BETWEEN COVID-19 AFTER-EFFECTS AND EUROPEAN GREEN DEAL

Challenges for small and medium-sized aluminium processing companies in Germany
Case study

POLICY PAPER

FAIReconomics
The magazine for sustainable economy and society
with the contribution of Professor Dr. Ingo Rollwagen

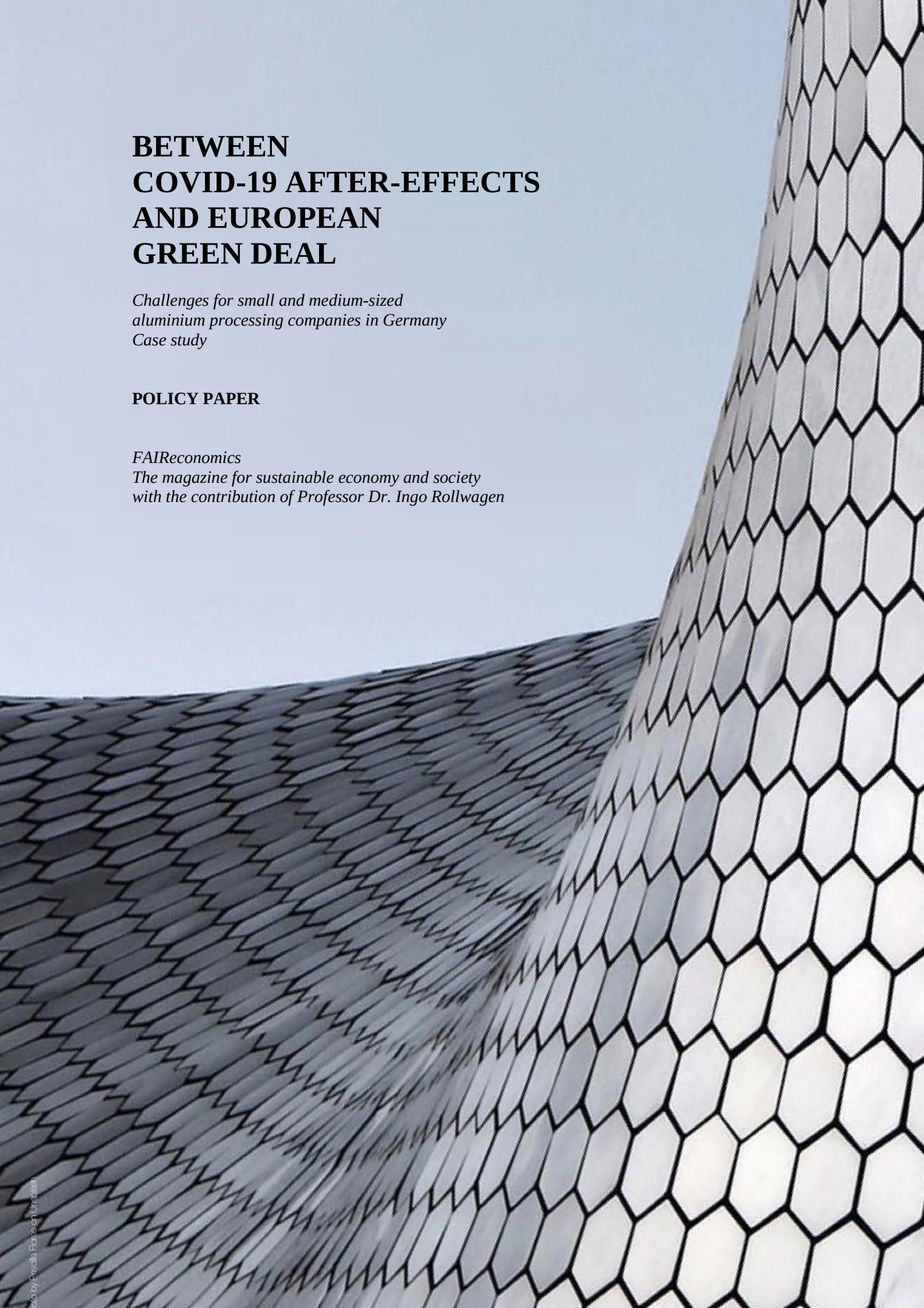

Photo by Priscilla Phoenix Urquiaga

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METHODOLOGY AND DESCRIPTION OF CONTENTS OF THIS PAPER

If you ask the general opinion in Germany on the subject of Aluminium, the public tends to associate negative connotations with the material. [1]

The production is considered to be very energy-intensive, and the public discussion in Germany is characterised by prejudices against this raw material and a less innovation-oriented and differentiated view of this material.[2] Despite its energy-intensive production, which can also take on a more ecological shape through the use of electricity, aluminium offers great potential on the basis of its durability, recyclability, and material properties.
This Policy Paper takes a closer look at the following aspects,

1) to what extent aluminium and its derived products can support the necessary shift towards a sustainable industry.
2) what is the status and shape of the (small and medium-sized) aluminium processing industry and what regulatory background is important with regard to the aluminium processing industry. (also based on a current survey and interviews)
3) which political steps are necessary to stimulate the German aluminium downstream industry which is mainly characterised by small and medium-sized companies, with new growth impulses through ecological transformation, circular business models[3] and design-intensive product innovations against the background of the recovery programme as a result of the COVID-19 pandemic and the upcoming European Green Deal with all its associated problems.

