have been influenced by intra-group mergers since 2017, the cement business merged with the concrete business and other operations within CEMEX Czech Republic, s.r.o., in 2018, separate data for the cement business is no more available

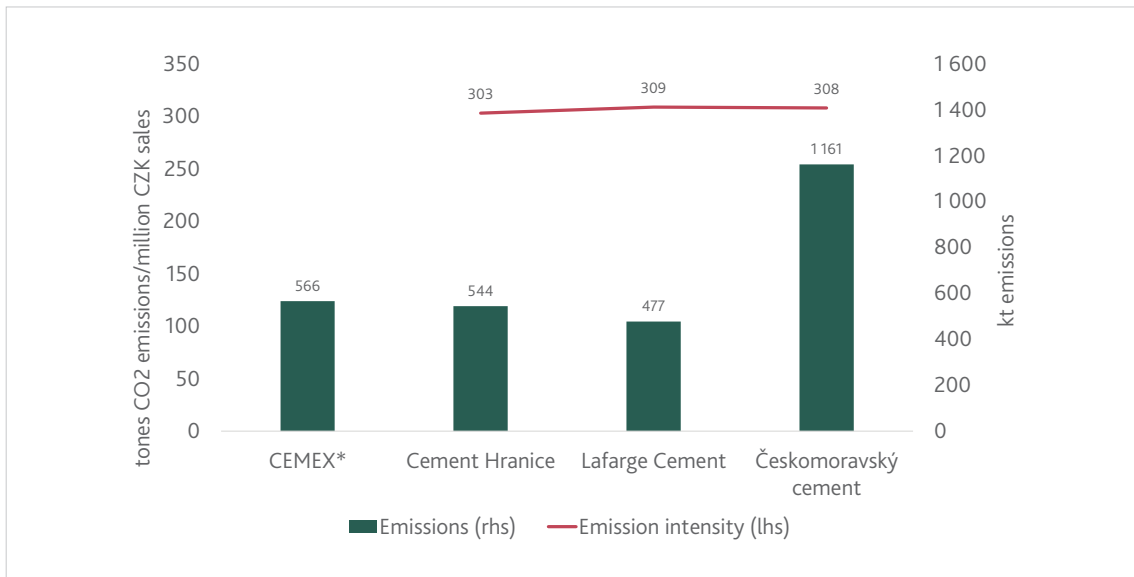
EBITDA margins are shown in the right-hand side of the chart above. With minor fluctuations, margins constantly reach values of over 30%, which is usually considered a sufficient margin to finance further investments (compared to the lower single digit margin percentage in the steel industry).³⁵

High margins, profits and good financial health of the Czech cement operations put them in a good starting position to invest in decarbonisation technologies. On the other hand, the poor results of the Czech subsidiary of Cemex, whose cement business was merged with the concrete business and other operations within a single legal entity, could potentially limit their investment capability, as the financial performance may be seen as a riskier entity for potential lenders.

All companies report similar emission intensity of their revenues (excl. CEMEX, which provides no separate cement sales data). Since production volume levels on entity basis are not publicly available, emissions can be compared to the reported sales. As shown in the chart below (please see the red line and a primary scale in Fig. 9), all Czech companies need to emit approximately 300 tonnes of CO₂ to generate CZK 1 million of sale revenues.

³⁵ CEMEX's financials have been influenced by intra-group mergers since 2017, the cement business merged with the concrete business and other operations within CEMEX Czech Republic, s.r.o., in 2018, separate data for the cement business is no more available.

Fig. 9: Emission intensity of cement production



Source: ISFC based on company annual reports

Decarbonisation efforts: Carbon capture and circularity

As all cement subsidiaries have multinational owners, the sustainability framework, including targets and strategies, is set at the global level. Therefore, the table below lists various goals related to emission reduction and statements published in recent years by each of the groups' headquarters:³⁶

³⁶ Websites of companies

Table 2: Decarbonisation efforts of Czech cement companies

	Heidelberg (Českomoravský cement)	Cemex	Lafarge	Dyckerhoff (Cement Hranice)
Emission reduction goal	15% compared to 2019 by 2030	35% compared to 1990 by 2030	20% compared to 2018 by 2030, net zero by 2050	20% compared to 2021 by 2030, net zero by 2050
Emissions intensity goal	less than 500 kg per tonne by 2030	475 kg CO2 per tonne by 2030	475 kg CO2 per tonne by 2030	below 500 kg CO2 per tonne by 2030
Utilized technologies	CCUS, circularity	3D print, circularity, hydrogen	CCUS, waste-derived fuels, calcined clay use	3D print, CCS, circularity
Other	established international expert taskforce to help on decarbonisation	Introduced a new concrete with lower generated emissions. Founding member of First movers' coalition – group intending to decarbonize production.	30% revenue from sustainable products by 2030	Introduced cement including 20% of a recycled construction waste – decrease of emissions of 30%.

Source: ISFC based on company websites

As can be seen in Table 2, most of the decarbonisation initiatives seem to be centred around two pivotal technologies – CCUS and circularity. Although CCUS technology has been subject to intensive development, running projects are currently in the pilot phase and lack industrial scale. Moreover, there are further barriers to implementing CCUS technology in Czech cement facilities, as demonstrated in Box 3.

Box 3: Specific conditions for CCUS in Czechia

A significant cost of operating CCUS technology in a cement facility is related to the transportation of the captured gas to a storage location or for utilisation. Therefore, CCUS is most cost efficient in large facilities or clusters of multiple different emitters. Production of cement in Czechia is spread equally around the country without the possibility to leverage savings through proximity or clustering.

- Due to their size, Czech cement producers are disadvantaged in comparison to their larger competitors in other countries (for example, average emissions in cement factories in Poland are 875³⁷ kilo tonnes of GHG emissions in each factory – about 60% higher than their Czech counterparts). Subsidies from the Innovation fund, the main public funding tool for industry, are granted based on “effectiveness of greenhouse gas emissions avoidance”.³⁸ This criterion might make it more difficult to obtain funding for smaller producers, as they cannot achieve economies of scale. There is also a higher cost associated with onshore carbon storage, as the technology has not been explored to the same extent as offshore carbon storage.

Based on the above, it is not surprising that most of the producers have opted for an approach based on circular economy, despite its limited potential for emission abatement. By leveraging lower priced raw materials (used concrete) and a cheaper production process, the manufacturing costs could potentially be equal or even lower than primary production.³⁹ The main remaining obstacle seems to be the logistics and the collection of secondary concrete, and the lack of adequate norms supporting circularity (see the chapter about Czechia’s policy framework).

Development of circular approach is also hindered by Czechia’s construction norms. Compulsory norms for construction are very restrictive in potential usage of recycled cement and concrete or cement with lower content of clinker. As a result, architects and real estate companies are not leveraging low carbon cement to its full potential. As there already is a large demand from real-estate developers for lower emission building materials, market will be quickly created once the construction norms are updated.

³⁷ ETS data

³⁸ Innovation Fund programme document, European Commission, 2022: https://climate.ec.europa.eu/eu-action/funding-climate-action/innovation-fund/what-innovation-fund_en#award-criteria

