

THE IMPACT OF CARBON NEUTRALITY ON HUMAN RESOURCES IN THE METALLURGY INDUSTRY

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Abstract

The greatest challenge for the metallurgy industry today is to adapt to the EU's stricter climate policy. The European Commission's aim to achieve neutral CO₂ emissions by 2050 will have a huge impact on the sector. The methods of achieving this aim will determine the fate of steel production in Europe. If European policy further weakens the competitive position of European smelters by giving preference to producers in China, Russia or the USA, the vast majority of production will move from Europe to third world countries. Steel companies in the Czech Republic are still attempting to limit the impact of their activities on the environment. Billions of crowns invested into reducing emissions from operations in the Moravian-Silesian Region led to a significant decrease in harmful emissions into the air. Although the industry is still a major source of pollution, its proportion of dust emissions, for example, has declined. The objective of carbon neutrality by 2050 will have a major impact on employment and the prosperity of industrial regions. The transformation to carbon-free industry entails the need for higher skills and sometimes even complete retraining of employees. The article analyzes the present impact of carbon footprint reduction on employment in the industry. The authors also predict further development in relation to human resources. The work takes into account external influences such as competition, the labor market and labor productivity.

Keywords: Metallurgy, carbon neutrality, human resources

1. INTRODUCTION

The article describes the current circumstances in human resources for the metallurgical industry, which is a two-hundred-year old tradition in the Czech Republic and still one of the key branches of manufacturing. The adoption of the Paris Agreement and subsequently Carbon Neutrality has created a critical situation on the steel market, including a global oversized production capacity, decreasing domestic production.

The main research question that the article will seek to answer is how carbon neutrality measures will affect the employment of the sector. Other research questions may include, for example, what measures need to be put in place to avoid a significant loss of workers in the sector. The methodologies used will include a search of current professional articles. Further analysis of data on current developments in the metallurgical sector, carbon production and unemployment. The data will be compared with each other, put into context and conclusions will be drawn from them in the form of recommendations.

2. CARBON NEUTRALITY

The Czech Republic and other EU Member States signed the 2016 Paris Agreement to jointly reduce greenhouse gas emissions by at least 40 % by 2030 compared to 1990 levels. To this end, in November 2018, the European Commission published a draft strategic plan to achieve carbon neutrality in the EU by 2050. The Commission declared the strategic plan did not include another new target, but only identified the paths that would help the EU reach carbon neutrality within thirty years. The Commission intends to maximize the EU's

contribution in the global effort to limit global temperature rise to 1.5 °C in line with the Paris Agreement [1]. However, carbon neutrality requires not only the introduction of further political and regulatory measures and the unprecedented transformation of almost all sectors of the economy (i.e. a technological revolution) but also a change in society's thinking and a fundamental shift in consumer behavior patterns.

Today, the EU emits 9 % of global greenhouse gas emissions, and this proportion will continue to decline as developing countries grow richer and their emissions increase (**Figure 1**) [2]. Industrial processes alone account for only 8 % of greenhouse gas emissions in the EU, less than agriculture, energy or transport. Therefore, unless other major CO₂ emitters, including the US, China and India, adopt similar far-reaching measures, it will be impossible to achieve the Paris Agreement objectives.