This is necessary because this future-oriented branch of production in the German economy is acutely at risk.

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[1] In the light of general hostility towards industry, metal producers in particular and also aluminium producing and aluminium processing companies tend to have a negative connotation. (cf. Schönauer AL. (2017) The industry in the mirror of media coverage. In: Hostility towards industry in Germany.
Springer VS, Wiesbaden), Vidal O., Arndt N., Herrington R. (2016) Metals for European Industry – does the general public want them or doesn't? In: Kausch P., Matschullat J., Bertau M., Mischo H. (eds) Extractive industry and social development. Springer Spektrum, Berlin, Heidelberg. Though a more positive perception also prevails on the current volume, cf. Groß M. (2019) Alice behind the distorting mirrors of the media world. In: Tabakschwärmer, Bücherwürmer und Turbo-Socken. Springer, Berlin, Heidelberg.

[2] Here we only refer to contributions such as those of Allwood, Julian M. and Cullen, Jonathan M. (2015). Sustainable Materials without the hot air. Cambridge. UIT Cambridge Ltd. September 3, 2015 and to cf. ELLEN MACARTHUR FOUNDATION (2019). Completing the Picture: How the Circular Economy Tackles Climate Change reveals the need for a fundamental shift in the global approach to cutting emissions. V.3 – 26 SEPTEMBER 2019. In: https://www.ellenmacarthurfoundation.org/publications/completing-the-picture-climate-change, which point out that metallic raw materials will also play an important role in the future, especially in shaping a circular economy.

[3] On circular business models, cf. ELLEN MACARTHUR FOUNDATION (2019). Completing the Picture: How the Circular Economy Tackles Climate Change reveals the need for a fundamental shift in the global approach to cutting emissions.SEPTEMBER 2019. In: https://www.ellenmacarthurfoundation.org/publications/ completing-the-picture-climate-change

The aluminium processing companies play a major role in the creation of value in Germany.

They supply a range of highly differentiated products, many of which are required by high-tech industries. Besides, they manufacture intermediates right up to parts and components for end applications, which make a decisive contribution to the success of a sustainable industrial turnaround.

A survey conducted as part of this Policy Paper impressively confirms the current difficult situation of German businesses, which has not only been brought to light by the economic consequences of the COVID-19 pandemic but has merely been exacerbated.

This is why the last chapter of this Paper argues that there is a need to review and redesign the trade and industrial policy impulses for aluminium processing companies, both upstream and, above all, to take account of SMEs in the downstream segment, in which the promotion of recycling and the transformation to circular business models can be achieved holistically by means of appropriate trade policy interventions – or better still, by refraining from interventions such as customs duties, which are not yet fully regarded as instruments in terms of their effect or which also have negative effects.

EXECUTIVE SUMMARY:

Aluminium producing companies in Germany are actively exposed to threats, according to a survey conducted by FAIReconomics specifically for this Policy Paper in May and June 2020. Almost all the companies surveyed are pessimistic about the near future.

The consequences of the COVID-19 crisis, a faltering supply chain, the deepest recession since 1945, the challenges of the Green Deal, and the transformation of companies due to the upcoming CO2 pricing are the biggest challenges. In addition, the climate and energy revolution requires reliable access to raw materials.

Due to the pandemic, many companies in the aluminium processing industry are working with restrictions.

However, aluminium is considered a key raw material in the forthcoming Green Deal, as its material properties will support

- a massive wave of the renovation of buildings and infrastructure;
- the further development of recycling management due to its high recyclability through the new development of design-based product innovations
- the introduction of renewable energy projects (especially wind, solar and hydrogen)
- the transformation of transport and logistics (e.g. electric vehicles, rail transport – lightweight construction)

In the past, the task of supporting the aluminium industry on the EU side was mainly based on trade rules. The application of import duties served as the main measure of industrial policy. The German national measures were primarily aimed at supporting existing upstream industries, i.e. the aluminium producing companies and the non-aluminium processing companies, by reducing their energy costs as part of a wider regulatory intervention for energy intensive sectors.

The main focus of European and German politics continues to be on the steel industry. The aluminium processing industry, especially small and medium-sized companies, which could play a major role in the aluminium processing industry in the context of climate change in the European Union, is not receiving the attention that aluminium as a material deserves. However, import duties on aluminium in Germany have meant that increasing international competition from developing countries and limited bargaining power towards their customers have considerably restricted the ability of downstream German aluminium processing manufacturers to pass on import duties directly.

In addition, the German government should work towards establishing an effective and reactive EU trade defence policy against unfair and carbon-intensive semi-finished aluminium products produced in China and imported into the EU.