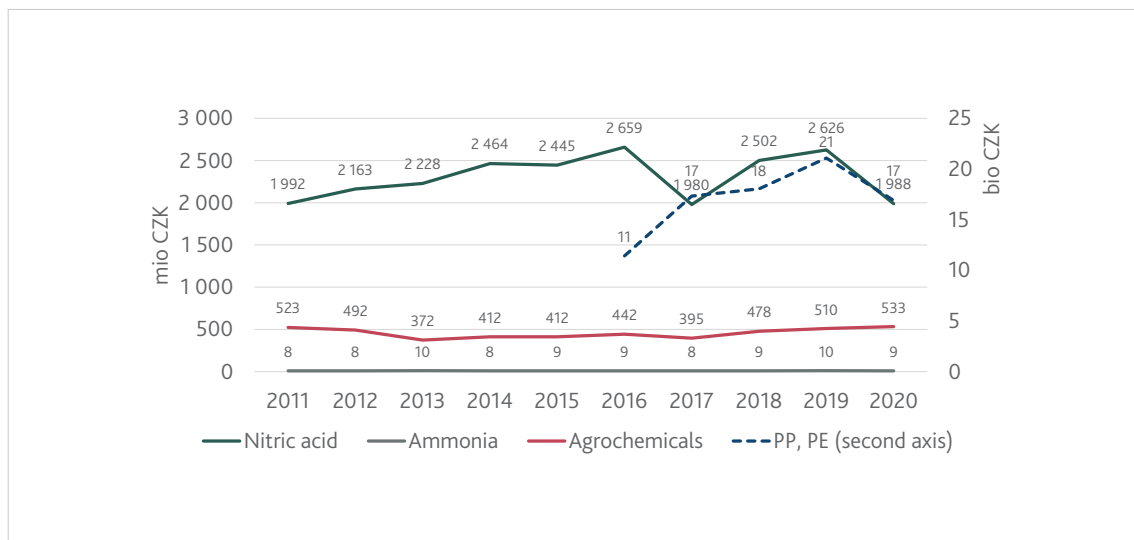
³⁹ Ohemeng, Eric A., Ekolu, Stephen O.: Comparative analysis on costs and benefits of producing natural and recycled concrete aggregates: A South African case study, 2020

Chemical production⁴⁰

As discussed earlier, the chemical industry accounts for a much smaller proportion of industry emissions in Czechia. For the chemical sector, decarbonisation is also a more complex issue, as carbon is the base of the industry's products and therefore the production cannot be completely decarbonised. Scientists must research how to amend carbon production pathways without emitting any greenhouse gases.

As visible in Fig. 10, value of production of various chemical substances is on very different levels. Ammonia has the lowest production value of 8–10 million CZK. On the contrary, polymers like polypropylene and polyethylene have much larger value of production – almost CZK 17 billion in the last observed year (data before 2016 are unavailable).⁴¹

Fig 10: Chemicals production in Czechia (current prices)



Source: ISFC, Czech statistical office

Note on data availability

- Production data for individual products is largely unavailable due to the diversification to multiple different substances – only aggregate data for the chemical industry are usually available.

⁴⁰ Differently structured data sources are used in this study – while the Czech Statistical Office uses detailed product split for publishing of production related data, the Emission Trading System of the European union uses distinctly less detailed categorization approach. Also, as we decided to carve out only two NACE families relevant for emission analysis in the CEE region, data are rarely collected on this level of detail. The Czech statistical office presents data for import and export only on “Chemical products” basis, which cannot be used for our chosen products. Therefore, in the chemical industry part, it is not possible present data as consistent as the previous industry chapters with less diversified product ranges.

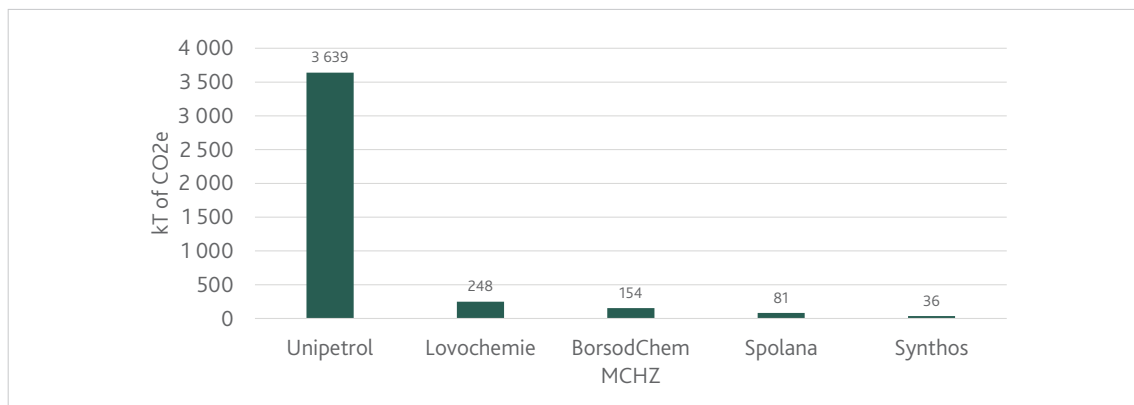
⁴¹ Czech Statistical Office, 2020: <https://www.czso.cz/csu/czso/vyroba-vybranych-vyrobku-v-prumyslu-rok-2020#>

- Export and import data are available for all chemical substances in total values only, therefore the level of international trade for particular chemical products cannot be determined.

Chemical industry emissions

Fig. 11 below compares emissions in 2020 of major companies in the chemical sector⁴² based on data from ETS (compared to the emissions from other sectors: steel 8,4 million tonnes, cement 2,7 million tonnes). Only a small part of Unipetrol's emissions is related to chemicals production – most emissions are related to oil refining. However, splitting of these emissions is not possible because of the integrated ammonia + oil refining manufacturing path.

Fig. 11: Comparison of emissions from chemical industry



Source: ISFC based on ETS data

Despite comparably lower emissions from the chemical sector compared to the steel and cement production (not considering Unipetrol's oil refining emissions), this sector is the most complex to tackle from the product range perspective. All Czech emitters are reported in the ETS under two families: "Production of bulk chemicals" and "Production of nitric acid". Specific companies are listed below. As with cement, the focus is on the ownership structure of the companies, as decarbonisation initiatives are largely driven by company headquarters.

- **Unipetrol** is the largest chemical production company in the country from the emission point of view and in terms of revenues (see the chapter about financial condition). It has a wide range of products, with the biggest focus on oil refining.⁴³ As oil refining is not understood as part of the chemical industry but is considered its own sector, there will be no further analysis of the financial position of the company, as any such analysis would inevitably reflect its oil refining activities rather than the ammonia and polymers production.

⁴² Emissions reported for the chemical sector under the ETS system require similar clarification as in the case of the steel sector

⁴³ Annual report, Unipetrol, 2020

- **Lovochemie** is one of the biggest producers of nitrogen-based fertilizers in the country. This company is part of Agrofert, a large concern focused on chemical and agricultural production. The group employs over 34,000 people⁴⁴, mostly in Czechia and Slovakia. Owned by PKN Orlen, Lovochemie is a part of a multinational concern with almost EUR 26 billion revenue in 2020.⁴⁵
- **BorsodChem MCHZ** produces a wide range of chemicals such as artificial sweeteners, water treatment chemicals, and polyurethane. However, their emission-intensive product is reflected in their assignment to the activity in the ETS – “Production of nitric acid”. Since 2011, BorsodChem group has been owned by Wanhua Chemical – a China based conglomerate with most of the operations run in Asia, but also with a few subsidiaries in Europe (Czechia, Hungary).
- **Spolana** is also part of the bulk chemicals family, as it produces not only organic substances like PVC and caprolactam, but also inorganic, e.g., sulphur and chlorine acid. Owned by PKN Orlen, Spolana is a part of a multinational concern with almost EUR 26 billion revenue in 2020.⁴⁶
- **Synthos** produces rubber, agrochemicals, and latexes. Out of the analysed companies, Synthos is a part of the smallest group. Consolidated revenues of its parent company, Synthos SA, were slightly above EUR 1 billion (compare to PKN Orlen’s revenues – EUR 26 billion).

Financial condition

Three of the companies – Lovochemie, BorsodChem, and Spolana – had revenues in the range of CZK 3,5 – 6 billion in the last years (compared to Českomoravský Cement, the largest cement producer, with revenue of around CZK 4 billion). However, the fourth analysed company, Synthos, achieved revenues CZK 10 – 18 billion over 2015–21, almost equal to the other three other companies combined. This gives an idea about the scale and structure of the chemicals’ market.