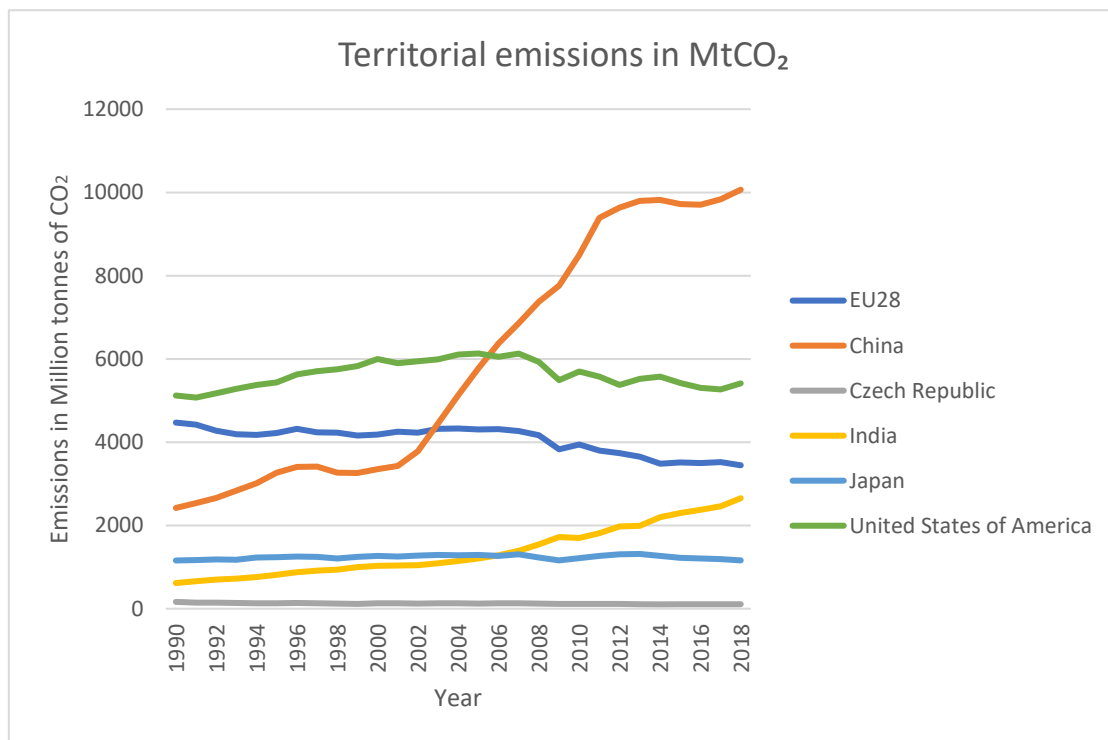


Figure 1 Territorial emissions in MtCO₂ (MtCO₂ = 1 million tonnes of CO₂) [2].

A precondition for decarbonization is an unprecedented transformation of Czech industry over the next decade. For many industries, low-carbon or carbon-free processes and technologies have not yet been proven. So far, they are in their pilot phase or do not exist at all. The deployment of low-carbon technologies, if any, will result in an increase in final product costs by 35–100 % for steel, 20–45 % for plastics and 70–115 % for cement, i.e. a fatal loss of competitiveness on the global market in all cases. Maintaining today's production volume of steel, chemical products and cement alone in Europe will mean an additional consumption of 710 TWh per year [3].

Investments into the environment in the Czech Republic are very high: in 1993–2017 they amounted to CZK 655 billion, of which about 60 % (CZK 403 billion, i.e. 60 %) were invested by industrial companies [4]. Any other additional costs associated with decarbonization will be so high that vulnerable sectors will not be able to cope, despite various types of subsidies, also while trying to maintain their global competitiveness. Czech industry could therefore pay a triple bill in the form of no returns from investments made into environmental measures, costs of new technologies and higher operating costs. There is a serious risk that some sectors will move to countries outside the EU where they do not charge for emissions and address environmental impact only with words, not to mention the social and human rights aspects; paradoxically then, global emissions will increase, not decrease [4].

3. PRESENT STATE OF THE METALLURGY SECTOR AND ITS HUMAN CAPITAL

The Czech steel industry is significantly influenced by developments on global and EU steel markets. Production in EU countries reached 159.4 million tonnes last year, an 8 % decrease compared to 2018. The world's largest steel producer in 2019 was again China, which produced 996.3 million tonnes (an increase of 8.3 % compared to 2018), which represents more than half of the world's total production. Global crude steel production reached 1,869.9 million tonnes in 2019, 3.4 % more than in 2018 [5]. However, crude steel production decreased in 2019 in all regions except Asia and the Middle East. Imports to the Czech Republic and Europe are at their historically highest levels due to persisting oversized capacity in production in China and other emerging countries.