Due to a lack of raw materials and with primary production having fallen sharply in recent years, the value chain of the German aluminium processing industry depends heavily on foreign metal production. Import duties lead to a cost disadvantage for German semi-finished product manufacturers compared to foreign competitors. As a result of the imposition of a duty on raw aluminium, the annual production costs of downstream aluminium have increased by about 100 million euros in Germany alone and by about one billion euros in Europe. A sum, as shown in the above Policy Paper, which is deprived of the small and medium-sized enterprises in Germany by the virtual premium on aluminium produced in the EU28. However, companies need these resources to master the digital, sustainable transformation and to recover the associated costs.

Per tonne of aluminium, the virtual aluminium purchased by the companies – since the EU primary aluminium producers also produce aluminium within EU 28 – amounts to about 85 euros per tonne. These are resources that small and medium-sized enterprises lack.

From the point of view of the WTO, UNCTAD and OECD, the tariffs levied here are not systematically and completely comprehensible in their effects on all economic entities. Previous investigations indicate that these measures have not had the desired effect since their imposition, but are distorting competition. Moreover, there are rather a few companies throughout Europe which are producers of primary aluminium, and even for these companies, it is not obvious that the originally intended effect of the duties, namely to protect jobs, has worked. There are rather indications that jobs have been cut or relocated.

In this context, as a simple measure – especially to relieve the suffering of small and medium-sized companies and to revive the economy – the immediate lifting of import duties on raw aluminium is considered to be a simple, easy to implement and immediately available measure which would reduce the production costs of downstream companies and thus support their ability to regain or maintain their competitiveness in Europe and on international markets.

It makes no sense to transfer many billions into the German economy for its survival and to maintain a trade barrier that the aluminium processing industry pays for instead of burdening it. An abolition of these customs tariffs is therefore both economically and systematically logical.

What the aluminium processing companies in Germany now need is a rapid relief from regulatory induced, ineffective cost burdens to master the sustainable transformation in terms of the Green New Deal. They need constructive support from regulatory initiatives, including the following measures:

- Increased support for research and development: Stronger support for research on metallic alloys
- Acceleration of R&D and applications – so that innovative products – related to developments in the aluminium industry (lightweight construction, etc.) can reach the market faster.
- Reduction of bureaucracy – to reduce costs and increase agility. Administrative burdens place a disproportionate burden on small and medium-sized enterprises in their sustainable transformation. Effective safeguards and remedies – to ensure security of supply and protect against dumping from countries such as India and China, which are flooding the markets with high-carbon semi-finished products
- The recovery plan in response to the coronavirus-induced challenge must support long-term growth in domestic production, high-quality manufacturing and low-carbon innovation. It must maintain a strategic advantage in aluminium to ensure security of supply for key sectors. And it must involve working with key trading partners to share best practices in adapting to the new conditions.

- The small and medium-sized aluminium processing industry could now be relieved if, as in the COVID-19 pandemic, aluminium as an important raw material were exempted from import tax.

It is important to keep in mind that

- raw materials are one of the pillars of the circular economy. Aluminium is one of the raw materials of the future for the circular economy. Companies (SMEs and large companies) in Germany and Europe can benefit from the properties of aluminium – especially its durability – in new circular-oriented business models and create new products with design innovations. Thus, in addition to growth impulses, an increase in resource efficiency, and a contribution to climate goals, greater independence of the German and European high-tech industry can be achieved.

- International raw materials policy and international trade policy should be part of the move towards circular economies – especially for small and medium-sized enterprises. Straight within the framework of a growth policy that is also oriented towards small and medium-sized companies, growth-oriented and knowledge-based, aluminium should be given greater attention as a strategic raw material. Alongside other raw materials, aluminium should be given greater consideration in the political agenda because of its importance. This was to enable growth dynamics based on transformation efforts and resulting design innovations through aluminium processing – also on the basis of recycled, but also new aluminium – to enable SMEs downstream.

1. ALUMINIUM AS A KEY RAW MATERIAL IN THE TRANSITION TO MORE SUSTAINABLE INDUSTRY AND ALUMINIUM-BASED DESIGN INNOVATIONS

This chapter discusses the extent to which aluminium and its derived products can support the necessary turn towards a sustainable industry with design innovations.

1.1 The importance of aluminium as a raw material

"No future technology without mineral resources. With technological change, the need for resources and thus the demand for mineral raw materials is also changing: Wherever electric mobility, lightweight construction, or renewable energies are used, the demand for base and so-called high-tech metals is on the rise."[4]

The material aluminium has become increasingly important in recent years, and according to further forecasts, it will continue to grow in importance. According to the report on the raw materials situation, demand for all major industrial metals increased in 2019. In the coming years and decades, a growing world population and an overall increase in economic prosperity will ensure that the demand for raw materials continues to rise. The OECD [2019] forecasts that the demand for metallic raw materials would double by 2060, while the demand for non-metallic raw materials of iron/steel, copper and aluminium, which together account for a solid 42 percent of metal exports, would double.[5]
As a feedstock and material, aluminium is characterised by its low density and thus lightness, and is therefore used where the weight must be reduced. It is known for its flexibility, strength, conductivity, durability (especially important when used as a building material), and corrosion resistance. Aluminium is easily recyclable if the alloy has been produced in appropriate quality during primary production and if recycling is handled properly. About 75 percent of all aluminium ever produced is still in use. Making aluminium usable again requires little energy, about five percent of what is needed for primary production.