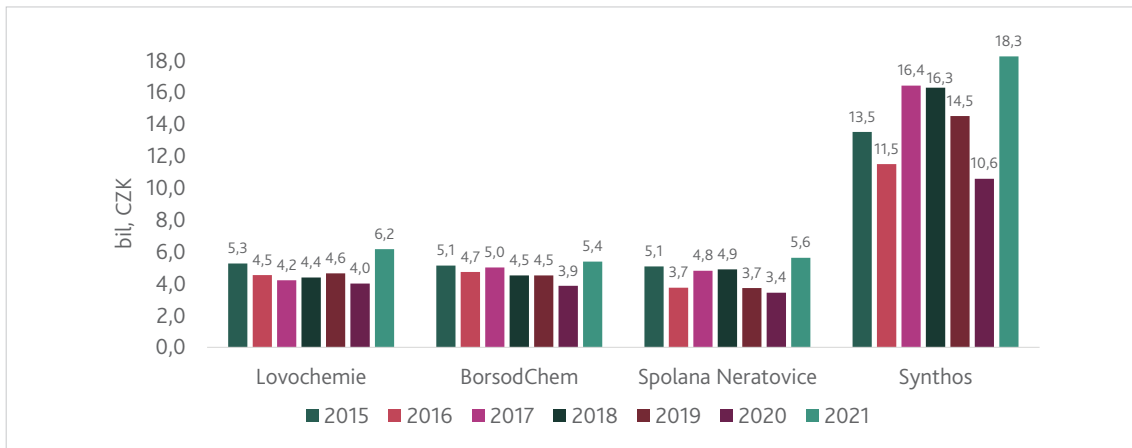
In 2020, all the companies incurred a sales decrease of varying scale due to the COVID-19 crisis. As visible on the chart below, production crisis in 2020 struck Synthos the hardest with a drop in sales by 27% (and –35% compared to 2018). In 2021, all the companies recorded a major recovery, with sales reaching record levels.

⁴⁴ Annual report, Lovochemie, 2020

⁴⁵ Annual report, Lovochemie, 2020

⁴⁶ Annual report, Spolana, 2020

Fig. 12: Sales of companies in the Czech chemical sector

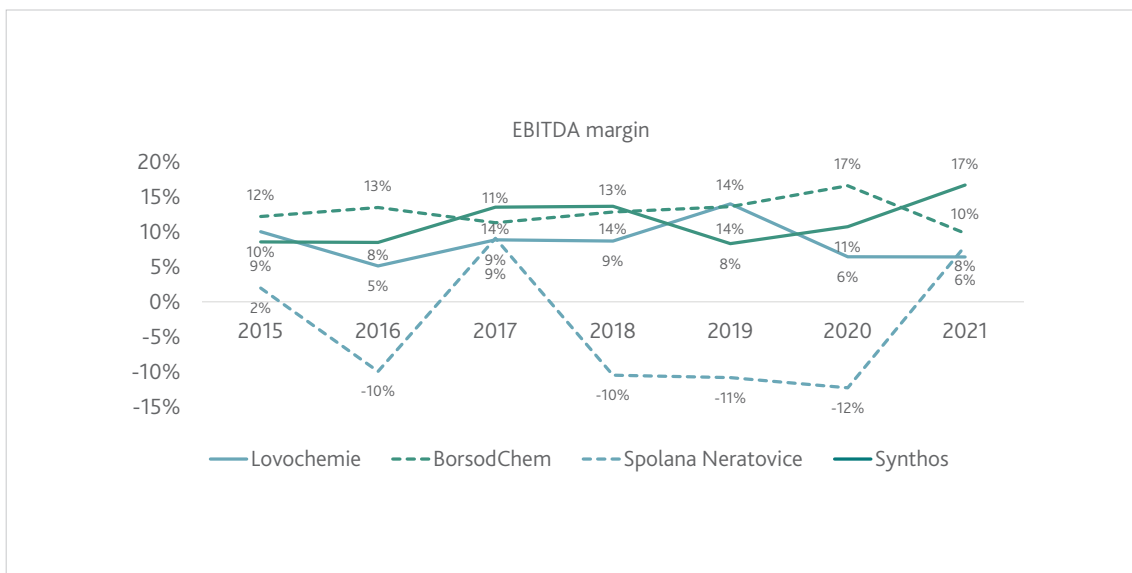


Source: ISFC based on company annual reports

When looking at the chemical sector's EBITDA margin, Spolana Neratovice reported a negative operating result in several years over 2015–21, which means that the revenues generated by the sale of products did not cover the operating costs of the company. Synthos, the most profitable company, reached EBITDA margin of around 10%, as visible on the Fig. 13.

EBITDA margins show rather low profitability of chemical production (e.g., compared to the cement production with margins around 30%). The chemical sector, with margins of around 10%, will have greater difficulty finding additional financing to invest into decarbonisation and blended financing of their efforts will be necessary for successful decarbonisation.

Fig. 13: Margin of chemical producers



Source: ISFC based on company annual reports

Decarbonisation efforts

There is much less publicly available information about the chemical industry's decarbonisation efforts, compared to the cement and steel industries. Currently, there are only two decarbonisation-focused initiatives in the Czech chemical industry. First is the installation of a new heating plant fuelled by gas instead of coal in Spolana Neratovice. The main aim of this upgrade was not to decrease emissions of greenhouse gases, but to reduce nitrogen and sulphur emissions. In fact, Spolana did not actually report a decrease of CO₂ in its press statement.⁴⁷

By comparison, Synthos is more ambitious, with an aim to reduce its CO₂ emissions by 28% by 2030.⁴⁸ Synthos aims to achieve this goal by using less CO₂ emitting energy sources. However, Synthos' plan works with a more controversial technology – nuclear microreactors. Furthermore, considering the development stage and expected price of these installations, there will be, under a business-as-usual scenario, hardly any emission reductions through this use of this technology before 2040.

The threats posed to the environment by the chemical industry are much more varied than cement or steel. In response, companies from the chemical industry have mostly focused on lowering emissions of sulphur and nitric oxides and improving their water management and wastewater purity.

Secondly, emissions from chemical industry companies are at significantly lower levels than those of cement and steel companies. Considering that their revenues are noticeably higher than those of cement companies, costs of emission allowances do not form a large part of their annual budget, the same way it does for other industries. As the increasing price of carbon puts pressure on company revenues going forward, we might see more activity in decarbonisation efforts within the chemical industry.

⁴⁷ Spolana Neratovice má novou teplárnu, výrazně sníží emise, 2022: <https://www.hybrid.cz/spolana-neratovice-ma-novou-teplarnu-vyrazne-snizi-emise/>

⁴⁸ Strategy 2030, Synthos: https://www.synthosgroup.com/wp-content/uploads/2021/12/Synthos_CSR_Strategy-2030_CZ.pdf

Policy landscape of Czechia

Legislation plays an important role in incentivising or delaying industry decarbonisation process. Given that clean electricity and hydrogen are crucial elements for maintaining industrial competitiveness, government legislation must ensure sufficient upscaling of renewable energy sources - not only to meet country's energy needs, but also to ensure energy independence and overall economic competitiveness. In the Czech case, the core document outlining future development in this space is the National Energy and Climate Plan (NECP), Hydrogen strategy and a document outlining the country's strategy for industrial decarbonisation. The lack of the latter results in uncertainty for companies, as the pathway for industry decarbonisation is only briefly defined.

National energy and climate plan

According to the NECP of Czechia, published in 2020, the overall share of renewable energy sources (RES) in total electricity production will increase to 22% by 2030 up from 15.5% in 2020. In total, 77.4 TWh of electricity will be generated in 2030, compared to 80TWh of electricity in 2019.⁴⁹ Due to a relatively large deployment of RES in 2009-2012, driven mainly by solar PV plants, Czechia had a head start in renewables installations. However, in the following years, the pace of new RES construction slowed. The current average yearly growth of renewable electricity production of 0,63% per year up to 2020 puts the country on course to fall well short of the target set by the NECP for 2030.

There is no credible estimate for the levels of electricity production necessary to decarbonise the entire industrial sector. Based on available data, the projected renewable energy capacities under the NECP have not taken into account the decarbonisation needs of energy intensive industries. For example, as stated in the Hydrogen strategy of Czechia, the production of green hydrogen needed to produce low-carbon steel and iron in 2018 (5 and 4 million tonnes, respectively) would have required around 20TWh⁵⁰ of electricity, which constitutes about 25% of the entire country's energy production in 2021.⁵¹

The European Commission's feedback from 2021 echoes stakeholder concerns.⁵² The Commission pointed out that Czechia is not fully exploiting the potential of solar and wind power generation. Specific measures to simplify administrative processes or remove the existing barriers to the development of renewables or to increasing energy efficiency would help.