In terms of human resources, the sector employs approximately 20,000 people directly and tens of thousands indirectly in supply companies, services and other related fields. Panorama of the Manufacturing Industry annually publishes a summary of all sectors, with an emphasis on economic indicators. The largest decline in the number of persons employed was from 2008 to 2009, which corresponds with the time of the Great Recession. Since then, the number of people employed has been around 44,000, with an increasing trend over the last three years. It should be noted that this indicator includes workers in foundry, basic metals manufacturing and metallurgical processing industries (collectively referred to as division CZ-NACE 24) [6].

It is interesting to compare the development of sales and labor productivity in the respective sector. Since the big drop in 2008 and 2009, both of these indicators have gradually grown, almost reaching the values prior to 2008, but in 2016, they again fell. One of the reasons for this is the adoption of the Paris Agreement and the first efforts of companies to reduce emissions. Although the number of units produced has been steadily increasing since 2016, both sales and labor productivity have declined. Basic wages in the industry, however, have had the opposite trend and are rising. [7]. Consequently, businesses are incurring large costs for innovation, equipment conversion and wages while producing the same quantity of units. Therefore, the prediction of the following development is not favorable for people employed in the sector. The expected upgrades will allow the production of the same amount of steel with fewer employees, all with the aim of reducing wage costs. The first hint at the European level was already seen in the Paris Agreement as early as 2016, when the number of employees fell to a historical minimum (**Figure 2**) [8]. Efforts to further reduce or even eliminate emissions will entail even higher costs for businesses, which will in turn require even more radical reductions of staff numbers.

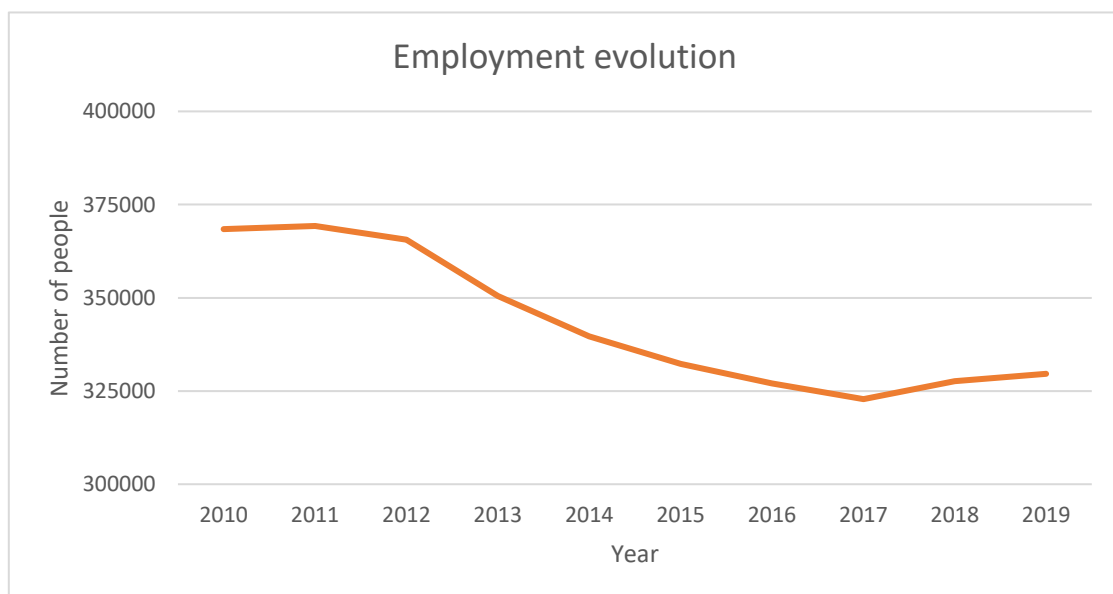


Figure 2 Employment evolution in Europe [8]

Metallurgy in the Czech Republic (CZ) follows the trends of the entire Czech branch of CZ-NACE 24. In 2017, 15,609 people were employed in the industry, 17,000 in 2018 and 17,800 last year. In Europe, the overall greatest employers in the metallurgy sector are Germany (DE), Italy (IT), Poland (PL), followed by Romania (RO) and France (FR) (**Figure. 3**). This upward trend in headcount may change sharply in 2020 due to the introduction of emission reduction measures, the relocation of production abroad, and the coronavirus pandemic, which has had a huge impact on Italy particularly.