[4] (BGR – Federal Institute for Geosciences and Natural Resources (2019): Germany – Raw materials situation 2018. Hannover: P. 54)
[5] https://www.oecd.org/env/indicators-modelling-outlooks/global-material-resources-outlook-to-2060-9789264307452-en.htm

Aluminium is used in the

- building and construction
- transport and mobility (automobile and vehicle construction, shipbuilding, aerospace
- packaging
- household articles
- furniture, design, and lighting technology
- mechanical industry
- electrical engineering
- packaging and container industry

The largest area of application for aluminium in Germany is the transport sector with vehicle construction, accounting for about 48 percent. The next largest areas of application are the construction industry with about 15 percent and the packaging industry with ten percent. Electrical engineering accounts for seven percent, and mechanical engineering and the iron and steel industry each account for six percent. Household articles as well as use in office supplies, furnishings, and leisure products account for four percent each.[6]

Aluminium, for example, occupies a leading position in the competition for lightweight construction and design materials and is the growth driver for an entire industry. Driven by the automotive industry, but not only by the megatrend of lightweight construction but also by improved material properties, technical advances in the process chain such as digital networking, new technologies – such as additive manufacturing or increased requirements for energy and resource conservation.

By investing in application-oriented development, small and medium-sized enterprises in the aluminium processing industry, in particular, are constantly improving the properties of their material, developing new products, and optimising production processes. Great progress is also being made in lightweight construction.[7] Experts put the share of aluminium in second-generation e-cars at between five and ten percent – roughly comparable to the share in internal combustion models. The luxury class E cars already have a 40 percent aluminium content.[8]

Thus, process and material innovations are drivers for the development of efficient lightweight construction solutions and their implementation in series production – in casting technology, heat treatment, joining and welding, the development of new alloys, and, finally, in the recycling of aluminium.

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[6] https://www.allesueberalu.de/aluminium-in-der-anwendung.html

[7] https://www.konstruktionspraxis.vogel.de/amp/auf-die-richtige-kombination-kommt-es-an-a-558550/?p=2

[8] cf. https://www.mckinsey.com/~/media/mckinsey/dotcom/client_service/automotive%20and%20assembly/pdfs/lightweight_heavy_impact.ashx)

Quality classes of aluminium:

Aluminium is not equal to aluminium. There are many different alloys on the market, which differ significantly in their material properties such as moldability, strength, corrosion resistance, and, above all, recyclability.
Aluminium alloys exist in very different forms. The basic material is **aluminium** [A199.5] and additional **alloying elements**. In particular, these are:

Magnesium [Mg]
Silicon [Si]
Manganese [Mn]
Copper [Cu]
Zinc [Zn]

By adding other elements to the alloy, the aim is to achieve certain physical and mechanical properties of aluminium products. Depending on the addition of elements, aluminium has a specific field of application.

For example, in machining operations such as turning or milling of aluminium, the strength of the alloy plays an important role. However, an increase in strength can be achieved not only by the addition of alloying elements and subsequent work hardening but also by heat or age-hardening treatment.
A distinction is therefore made between **heat-treatable** and **non-heat-treatable** (air hardening) alloys. In addition, aluminium alloys are divided into wrought alloys and cast alloys. Important to know: Wrought aluminium alloys can be further processed by cold or hot forming – for example, by rolling or by extrusion – to create the desired end product, such as aluminium profiles; subsequent forming of cast aluminium alloys is very difficult or even impossible.

Wrought aluminium materials include

Pure and ultrapure aluminium
Air hardening alloys: AlMgMn, AlMn, AlMg
Heat-treatable aluminium alloys: AlZnMgCu, AlCuMg, AlZnMg, AlCuSiMn, AlMgSi

The most important aluminium casting alloys are

AlSi
AlCuTi
AlMgSi
AlSiMg
AlSiCu
AlCuTiMg
AlMg

Group	Main alloy element	Hardenability	Strength
1xxx	At least 99% aluminium	Not hardenable	70-190 N/mm2
2xxx	Copper	Hardenable	190 -570 N/mm2
3xxx	Manganese	Not hardenable	100 – 350 N/mm2
4xxx	Silicon	Hardenable and non-hardenable alloys	170 – 380 N/mm2
5xxx	Magnesium	Not hardenable	100 – 450 N/mm2
6xxx	Magnesium and Silicon	Hardenable	100 – 450 N/mm2
7xxx	Zinc	Hardenable	220 – 700 N/mm2
8xxx	Other elements	Different	Different

Aluminium alloys are divided into eight alloy groups, each of which is assigned a digit from one to eight and three zeros. As can be seen from the table, each of these groups has different main alloying elements.

The **1000th group** is **pure aluminium** – in other words, aluminium which can only contain impurities of up to one percent. This material offers the best physical properties regarding electrical and thermal conductivity. In addition, pure aluminium is also the best formable material.