⁴⁹ Srovnání scénářů transformace elektroenergetiky ČR, Fakta o klimatu, 2020: <https://faktaoklimatu.cz/info-grafiky/srovnani-energetickych-scenaru-cr>.

⁵⁰ Hydrogen strategy of Czechia, Ministry of Industry and Trade, 2021: https://www.mpo.cz/assets/cz/prumysl/strategicke-projekty/2021/8/Vodikova-strategie_CZ_G_2021-26-07.pdf

⁵¹ Energetický regulační úřad, Annual report, 2021

⁵² Evaluation of Czechia's energy plan, European Commission, 2021

Hydrogen strategy⁵³

Czechia published its hydrogen strategy in July 2021 in compliance with the European Union's 2050 agenda. The strategy discusses the production, usage, and transportation of low-carbon hydrogen. The strategy distinguishes between four types of hydrogen according to its production sources:

Box 4: "Colours" of hydrogen

Green	Pink
Electricity from renewable sources	Electricity from nuclear
Grey	No colour assigned
Pyrolytic decomposition of natural gas	Pyrolytic decomposition or plasma gasification of waste

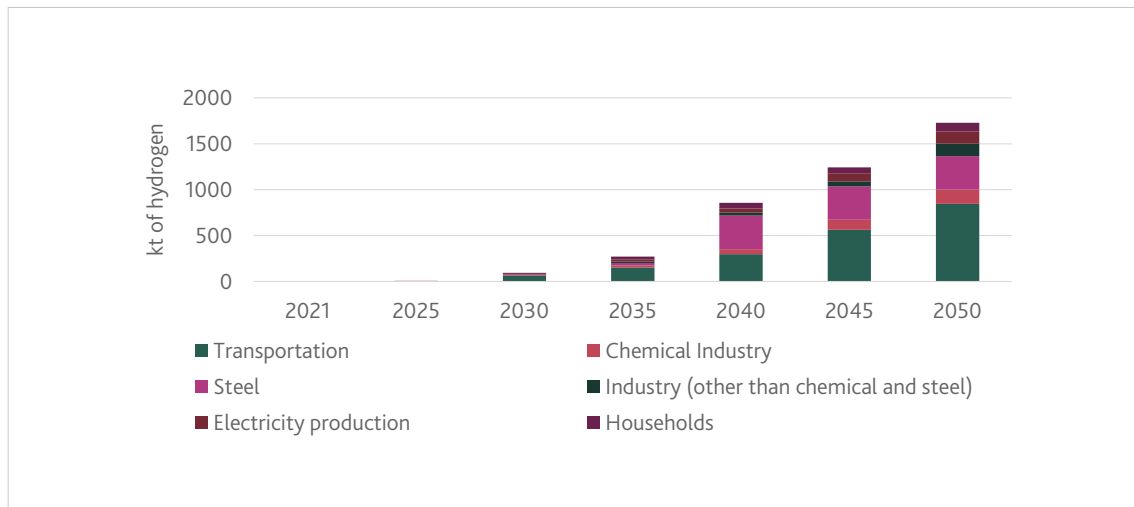
Source: ISFC based on Hydrogen strategy of Czechia

Based on the predictions stated in the Hydrogen strategy, there will not be a sufficient supply to satisfy hard-to-abate industries by 2035. Estimates for hydrogen consumption in 2035 and 2050 are shown on Fig. 14. The total estimated consumption in 2035 is 273 kilo tonnes of hydrogen. The amount rises to an overwhelming 1,728 kilo tonnes in 2050. Most of the consumption has been allocated to transportation (green column on Fig. 14: 56% of total). It is predicted that steelmaking will require 27 kilo tonnes of hydrogen in 2035 and 364 kilo tonnes in 2050. However, the amount planned to be produced in 2035 would only be enough for production of approx. 300 kilo tonnes of steel. For context, the current annual production in Czechia is only now reaching 5 million tonnes. This shows the gap between the current hydrogen production rates and the amounts needed to meet the industry needs alone.

Production plans in the hydrogen strategy are insufficient to accommodate primary steel production in 2035. Hydrogen strategy plans to provide for steel and chemical industry in 2045, however with the free allowance phase out currently suggested for 2032, hydrogen supply will have to be secured much earlier than 2045. With limited local production capabilities, majority will have to be imported from other regions. To secure the necessary supply which is to be in high demand from other countries as well, Czechia should start working its hydrogen import plans. Distribution could be ensured either by retrofitting the current natural gas network or building a new independent and dedicated network for hydrogen.

⁵³ Hydrogen strategy, Ministry of Industry and Trade, 2021: https://www.mpo.cz/assets/cz/prumysl/strategicke-projekty/2021/8/Vodikova-strategie_CZ_G_2021-26-07.pdf

Fig. 14 Consumption of hydrogen in Czechia



Source: ISFC based on Hydrogen Strategy of Czechia

Indirect cost compensation

While the analysed industries are all part of the free allowance allocation scheme, they are nonetheless impacted by their presence in the ETS-covered geographies, albeit indirectly. Their energy suppliers are subject to ETS trading, and thus they will expect their customers to partly absorb the cost related to the emission allowances. Ultimately, the increased price of electricity could have a negative impact on the competitiveness of hard-to-abate industries, which could lead to carbon leakage.

In order to avoid such a development, the European Commission has approved the Czechia's scheme to compensate energy-intensive companies for indirect emission costs under the State Aid guidelines of the ETS. The total size of the fund is EUR 1,4 billion and it is intended for distribution in the period 2021–2030. Simultaneously, the European Union has concluded that state support should be set to the minimum level and not jeopardise equal conditions in the internal energy production market.⁵⁴

To be eligible for a compensation of up to 75% of their electricity cost, the enterprise must be a part of the carbon leakage endangered sector (sectors are listed in the Table 3). Also, companies must either source 30% of their energy consumption from carbon-free energy sources or follow the recommendations of an energy audit. Despite the fact the ratio of renewables in the Czech energy mix is significantly lower than the 30% of carbon-free energy requirement, it should be easily achievable for Czech producers. "Carbon-free" entails also electricity generated in nuclear plants, which presents approx. 34% of electricity consumed in Czechia. The programme was launched at the beginning of 2021; hence the first round of payments was

⁵⁴ Commission approves EUR 1,4 billion Czech scheme to compensate energy intensive companies for indirect emissions cost, European Commission, 2022: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1782

intended to compensate for electricity cost incurred in 2020.⁵⁵ The total allocated amount reached CZK 1,3 billion (EUR 53 million). The table below shows the split of the amount to different eligible sectors.

Table 3: Split of indirect cost compensation in 2021

Sector	Compensation in CZK
Manufacture of seamless tubes	3 654 596
Manufacture of aluminium	57 670 930
Manufacture of fertilisers and nitrogen compounds	16 776 432
Manufacture of chemical fibres	19 638 049
Manufacture of other organic substances	155 860 851
Manufacture of other inorganic chemicals	126 481 350
Manufacture of paper and paperboard	188 536 873
Manufacture of pig iron, steel and ferro-alloys	496 156 110
Total	1 064 775 192

Source: ISFC based on Ministry of industry and trade data⁵⁶

Despite the budget pool of CZK 1,3 billion, only approx. CZK 1,1 billion has been utilised. Almost 50% has been granted to pig iron, steel, and ferro alloy manufacturing sector. This indicates a very high level of electric energy consumption, even though current technologies are based on blast furnaces (BOFs), and therefore do not require as much electricity as EAFs. Fertilisers and nitrogen compounds producers (group including BorsodChem, Spolana and Synthos) received a compensation of CZK 16 million. The cement industry did not receive any compensation. Indirect cost compensation grew in relevance after the rapid growth of energy prices in 2022. As a reaction to the developments in past 6 months, Czech government has prepared a costcompensation plan aimed at both household and industrial entities. The total allocation in the programme is EUR 1,22 billion. The conditions set for the energy intensive industries are as follows:

- Up to 50% increase of energy-related costs,
- EBITDA of the requesting company must be negative,
- Cost is compensated up to EUR 8,5 million.