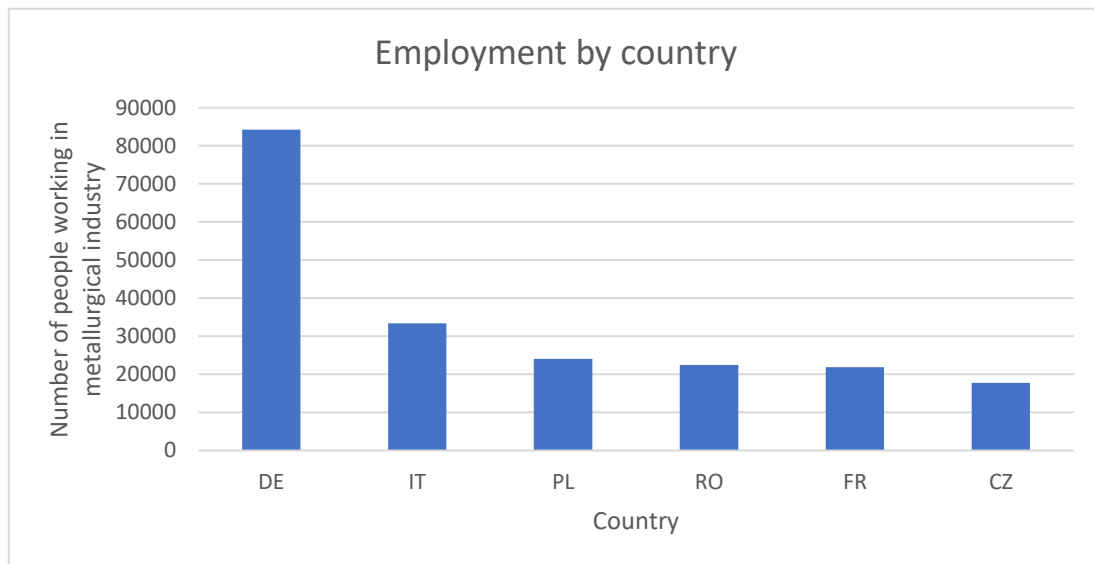


Figure 3 Employment by country [8]

4. ENTERPRISES AND CARBON NEUTRALITY

Steelmaking has experienced a fundamental transformation over the past two decades. The environmental impact of the industry decreased significantly, production now creating a fraction of the dust and other pollutant emissions compared to the 1980s and 1990s, and recycled steel is also being increasingly used. Nonetheless, businesses will have to face rising costs of emission allowances and a gradual reduction in the number of free allowances over the coming years, and, above all, meet carbon neutrality targets.

The most important Czech metallurgical company TŘINECKÉ ŽELEZÁRNY, a. s. is now a member of the strategic forum for solving important projects of common European interest, namely the strategic forum Low CO₂ emissions Industry. This forum identifies key technologies in the metallurgical, chemical and cement industries. Several specific recommendations and areas for financing further research and development have been defined. For example, hydrogen or electrical metallurgy, waste recycling and the like. The question is whether steel consumers will be willing to accept increased prices for steel products when the current trend is the opposite as countries where production takes a higher toll on the environment than in Europe call for cheaper steel. Furthermore, a so-called Hydrogen Team is working at the TŘINECKÉ ŽELEZÁRNY, a. s. and attempting to implement a technology that produces hydrogen from coke oven gas using PSA (Pressure Swing Adsorption) technology. Each year, they invest in new greenery to compensate for the carbon footprint. At present, almost 40,000 thousand trees are growing on the company plots, binding up 120,000 tonnes of CO₂. According to preliminary calculations, costs in TŘINECKÉ ŽELEZÁRNY, a. s. will rise by CZK 1.1 to 1.8 billion annually in 2030. In the traditional ore-based iron and steel production process, carbon neutrality cannot be ensured by the technologies available today [9].