Copper is the main alloy element of the **2000th group.** These materials have high strength and are therefore also difficult to cold form. Also, the 2000th alloys are also only moderately resistant to corrosion, have limited weldability, and are mainly used for machining.

Manganese alloyed aluminium materials belong to the **3000th group** and have only slightly higher strength than pure aluminium.

The **silicon** alloyed **4000th materials** play a rather secondary role for the usual semi-finished products such as sheets, rods, and profiles. Since silicon lowers the melting point, these alloys are used for filler welding rods or for die castings.

The **5000 alloys** can be cold formed very well. Therefore, these alloys are very often used for sheet metal for cold forming. In addition to good **workability**, they also offer **particular strength**.

6000 and **7000 alloys** have **high strength** and are often used for structural parts. The 6000th have a high strength and the 7000th alloys, which contain copper, even the highest strength values.

The **8000th group** are so-called **special alloys**, which have not yet been produced on a large scale and are not represented on the market.[9]

[9] Handbook of wrought materials, Honsel, http://www.eloxal-muenchen.de/downloads/Handbuch_Knetwerkstoffe.pdf

1.2 ALUMINIUM – A GREEN RAW MATERIAL AND IMPORTANT COMPONENT FOR CIRCULAR DESIGN INNOVATION

Thanks to its properties (strength, conductivity, easy to recycle) and the associated possibilities of moldability, aluminium offers engineers and designers the opportunity to further improve the material and make its production less energy-intensive, and, above all, to create interesting products by incorporating aluminium, which in turn, like lighter vehicles, are also more ecologically compatible. To further improve aluminium as a green raw material, recyclability and durability play a particularly important role.

This is because aluminium production is very energy-intensive. It consumes about twice as much energy as steel production. However, the great advantage of aluminium is that electricity is used here. Against the backdrop of the growing climate debate and the Paris Climate Agreement, producers of primary aluminium are forced to work towards scientifically sound reduction paths and to switch to both low-carbon power sources and efficient production plants. As the former has a much more significant impact on final carbon intensity, this should always be a priority for capital investment in carbon reduction activities. To the extent that the carbon intensity of electricity decreases, the efficiency of the smelting plant loses importance compared to other processes in the value chain, such as bauxite mining and processing or anode production.[10]

So if the electricity for aluminium extraction is generated exclusively from renewable energy sources, hardly any CO2 is released during the production of the light metal.[11]

When talking about aluminium as a green raw material, it should be noted that actually about 75 percent of all aluminium ever produced is still in use. Making aluminium usable again requires little energy, about five percent of what is needed for primary production.[12] When talking about aluminium recycling, we refer to "real" recycling, which means that the metal retains its properties even after any number of cycles. Even if recycling is adequately arranged and the primary aluminium is of high quality, it has been an ideal raw material for design innovations such as upcycling innovations for many years.[13]

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[10] https://prod-drupal-files.storage.googleapis.com/documents/resource/public/The-Case-for-Low-Carbon-Primary-Aluminium-Labelling.pdf

[11] Raabe et al. also refer to this aspect and further potential with regard to the increased use of hydrogen-based electrolysis (cf. Raabe, D., Tasan, C.C. & Olivetti, E.A. Strategies for improving the sustainability of structural metals. Nature 575, 64–74 (2019). https://doi.org/ 10.1038/s41586-019-1702-5)

[12] Cf. https://www.hydro.com/de-DE/uber-aluminium/innovative-losungen-mit-aluminium/

[13] To the historical dimension of design innovations in combination with aluminium cf. Zimring, Carl A. (2017): Aluminium Upcycled: Sustainable Design in Historical Perspective. JHU Press. 2017.

But not all aluminium is the same. There are many different alloys on the market, which differ significantly in material properties such as workability, strength, corrosion resistance, and, above all, recyclability.

Recycling activities are very widespread in Germany[14], although Germany and the EU still export aluminium scrap,[15] which also indicates that there is still a need for promotion in this area. Metallic raw materials are generally not used for transportation. A large share is available again through recycling at the end of the life of the products in which they are bound. In German refining and crude steel production, as in recent years, about 59 percent of aluminium, about 41 percent of copper and about 44 percent of crude steel originated from secondary raw materials.