The last condition presents the key issue. As per the statement from Třinecké Železárny, the increase in energy costs will reach at least EUR 40 million.⁵⁷ Even though this calculation could not be verified and the eventual impact on each single business will differ based on their contractual pricing, the current compensation will be insufficient to enable energy intensive industries to maintain their competitiveness. Considering that each of the steel mills spent

⁵⁵ https://www.mzp.cz/cz/kompenzace_nakladu

⁵⁶ Indirect emission cost compensation, Ministry of Industry and Trade, 2021: <https://www.mpo.cz/cz/prumysl/prumysl-a-zivotni-prostredi/kompenzace-nepriimych-nakladu/informace-o-vyplacenych-kompenzacich-nepriimych-nakladu-za-kalendarni-rok-2020--267830/>

⁵⁷ Průmyslové podniky doufaly v zastropování energií, Český Rozhlas, 2022: <https://cesky.radio.cz/prumyslove-podniky-doufaly-v-zastropovani-energii-pomoc-prichazi-ve-forme-8761576>

around EUR 1 billion annually on energy-related cost in 2020⁵⁸, the leap in energy prices in past eight months must have had a significantly higher impact than the government-suggested EUR 8,5 million compensation will cover.

Strategy Czechia 2030

The industrial strategy of Czechia has not yet been published, but some inferences on the intended direction of industrial decarbonisation can be taken from the document “Strategy CZECHIA 2030” (Strategy 2030) published in 2017.

The Strategy 2030 follows publishing of the UN's Sustainable Development Goals (SDGs). While SDG number 9 – “Industry, Innovation and Infrastructure” is mentioned, the plans, policies or incentives for decarbonisation of industrial production are not outlined in detail. The Strategy 2030 describes industry decarbonisation only to a limited level as an “opportunity for technological growth and contribution to the global efforts of mitigation of the climate change”.

⁵⁸ Annual Reports of companies

Financing of decarbonisation in Czechia

Along with the policy landscape, access to finance for decarbonisation efforts plays an equally important role. Generally, there are two potential sources of funding – public and private. Public funding incorporates all the funding from the EU or state budgets. Private funding includes any source of financing from private entities. In Czechia, private financing is largely based on bank loans, but there is another option to acquire funds for decarbonisation initiatives - bond issuance.

Public finance

Modernisation Fund⁵⁹

The Modernisation Fund is a funding programme designed to “support 10 lower-income EU Member States in their transition to climate neutrality by helping to modernise their energy systems and improve energy efficiency⁶⁰.” Its funding pool is generated by the revenues of the auction of 2% of allowances in the ETS system from the years 2021–2030. For Czechia, that means a total amount of 193 million allowances. With the price of EUR 86 /allowance (price as of 29.8.2022), the total allocation by 2030 would be EUR 16,6 billion.

The Ministry of Environment (MoE)⁶¹, the administrator of the fund, has created nine specialised programmes to help allocate the entire funding pool more efficiently. Of the nine, the most relevant for decarbonisation of hard-to-abate industry is number three: “ENERG ETS: Improvement of energy efficiency and cutting greenhouse gas emissions in industry in the ETS”. The total funding for this programme is 13.3% of the total pool of the Modernisation Fund – about EUR 2.2 billion based on the current (August 2022) allowance price.

There are two suggested model projects relevant for industry decarbonisation:

- Upgrading (reconstruction or replacement) or reconfiguration of production or processing facilities.
- Implementation of waste heat recovery systems.

Up to 55% of the project’s expenses can be reimbursed from the ENERG ETS industry programme with calls aiming both for projects below EUR 15 million (two calls by September 2022, total allocation EUR 96 million) and above EUR 15 million (one call so far, total allocation EUR 2 billion). Since none of the calls from ENERG-ETS have been concluded yet (as of September 2022), the success rate of hard-to-abate industries using this funding cannot be evaluated.

Innovation Fund

The Innovation Fund is tailored to the needs of hard-to-abate industries. It will be funded

⁵⁹ Modernisation Fund programme document, Ministry of Environment

⁶⁰ https://ec.europa.eu/clima/eu-action/funding-climate-action/modernisation-fund_en

⁶¹ <https://www.sfzp.cz/dotace-a-pujcky/modernizacni-fond/>

by revenues from sales of 450 million allowances⁶² between 2020 and 2030. With the current price of EUR 86/allowance (August 2022), the overall pool to allocate would reach EUR 38 billion by 2030 to finance the following types of projects:

- innovative low-carbon technologies and processes in energy-intensive industries, including products substituting carbon-intensive ones,
- carbon capture and utilisation (CCU),
- construction and operation of carbon capture and storage (CCS),
- innovative renewable energy generation,
- energy storage.

The Projects are evaluated based on the following criteria:

- effectiveness of greenhouse gas emissions reduction,
- degree of innovation,
- project maturity,
- scalability,
- cost efficiency.

Calls from the Fund are divided into two categories: small projects (below EUR 7,5 million) and large projects (above EUR 7,5 million). So far (by October 2022⁶³), one call from each category has been published. Companies located in Central and Eastern Europe (CEE) were rather unsuccessful in securing funding: from 54 awarded projects, only 2 are based in the region.

The selection of projects shows that the Innovation Fund prioritises projects with a higher level of maturity and development. Efficiency of greenhouse gas emissions reduction, cost efficiency and scalability will be easier to achieve for installations with high production capacities. It is clear, that projects with a lower technological readiness level will have to seek alternative sources of funding.

National Recovery Plan

The Ministry of Industry (Mol) is administrating funds from the Recovery and Resilience Facility (RRF) via the National Recovery Plan. The total funding of the Plan in period 2021–2026 will reach approximately EUR 6 billion⁶⁴ in grants and another EUR 800 million in the form of loans.

The Plan consists of nine pillars with multiple programmes in each. Decarbonisation and other sustainable initiatives will be financed from the pillar “Physical infrastructure and green transition”. The only relevant programme for industrial decarbonisation within this pillar is “Circular economy, recycling and water for industrial use”. The total financing for the entire period is

⁶² Innovation Fund programme document, European Commission, 2022, https://climate.ec.europa.eu/eu-action/funding-climate-action/innovation-fund/what-innovation-fund_en

⁶³ Third call will be published in November 2022.

⁶⁴ <https://www.sfzp.cz/dotace-a-pujcky/norske-fondy/program-zivotni-prostredi/>

EUR 176 million, aimed at “recycling infrastructure, circular solutions and water-saving”.⁶⁵ Funds available in the Modernisation Fund could therefore be helpful to finance circularity solutions in emission-intensive industries, especially secondary production of cement and steel.

Operational programmes⁶⁶

Czechia is set to receive EUR 24.5 billion from European structural and investment funds (ESIF) in period 2021–27. The largest portion, EUR 11.1 billion, comes from the European fund for regional development. On the national level, ESIF are translated into operational programmes with individual calls for proposals. Out of the nine operational programmes, only one seems to be relevant for industry decarbonisation:

Table 4: Operational programme for Industry Decarbonisation

Programme	Allocation	Potential use
Operational programme Technology and Competitiveness (OP-TAK)	EUR 3.26 bil.	• Resource efficiency
		• Low-carbon economy
		• Waste energy utilisation
		• Increase of energy efficiency of manufacturing and technological processes
		• Improvement of waste recycling and reuse

Source: ISFC based on Ministry of Environment

The technology and competitiveness programme has been approved only recently – in June 2022 – and therefore it is too early to judge its usability for hard-to-abate industry with much certainty. The programme’s aim is to “support research, innovation, smart energetics and circular economy” and “businessmen from all regions of Czechia except for Prague can request funding”.⁶⁷ Since OP-TAK is focused on SMEs, its usability for hard-to-abate industries will likely be at a lower level.

What follows is a summary of all funds available for decarbonisation of hard-to-abate industry in Czechia from 2021–2030. Looking at the total value, it is notable that there is no programme dedicated solely to investments in Czech industry. The below table shows the maximum available funding, which hard-to-abate industries must compete for.