Another Czech company, Liberty Ostrava a.s. wants to invest approximately CZK 19 billion in its plant over the next ten years. Part of the strategic investment will be primarily to build new hybrid technology for steel production, which, according to the company, will be the first of its kind in Europe. Rolling mills will also undergo

major modernization. The company wants to achieve carbon neutrality by 2030 and also build new hybrid technology in 2021–2024 for the production of steel. This will enable the steel works to not only use a higher scrap volume and reduce its dependence on imported raw materials but also radically reduce the environmental impact of production and increase flexibility by combining pig iron production with electric arc furnace technology. The key to the long-term prosperity of Liberty Ostrava a.s. is connection to a very high voltage network, which will enable further reduction of CO₂ emissions due to a more predominant use of electricity at the steel works. Liberty Ostrava a.s. wants to build the necessary connection to this network over the next five years [10].

5. IMPACT ON METALLURGY

Efforts to achieve carbon neutrality by 2050 will have a strong negative impact on employment in the metallurgy industry and the prosperity of the industrial regions concerned. Today, metallurgical companies are literally struggling to survive because of the competition of cheap steel and the cost of modernization.

Now, quite unexpectedly, the situation not only in this industry has been complicated by the Coronavirus pandemic, which has so far necessitated the discontinuation of certain products. The economic crisis, which will require major redundancies, is expected to begin [11]. Already the world and the Czech automotive industry, the main industrial sector of the Czech Republic and also one of the major customers of the metallurgical industry, have been greatly affected. This may also postpone or slow down the carbon-free transformation of the industry, although it will not stop it. The change will eventually require higher qualifications for employees and sometimes even complete retraining.

6. RECOMMENDATION

Several factors could assist in reviving the Czech metallurgy industry. These include [12]:

- Initiation of rigorous cooperation with state administration and at the governmental level and assistance in finding economically and technologically accessible options to gradually transform Czech industry and appropriate forms of support.
- Analysis and expert discussion on electrification of Czech industry and related threats and opportunities (building the necessary infrastructure, affordability of clean energy in sufficient quantity, etc.).
- Maximization of state support, including maximizing compensation for indirect costs for energy-intensive industries exposed to carbon leakage; the price of emission allowances has climbed to almost EUR 30 over the last two years, and the industry is facing several times the cost of purchasing it and being forced to buy significantly more expensive electricity, in which the increase in the price of allowances is fully reflected. The Czech Republic is almost the only EU industrial country that has not yet introduced compensation for these increased costs.
- Establish circumstances so that Czech and European companies compete under the same conditions, whether in the form of a carbon surcharge at the EU border (Border Adjustment Mechanism) or other in order to level competitiveness.

7. CONCLUSION

The Czech metallurgy industry is not developing well, starting with large costs for modernization associated with aiming for carbon neutrality, the cost of emission allowances, and strong competition abroad, especially with China, which produces steel at prices that Europe cannot compete with. The current pressure from trade unions to continually raise wages establishes a hopeless situation with human resources. Although the number of employees in the industry has increased over the past three years, sales and labor productivity have

declined. Since some companies will literally fight for survival in the coming years, a large outflow of labor in this field can be expected. Unfortunately, some companies will not be able to achieve carbon neutrality as a result of unbearable costs and will be forced to cease operating, thus dismissing employees. If some companies survive the modernization process, a problem with the qualifications of currently available workers will arise. Companies will want to take advantage of state active employment policy measures, such as direct retraining and support for employees during rebuilding operations and retraining when they cannot work. However, the global and Czech industry is currently affected by the Coronavirus pandemic. The Czech Republic had tried to invest and channel sufficient resources into the education system and vocational education as well as retrain existing employees in industrial areas affected by carbon neutrality before the pandemic, however it was not on a scale large or quick enough. Moreover, it will now need to focus on reducing the economic impact of the state of emergency and bringing the economy back to at least pre-pandemic levels. It will be interesting to see how Czech measures will fare and whether and when they will focus and support measures for carbon neutrality in the Czech metallurgical industry.

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