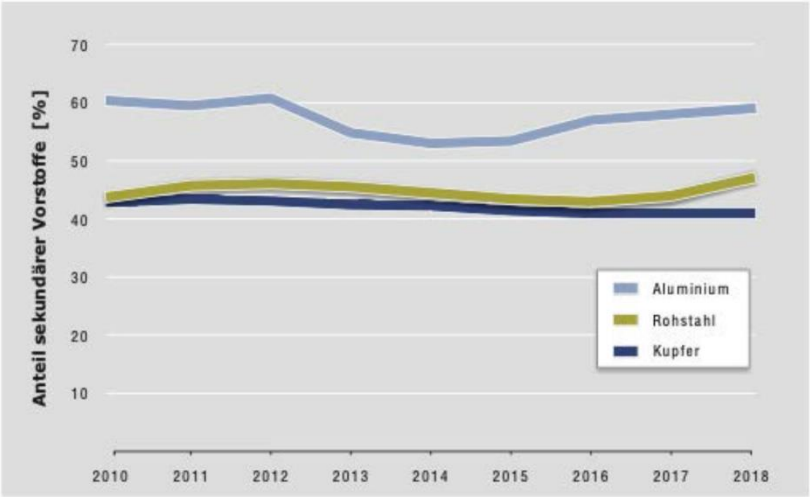

Abb. 2.11: Anteil sekundärer Rohstoffe an der deutschen Aluminium-, Kupfer- und Rohstahlproduktion (vorläufige Zahlen für 2018, berechnet auf Grundlage von Daten von: ICSG, BDSV, WV Metalle, WBMS, Zahlen für Rohstahl im Jahr 2018 geschätzt).

Aluminium	Aluminium
Rohstahl	Crude steel
Kupfer	Copper
Anteil sekundärer Vorstoffe [%]	Share of secondary precursors [%]
Abb. 2.11: Anteil sekundärer Rohstoffe an der deutschen Aluminium-, Kupfer- und Rohstahlproduktion (vorläufige Zahlen für 2018, berechnet auf Grundlage von Daten von: ICSG, BDSV, WV Metalle, WBMS, Zahlen für Rohstahl im Jahr 2018 geschätzt).	Fig. 2.11: Share of secondary raw materials in German aluminium, copper and crude steel production (provisional figures for 2018, calculated on the basis of data from: ICSG, BDSV, WV Metalle, WBMS, figures for crude steel estimated for 2018).

Source graphic: BGR – Federal Institute for Geosciences and Natural Resources (2019): Germany – Raw materials situation 2018. Hannover: P. 15)

[14] For an overview of recycling sites in Germany cf. BGR – Federal Institute for Geosciences and Natural Resources (2019): Germany – Raw materials situation 2018. – 144 p.; Hannover: P. 36.

[15] "Despite its high dependence on imports of metals, Germany was again a net scrap exporter in 2018 as in previous years. As a result of the stricter regulations for Chinese scrap imports since mid-2017, the country's importance has declined from being Germany's largest to what is now the fifth-largest destination country for German non-ferrous metal scrap in 2018". (cf. BGR – Federal Institute for Geosciences and Natural Resources (2019): Germany – Raw materials situation 2018. – 144 p.; Hannover: P. 53)

The shares have been comparatively constant for some years, as only certain quantities of recycled material can be used in the companies. The input quantities are limited by the plant technologies and their capacities.[16]

Even though primary aluminium production is considered to be extremely energy-intensive, only five percent of the energy required for primary production is needed for aluminium recycling. And another figure: three quarters of the aluminium ever processed worldwide is still in the material and recycling cycle today.[17]

The recycling rates in the aluminium sector are around 95 percent, even for packaging – and now also for relatively short-lived product applications. Recycling rates of more than 80 percent have been achieved here in Germany. This is the highest recycling rate in Europe, if not in the world. The recycling rate for aluminium beverage cans in the deposit system in this country is now over 96 percent.

[16] (cf. BGR – Federal Institute for Geosciences and Natural Resources (2019): Germany – Raw materials situation 2018. – 144 p.; Hannover: P. 18)

[17] Successful environmental management according to DIN EN ISO 14001:2015 and EMAS: Solutions P. 191 et seq.

Aluminium production method

There is no shortage of aluminium in this world, as eight percent of the earth's surface contains aluminium, making it one of the most widely available raw materials (after silicon and oxygen). The other side of the coin is that almost all the aluminium in these 8 percent is found in a mixture of 270 different minerals. The extraction of aluminium is therefore very resource-intensive.

Aluminium is produced in two stages: the Bayer process, in which bauxite is converted to alumina, and the Hall-Heroult electrolysis process, the production process from alumina to pure aluminium. High amounts of energy are required at this final stage. In 2010, an estimated three percent of the world's electricity was used to produce aluminium. To reduce these amounts of energy, a lot of research and development is currently underway, especially to further develop the Hall-Heroult technology and to define new alternative methods. But the best results are achieved in the field of aluminium recycling.
Up to 95 percent of the energy required for the production of primary aluminium can be saved by recycling, according to the Fraunhofer Institute IS1.[18]

Although in the future, by creating better framework conditions and pursuing a more circular economic activity, the demand for aluminium can also be partly covered by an increased recycling rate and increasing recycling makes a significant contribution to improving the supply of raw materials, this does not mean that the demand for raw aluminium will fall. As long as the world population and the global economy continues to grow, the recycling sector will only be able to supplement the supply of raw materials to a limited extent – even in the long term.[19]

Aluminium, therefore, has great potential if more research is done and recycling is expanded. Due to its already high recycling rate and the above-mentioned properties, aluminium is already recognised as a green raw material and, above all, as a component for circular design innovations. For example, the EU has set itself the goal of achieving 100 per cent circularity of aluminium by 2030. To meet the challenge of increasing demand for raw materials, the aluminium industry has set itself an ambitious goal, namely to become 100 percent circular within the next ten years. Aluminium that has reached the end of its service life will thus find its way back into the supply chain to be put to another use. If this goal is achieved, less imported aluminium will also be sold in Europe, as 50 per cent of total aluminium demand can then be supplied by post-consumer recycling. Today, approximately between 75 percent and 90 percent of aluminium is recycled.