⁶⁵ <https://www.planobnovycr.cz/fyzicka-infrastruktura-a-zelena-tranzice>

⁶⁶ European Funds alphabet, Ministry of Regional Development, 2022: <https://www.dotaceeu.cz/getmedia/4b-dc6693-acda-4210-a3c4-c5afaedffobe/ABECEDA-FONDU-EU-2021%e2%80%932027.pdf.aspx?ext=.pdf>

⁶⁷ European Commission approved OP TAC, Ministry of Industry, 2022: <https://www.mpo.cz/cz/podnikani/dotace-a-podpora-podnikani/optak-2021-2027/aktualni-informace/evropska-komise-schvalila-op-tak--napodporu-podnikatelu-je-pripraveno-temer-82-miliard-korun-z-fondu-eu--268464/>

Table 5: Summary of public funding for industry decarbonisation (total amount by 2030)

	Modernisation Fund	National Recovery Plan	OP-TAK	Innovation Fund
Funding (bil EUR)	2.2 ⁶⁸	0.18	3.26	38 ⁶⁹
Administrator	Ministry of Environment	Ministry of Environment	Ministry of Industry	Ministry of Industry
Applicability for hard-to-abate industry	High	Low	Low	High

Source: ISFC

In conclusion, the only funds readily available for the Czech hard-to-abate industry are the Modernization Fund and Innovation Fund. Funding allocation in both Funds appears sufficient, however the availability of funding for Czechia’s hard-to-abate industry will largely be determined by the quality of their funding applications. The low success rate of companies located in the CEE region in the previous two calls of Innovation Fund demonstrates the high competition and likely future challenges for the region.

Should this trend continue, the divergence in decarbonisation efforts seen between Western and Eastern EU countries will inevitably worsen as a result. As the Modernisation Fund’s ENERGETS calls have not yet been evaluated, there is no indication on future financial flows. Creation of special programmes for hard-to-abate industry within the Modernisation Fund would ensure sufficient funding channels to enable decarbonisation and the prevention of carbon leakage.

Role of Czech National Bank (CNB)

CNB activities in sustainable finance field have been very limited so far. Compared to the European Central Bank (ECB), CNB’s target is two-fold:⁷⁰ (1) primary target is “to maintain a price and financial stability, safe functioning of the financial system of Czechia” and (2) the secondary target is “to support government’s economic policies and policies of the EU with the aim to contribute to achievement of the EU’s goals”, unless the primary target is impacted.

Therefore, CNB could potentially leverage some of the available tools to support greening of the financial system (provided that price stability is not impacted). Some inspiration can be taken from the ECB or other European central banks. Below follows a list of few examples showing how sustainability can be incorporated in central bank monetary policy tools and activities:

⁶⁸ allowance cost EUR 85

⁶⁹ allowance cost EUR 85

⁷⁰ Act on the Czech National Bank, part 1, par. 2 (1), https://www.cnb.cz/export/sites/cnb/cs/legislativa/galleries/zakony/zakon_o_cnb.pdf

- Incorporating sustainability-related risks in risk assessment of financial institutions. As Mark Carney, former governor of the Bank of England described⁷¹, there are two types of risks arising from global climate change that financial institutions should pay attention to: (1) physical risks (possible risk of losing an asset due to damage caused by climate change) and (2) transition risks (possible loss of asset value due to a transition to a low-carbon economy or policy changes that make the asset unusable). Role of CNB, as the financial system regulator, is to ensure local banks pay sufficient attention to climate risks in their risk management systems.
- Another tool central banks have available for supporting transition in the financial system is prioritisation of investment into green bonds. For example, DNB, the Dutch central bank, has invested more than EUR 460 million in green bonds before the end of 2021.⁷² ECB has also announced its intention to prioritise purchases of green bonds under the Corporate Sector Purchase Programme.⁷³
- Central banks can establish a knowledge generation and exchange platform to support adoption of green financing practices. Upcoming European non-financial reporting regulation creates a need for significant expansion of current non-financial reporting skills among finance and legal professionals.

In order to support greening of the finance system, CNB could take a more proactive approach in sending more positive signals to the Czech market, indicating its support of sustainable finance products such as green bonds or green mortgages. Despite its primary focus on maintaining price stability, its secondary goal – to support Czech and EU goals and policies – gives the CNB a mandate to play a more active role in sustainable finance.

Private finance

In addition to public funding sources, decarbonisation of the hard-to-abate sectors will require the mobilisation of private capital. Businesses in these sectors tend to rely on the traditional financing approach, based on bank loans of varying maturities.⁷⁴

Corporate Banking:

As specific conditions of particular loans are typically subject to a contractual confidentiality clause, it is difficult to ascertain the entire situation in detail from publicly available sources. The most relevant examples regarding sustainability in debt financing is listed below.

- **Česká spořitelna** (member of Erste Group, market ratio 24%): There is no specific information from the area of corporate banking. Česká Spořitelna promotes mainly

⁷¹ Breking the tragedy of the Horizon – climate change and financial stability, Mark Carney, 2015
<https://www.bankofengland.co.uk/speech/2015/breking-the-tragedy-of-the-horizon-climate-change-and-financial-stability>

⁷² Sustainable Invesmten, DNB: <https://www.dnb.nl/en/green-economy/sustainable-investment/>

⁷³ Green Central Banking, European Parliamentary Research Service, 2022: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733614/EPRS_BRI\(2022\)733614_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733614/EPRS_BRI(2022)733614_EN.pdf)

⁷⁴ Annual reports 2021

sustainability products for retail investors – ethical investment funds or mortgages for sustainable residential buildings are the main flagship offers for financing transition.

- **Komerční banka** (Société Générale, market ratio 18%) claim to have provided “ESG-related” loans of CZK 21,9 billion (EUR 890 million) in 2021. For example, ESG-related loans were provided to finance energy efficiency improvements, low emission mobility or wastewater management. The total value of corporate loans is CZK 229 billion, therefore ratio of ESG-related loans amounts to 10%. Without further information about the classification and categorisation of ESG-related loans, it is very difficult to assess the validity of this measure.
- **Raiffeisenbank** (market ratio 8%) bank does not publish any ESG debt financing information.
- **Československá obchodní banka** (KBC group, market ratio 27%) is the only bank referring to the EU taxonomy – CZK 3,2 billion (EUR 129 million) of debt financing in alignment with the EU taxonomy was provided in 2021. In total, ČSOB provided loans worth CZK 175 billion to its corporate clients, therefore 1,8% of the total corporate debt financing was in alignment with the EU taxonomy.⁷⁵

Looking ahead, EU taxonomy and related compulsory reporting like Sustainable Finance Disclosure Regulation (SFDR) will introduce higher level of reporting standardisation and will put additional pressure on financial institutions to expand their sustainability-aligned financing.

Capital market

In addition to loan financing, companies can also issue green and/or sustainability-linked bonds during their transition phase. The EU Green Bond standard allows bonds to be marketed as green, if the proceeds will be used to fund an activity aligned with the EU taxonomy.⁷⁶ For each of the analysed industries, the taxonomy sets a different set of criteria. Table 6 shows alignment of the Czech cement and steel companies with the EU taxonomy.

⁷⁵ Ratios of ČSOB and Komerční banka should not be compared, as both institutions are using a different classification (“ESG loans” vs taxonomy-aligned loans).

⁷⁶ European Green Bond Standard, European Commission, 2022: https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/european-green-bond-standard_en

Table 6: Alignment of Czech hard-to-abate industry with taxonomy criteria

Industry	Taxonomy criteria ⁹	Company Conclusion	Alignment with EU taxonomy
Steel	EAF: at least 90% of steel scrap used	Liberty Steel: 100% since 2025	Aligned
	BOF: maximum of 2,146 t CO ₂ /t	Třinecké Železářny: 1,8 t of steel	Aligned
Cement	maximum of 1,191 t CO ₂ /t of cement	Českomoravský cement: n/a	Aligned
		Cemex: 0,475 t	Aligned
		Lafarge: 0,461 t	Aligned
		Cement Hranice: 0,468 t	Aligned

Source: ISFC based on company annual reports and European Commission

As can be seen in the table above, despite being seen as “dirty industries”, companies in the cement and steel sectors in Czechia comply with EU taxonomy criteria and are in line with the 2050 net zero target.

Currently, the volume of sustainability focused bonds issued in Czechia lags behind Western Europe. As of September 2022, there had been the following issuances certified as green or sustainability linked bonds.

- CPI Property Group, the largest property owner in the CEE region issued its first green bonds in 2019 in Hungary worth EUR 86 million (30 billion forint).⁷⁷ This was the first issuance of green bonds in Hungary. Another pioneering event took place at the beginning of 2022, when CPI became the first real estate company to issue sustainability-linked bonds. The bonds were related to its target of decreasing emissions by 30% by 2030. If this target is not met, the interest rate of the last coupon payment will increase from 1,75 to 2%.
- The biggest issue of green bonds in Czechia was made by Česká spořitelna.⁷⁸ The EUR 500 million worth bonds are to be used to finance energy efficiency improvements in commercial buildings.
- Raiffeisenbank issued green bonds to the value of EUR 350 million⁷⁹ with similar

⁷⁷ Vítková CPI prodala v Maďarsku dluhopisy za 2 miliardy, Dluhopisy.cz, 2020: <https://dluhopisy.cz/novinka-dluhopisy-2020-novinky-33-tydne>

⁷⁸ Česká spořitelna posiluje zelené finance – vydala dosud největší emisi zelených dluhopisů v Česku, Česká Spořitelna, 2021: <https://www.csas.cz/cs/o-nas/pro-media/tiskove-zpravy/2021/09/07/ceska-sporitelna-posiluje-zelene-finance-vydala-dosud-nejvetsi-emisi-zelenych-dluhopisu-v-cesku>

⁷⁹ Emise zeleného dluhopisu, Raiffeisenbank, 2021: <https://www.rb.cz/informacni-servis/pro-media/tiskove-zpravy/tiskove-zpravy-2021/tiskove-zpravy-202106/0702021-emise-zeleneho-dluhopisu>

- purposes – energy efficiencies, sustainable transportation, and land use. At the time of issuance in mid 2021, this has been the largest green bond issuance in the region.
- Sustainability linked bonds were also issued in April 2022 by ČEZ⁸⁰, large energy producer. A bond worth EUR 600 million was linked to cutting emissions to 0,26 tCO₂e/MWh of produced electricity. Should ČEZ fail in meeting this target, the last coupon payment in 2022 will be increased from 2,375% to 3,125%.

Comparing to Western Europe, use of green and sustainability linked bonds is increasing slowly. However, it is expected that the EU Sustainable Finance agenda policies, together with investor pressure will lead to a wider use of both green and sustainability linked bonds. Using these tools would allow lenders to profit from a lower interest rate⁸¹ compared to standard bonds.

There are some factors preventing hard-to-abate industries from issuing green or sustainability-linked bonds – high administrative costs and minimum liquidity. Every green bond issuance must be accompanied by a publication of a green bond framework, detailing the company's sustainability goals and strategy to clarify the role of the bond issuance. The framework has to be verified by a second party opinion to ensure its validity. Both steps bring additional costs to the publisher.

Also, green bonds, similarly as any other bonds, have to be published in certain minimum volume, usually estimated to be in the lower hundreds of million euros. It is to ensure the instrument will have a sufficient trading volume and liquidity. Investors might perceive issuance of smaller volume as less liquid and thus require compensation for decreased liquidity through a heightened interest rate. In this case, a company would probably opt for a bank loan rather than a bond. These two limiting factors reserve bond financing to the largest decarbonisation projects. Only projects in steel making, and possibly large investments in cement making, would achieve the ticket size justifying the green bond issuance.

⁸⁰ ČEZ website: <https://www.cez.cz/cs/pro-investory/obligace/bonds-zpravy/emise-dluhopisu-v-ramci-emtn-programu-2022-157204>

⁸¹ Green Bonds offer pricing benefits both issuers and investors, Climate Bonds Initiative, 2022: <https://www.climatebonds.net/2022/03/green-bonds-offer-pricing-benefits-both-issuers-and-investors>

Box 5: Other financial tools potentially available for the decarbonisation of hard-to-abate industries

European Guarantee Fund (EGF)⁸²

Set up by the European Investment Bank, the Fund is aimed at “European Union businesses that are having trouble because of the economic downturn but that would have been strong enough to get a loan in the absence of the COVID-19 crisis”. Countries participating in the EGF provide guarantees to funded projects thus mobilising private investment. EGF is expected to mobilise approx. EUR 200 billion across all contributing Member States. As discussed previously, the impact of the COVID crisis on Czech hard-to-abate industries was significant, so companies operating in the hard-to-abate sector could leverage loan guarantees for their decarbonisation efforts. However, Czechia has not participated in the guarantee programme and therefore Czech businesses are not allowed to apply to the programme.

Development bank products

The Czech Development Bank offers a variety of products ranging from discounted loans to guarantees for bank products. However, the Bank mostly focuses on international expansion of Czech businesses, so its services for decarbonisation of hard-to-abate industries are limited. The most relevant programme is a discounted loan to increase energy efficiency, but this programme only offers EUR 20 thousand – 2 million.⁸³

⁸² Green Bonds offer pricing benefits both issuers and investors, Climate Bonds Initiative, 2022: <https://www.climatebonds.net/2022/03/green-bonds-offer-pricing-benefits-both-issuers-and-investors>

⁸³ Czech Development Bank, Produkt catalogue, 2023: <https://www.nrb.cz/podnikatele/>

Barriers to decarbonisation of hard-to-abate industries

Below follows a full list of the main barriers of decarbonisation divided into three categories – policy, finance, technology. Short recommendations for overcoming these barriers are also included.

Box 6: List of barriers to decarbonisation of hard-to-abate industries

Area	Barrier
Policy	Increased energy-related costs
Policy	Availability of state-level strategy setting documents for industrial decarbonisation
Technology	Range of technological pathways of decarbonisation
Policy/ Technology	Anticipated clean energy and green hydrogen availability in National energy and climate plan and Hydrogen strategy
Finance	Operating margins in the steel sector
Policy	Utilisation of sustainability principles in public funding
Finance	Availability of public funding
Finance	Additional financial tools supporting decarbonisation
Finance	Support for pilot and demonstration installations
Finance	Carbon price volatility
Policy	High ratio of exported steel scrap
Policy	Construction standards and norms do not support alternative uses of cement
Finance	Non-financial reporting capacity
Finance	Underdeveloped capital market which affects the potential for green and sustainability linked bond market

Policy: Increased energy related cost

Energy prices (coal and electricity) have leapt to an unprecedented height in 2022 (doubling and tripling, respectively). The Government of Czechia offers two compensation schemes: **Indirect cost compensation**, funded from emission allowances revenues, introduced in 2021, and **Increased energy cost compensation**, funded from the state budget, introduced in October 2022 as a reaction to the energy cost hike in 2022. In total, these two schemes are far from sufficient to compensate the increased cost. The steel industry faces the most urgent challenge – maximum compensation offered from the second programme is set to EUR 8 million. With such market conditions continuing, steel producers located in the country will struggle to remain profitable.

Solution: Indirect cost compensation programmes should be focused on timely and sufficient compensation of increased costs to prevent carbon leakage. The indirect cost compensation programme compensates up to 75% of the energy cost, however, its budget is insufficient to accommodate for increased prices from 2022.

Policy: Availability of strategy setting documents on industrial decarbonisation on the state level

Czechia does not have any strategic documents focused on the topic of hard-to-abate industry decarbonisation. The only overarching document is the “Strategy Czechia 2030”, which

lacks sufficient detail. This lack of documentation prevents businesses from investing in any decarbonisation-related efforts, as companies need a transparent, predictable and sufficiently detailed decarbonisation framework to be able to plan their investment.

Solution: Government industry decarbonisation strategy could be created, with specific targets and milestones showing the intended pathway of hard-to-abate industries decarbonisation. The strategy could contain relevant plans for development of crucial technologies like CCUS.

Technology: Low range of technical options for decarbonisation

Current research offers only two options for decarbonising steel production: Hydrogen direct reduction for primary steel and electric arc furnace for scrap steel recycling. There is no emissions-free alternative for cement production and the only possibility in foreseeable future will be capturing the emitted carbon dioxide. The same situation applies to the chemical industry. To widen the range of options, funding could be targeted at all stages of technology development - R&D, pilot and demonstration.