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[18] Cf. https://www.isi.fraunhofer.de/content/dam/isi/dokumente/ccx/2013/ Umweltforschungsplan_FKZ-370946130.pdf

[19] (cf. BGR – Federal Institute for Geosciences and Natural Resources (2019): Germany – Raw materials situation 2018. – 144 p.; Hannover: P. 53)

Aluminium as a component for circular design innovations

Although an overall overview of the use of aluminium for the production of design innovations cannot be given here, aluminium is already being used in many projects aimed at "Circular vs Design". Aluminium is used in medical technology, for example, because the raw material has the property that it can be transformed into conversion layers on the surface by targeted electrical oxidation. The simplest form of conversion is natural anodising and its further development, hard anodising. In both forms of anodising, an amorphous, hydrous oxide hydrate is produced from the aluminium, from which, in turn, a hexagonal-tubular structure is created. The anodised structure can be compared to a honeycomb, in which, despite the soft wax, the build-up of a superordinate macroscopic structure results in far greater mechanical strength than the material itself would initially suggest. Conventional anodised surfaces, produced in good quality, are a solution for many technical requirements and can often replace materials containing iron and steel. They offer a number of advantages: only a third of the weight, cheaper to purchase, and about half the cost of processing.[20]

Other examples of the use of aluminium can also be found in the energy sector, especially with regard to the superstructures or mounts of photovoltaic systems. Here, developments such as agro-photovoltaics and other advancements will lead to further aluminium-based design innovations.

Other examples of design innovations include new developments in the field of white goods, where the application of aluminium is used to significantly reduce the tonnage of a refrigerator manufacturer's appliances and still produce very efficient refrigerators and freezers. Similar orientations can be seen in the field of interior design and especially in the production of (office) furniture, lamps, or similar other objects. Alumunium has the potential to play a role in models of the so-called "circular economy" in aspects of material recycling as well as the optimisation of production processes and in the improvement of products to become even more important for design innovations in various areas.[21]

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[20] cf. https://www.wotech-technical-media.de/womag/ausgabe/ 2016/01-02/17_fluege_anodisieren_01j2016/17_fluege_anodisieren_01j2016.php

[21] Cf. ELLEN MACARTHUR FOUNDATION (2019). Completing the Picture: How the Circular Economy Tackles Climate Change reveals the need for a fundamental shift in the global approach to cutting emissions. V.3 – 26 SEPTEMBER 2019. In: https://www.ellenmacarthurfoundation.org/publications/completing-the-picture-climate-change

1.3 OPPORTUNITIES THROUGH INNOVATIONS WITH ALUMINIUM

As a recent study shows,[22] there is still a great deal of unused innovation potential, especially in the area of generation through the use of new hydrogen-based energy solutions, as well as in the area of alloys, which could be exploited through additional investments and new circular business models[23]. In this context, potentials in the area of additive manufacturing [3D printing], in weight reduction as already mentioned, in the avoidance of scrap or waste in metal production and by-product management are particularly important, as the following figure on the impact and technological maturity with regard to more sustainable measures (Figure 2) shows.

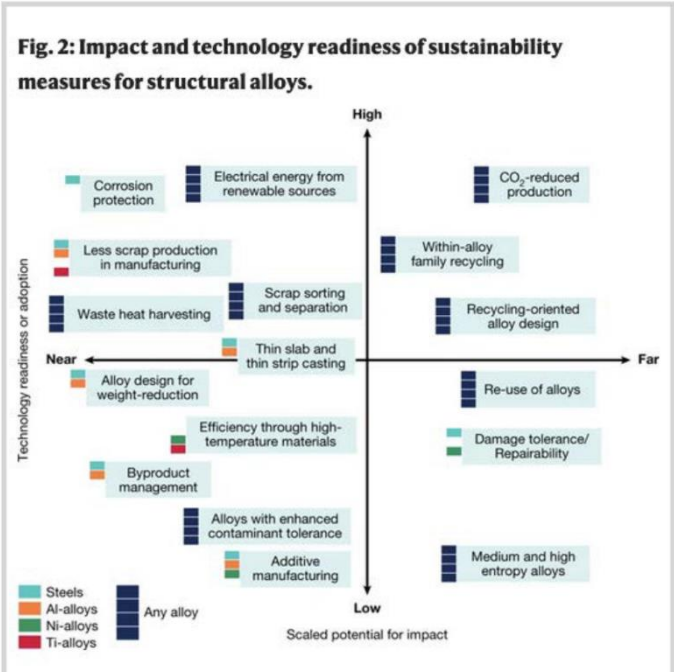

Fig. 2: Impact and technology readiness of sustainability measures for structural alloys.	Fig. 2: Impact and technology readiness of sustainability measures for structural alloys.
High	High
Near	Near
Far	Far
Low	Low
Corrosion protection	Corrosion protection
Electrical energy from renewable sources	Electrical energy from renewable sources
Less scrap production in manufacturing	Less scrap production in manufacturing
Waste heat harvesting	Waste heat harvesting
Scrap sorting and separation	Scrap sorting and separation
Thin slab and thin strip casting	Thin slab and thin strip casting

[22] Vgl. Raabe, D., Tasan, C.C. & Olivetti, E.A. Strategies for improving the sustainability of structural metals. Nature 575, 64–74 (2019). https://doi.org/10.1038/s41586-019-1702-5.