Solution: European research institutions could join forces with industrial companies to bring new solutions for hard-to-abate industries and increase efficiency of the current ones. Public private partnership organisations should be established to accelerate new patent introduction.

Technology/Policy: Low anticipated clean energy and green hydrogen availability in the National Energy and Climate Plan and Hydrogen strategy

Cement and steel industry need a large, reliable supply of clean electricity and green hydrogen. From 2015, Czechia increased its electricity production from RES only slowly. In addition, the electrical grid needs costly upgrades to supply production sites with high voltage electricity. Current plans for RES scale up and green electricity production will probably not be enough to meet the steel industry needs, limiting it to the option of electric arc furnace technology.

Solution: NECP and Hydrogen strategy could be updated to accommodate for the increased need related to decarbonisation of hard-to-abate industries. A more realistic way of ensuring sufficient supply of green hydrogen could be drafted.

Finance: Low profit margins in the steel sector

In the last decade, steel making company profits have fluctuated. Due to the multiple recent supply shocks and supply chain interruptions (COVID-19, Chinese production ramp up), firms producing steel have seen a major drop in their margin levels. Low margins make any large investment decision more difficult.

Solution: Steel makers could fully utilize the available funding potential together with other financial tools (private equity funds, or public discounted loans and guarantees).

Policy: Low utilisation of sustainability principles in public procurement

Almost half of all construction contracts are issued by public institutions. Current procurement laws and rules have no environmental or sustainability-related criteria, such as prioritising decarbonisation. Inclusion of any such criteria (e.g., requirements for transition plans or emission reduction targets, energy efficiency, carbon intensity monitoring and reporting) would be a vital signal to producers of construction materials – cement and steel.

Solution: State procurement policies could be updated to incorporate environmental metrics and to support the creation of a market for low-emission products.

Finance: Limited availability of public funding

Only two public funding programmes can be used to finance hard-to-abate industry decarbonisation – the Modernisation Fund and the Innovation Fund. While funding of these programmes is adequate, no funding has yet (by October 2022) been granted to any enterprises in these sectors. Such a trend jeopardises the future competitiveness of Czech hard-to-abate industries.

Solution: Czech companies could cooperate closer with Ministry of Environment to increase their changes for Innovation Fund grants. Modernisation fund could include calls focused on hard-to-abate industries/industries with risk of carbon leakage.

Finance: Lack of financial mechanisms and tools aimed at financing industry decarbonisation

Financial tools to lower the risk of investments are missing. Despite the potential of the European Investment Bank's (EIB) European Guarantee Fund, Czechia is not among participants to this programme. The National Development Bank is mostly focused on smaller and medium businesses and therefore does not offer a dedicated programme for financing decarbonisation of hard-to-abate industries.

Solution: National Development Bank could expand its portfolio of products to cover decarbonisation needs of hard-to-abate industries. Czechia could join the European Guarantee Fund to enable businesses to use the programme.

Finance: Lack of support for pilot and demonstration installations

Current public funding programmes focus mostly on the initial or the last stage of new technology development. Operational programme Technology and competitiveness, Operation programme Jan Amos Komensky, Modernisation Fund, National Recovery Fund and other subsidy programmes support the R&D phase. Meanwhile, the Innovation Fund is intended for

projects in the commercial phase of implementation. After the successful development of a new technology, it must be tested on plants of a smaller scale – the pilot and demonstration stage. To be able to bring decarbonised products to the market, companies must be offered financial support tools for all phases of the technology development lifecycle.

Solution: Modernisation Fund could include calls aimed at supporting pilot and demonstration stages of technology development. Such calls could include requirements for commercialisation potential of the funded installation, however, it should not prioritise projects already at industrial scale.

Finance: Carbon price volatility

The price of carbon has fluctuated between EUR 58 and 98 per tonne of released CO_{2e}⁸⁴ in 2022. Since carbon price is a key element to consider during the decarbonisation investment decision-making, its stability is essential to be able to assess the return on investment (ROI) of the project. Should the price drop to 2018 levels, investing in production decarbonisation would become uncompetitive for some of the technologies.

Solution: Czech and EU public institutions could explore the use of available financial tools that can help to decrease the risk of fluctuating carbon prices.

Policy: High ratio of exported steel scrap

Due to the lack of availability of hydrogen for direct reduction, electric arc furnace remains the only feasible decarbonisation technology in the coming decade. For this, scrap steel availability will be crucial. However, according to the Steel Union, from 4,3 million tonnes of scrap steel annually available in Czechia, 2,3 million is exported.⁸⁵ Steel Union does not disclose the location of the customers for the Czech scrap steel; but it can be inferred that Czech trading routes are following European ones – i.e., a large part of it is sold to regions with less stringent environmental regulation. To be able to achieve decarbonised production of steel and to prevent carbon leakage, a sufficient supply of scrap steel should be ensured.

Solution: EU regulators should ensure that production carbon intensity in other regions is appropriately assessed after the launch of CBAM. If costs of emitted carbon will be reflected equally in European and imported production, conditions on scrap steel market will be more levelled.

Policy: Construction standards and norms do not support alternative uses of cement

One of the solutions for decarbonisation of cement production is achieving a higher level of circularity and a lower ratio of cement clinker in concrete. However, Czech construction

⁸⁴ <https://tradingeconomics.com/commodity/carbon>

⁸⁵ Jak úspěšně dekarbonizovat ocelářství, Steel Union, 2022: <https://www.ocelarskaunie.cz/ak-uspesne-dekarbonizovat-ocelarstvi/>

material norms currently do not support any type of concrete with lower embedded emissions. This lack of regulation and guidance for architects and construction companies hinders the development of a market for more environmentally friendly cement products and removes incentives for decarbonisation.

Solution: Regulators could incorporate low-carbon cement types in updated construction norms. Standardisation of the recommended uses will increase low-carbon cement applicability and its production will ramp up due to the already existing demand for more sustainable construction materials.

Finance: Underdeveloped non-financial reporting capacity

Pressure to develop non-financial reporting tools comes from multiple sources: financial sector, public funding programmes, and new European reporting requirements. With the Corporate Sustainability Reporting Directive (CSRD) coming into force, the scope of mandatory non-financial reporting will increase from the current 25 companies to approximately 1,000 companies in 2024.⁸⁶ As a consequence, more entities will have to track and report their non-financial data. Czech companies currently lack experience in working with non-financial reporting and how to leverage it for strategic or business planning purposes. In Czechia, the pool of qualified employees or non-financial reporting experts is very limited, forcing companies to rely on consultancies.

Solution: Regulators and professional and industry associations could cooperate to design appropriate training programmes and promote them via relevant communication channels.

Finance: Underdeveloped green and sustainability linked bond market

Green and sustainability linked bonds are potentially another tool to finance decarbonisation, applicable particularly to projects with large capital requirements. Development of the instrument, however, has been slow in recent years and there has been no green bond issuance by hard-to-abate industry yet (by October 2022).

Solution: Issuance of green or sustainability bonds by a state or municipal body would help promote green bonds as a viable financial tool for raising funds. Czech public bodies can take inspiration in V4 region – Poland issued the very first sovereign green bond in 2017.

⁸⁶ CSRD introduction, CSRD.cz, 2022: <https://csrd.cz/vse-dulezite-o-csrd/>

Conclusion

After the phase-out of free allowances, presumably before 2035, emission-related costs will have a distinct and measurable impact on companies' profit and loss statements. With already low margins, especially in the steel sector, such costs could present a survival risk. The afore-mentioned barriers should be removed or at least significantly reduced to enable the transition of hard-to-abate industries towards decarbonised production and thus avoid further increase in costs and potentially loss of competitiveness.

With the global economy moving towards sustainable business models, decarbonisation will be one of the main market trends. Before 2050, producers in all regions will be pushed to decrease their emissions both by state and international regulation, and by the market demand for sustainable products. For those who will manage to cut emissions more efficiently, decarbonisation will be a lucrative business opportunity.

With the global economy moving towards sustainable business models, decarbonisation will be one of the main market trends.