[23] Vgl. ELLEN MACARTHUR FOUNDATION (2019). Completing the Picture: How the Circular Economy Tackles Climate Change reveals the need for a fundamental shift in the global approach to cutting emissions. V.3. SEPTEMBER 2019. In: https://www.ellenmacarthurfoundation.org/publications/completing-the-picture-climate-change

Alloy design for weight-reduction	Alloy design for weight-reduction
Efficiency through high-temperature materials	Efficiency through high-temperature materials
Byproduct management	Byproduct management
Alloys with enhanced contaminant tolerance	Alloys with enhanced contaminant tolerance
Additive manufacturing	Additive manufacturing
CO_2-reduced production	CO_2-reduced production
Within-alloy family recycling	Within-alloy family recycling
Recycling-oriented alloy design	Recycling-oriented alloy design
Re-use of alloys	Re-use of alloys
Damage tolerance/ Repairability	Damage tolerance/ Repairability
Medium and high entropy alloys	Medium and high entropy alloys
Scaled potential for impact	Scaled potential for impact
Any alloy	Any alloy
Steels	Steels
Al-alloys	Al-alloys
Ni-alloys	Ni-alloys
Ti-alloys	Ti-alloys
Technology readiness or adoption	Technology readiness or adoption

Quelle: Fig 2, zitiert aus: Raabe, D., Tasan, C.C. & Olivetti, E.A. Strategies for improving the sustainability of structural metals. Nature 575, 64-74 (2019],

2. ALUMINIUM PROCESSING, (SMALL AND MEDIUM-SIZED/DOWNSTREAM) INDUSTRY – STRUCTURAL AND CURRENT SITUATION AND POLITICAL-REGULATORY FRAMEWORK CONDITIONS/IMPACT

2.1 Current situation of downstream – Aluminium processing companies during COVID-19

COVID-19 has hit the German and European economy very hard and led to a recession that is stronger than the one experienced during the financial crisis of 2009 et seq.
With the shutdown in March and April, economic output was also drastically reduced. With the easing of contact restrictions, economic activity picked up again from May onwards. The economic recovery phase will take time, as epidemiological risks persist and citizens and business adapt their behaviour accordingly. The measures taken by the Federal Government, which are also extensive by international standards, support the recovery process of the economy, the German Ministry of Economics writes.[24]

Nevertheless, the economic distortions are immense, and many aluminium processing companies see the economic conditions of their companies as very bad. (See the survey). Whether the economic policy measures of the Federal Government will have the necessary effect is not yet foreseeable. The hot phase is not expected until autumn. Moreover, it is not yet foreseeable that a possible second wave of the pandemic will lead to further distortions.

In addition, the commercial banks which, in conjunction with the state-owned KfW, grant loans to ailing companies are concerned about whether the measures taken so far are sufficient in the long term. This is because banks increasingly fear that the equity base of the companies they finance would meltdown. There are already the first calls for the legislator to ease the conditions for state equity injections into Corona-damaged companies.[25]

The way out of the Corona Valley will be long and arduous. "The federal government's new economic stimulus package is an important boost. "However, a large number of small and medium-sized enterprises are still experiencing a heavy strain on their liquidity, and the danger of insolvency has not been averted for them despite the easing of the corona restrictions". [26]

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[24] https://www.bmwi.de/Redaktion/DE/Pressemitteilungen/Wirtschaftliche-Lage/2020/20200615-die-wirtschaftliche-lage-in-deutschland-im-juni-2020.html
[25] https://www.handelsblatt.com/meinung/gastbeitraege/gastkommentar-mittelstaendler-muessen-einfacher-an-staatshilfe-kommen/25911330.html
[26] https://www.wiwo.de/unternehmen/mittelstand/coronakrise-mittelstand-rechnet-im-zweiten-quartal-mit-umsatzeinbussen-von-250-milliarden-euro/25933516.html

"For the small and medium-sized automotive supply industry, which includes many aluminium processors, the situation caused by the virus is a catastrophe. "The current shutdown of the automotive industry threatens the existence of the German supply industry and its employees," says Christian Vietmeyer, spokesman for the supply industry working group [ArGeZ], an alliance of over 9,000 small and medium-sized supply companies. For many small and medium-sized enterprises, things are now getting tight. This is why tailor-made financial assistance and highly flexible regulations in labour law are now urgently needed, as well as a partnership approach in the supply chain," said Vietmeyer.[27]

As a result of the global shutdown, which by the way is continuing in some parts of the world, about two-thirds of the companies surveyed expect supply bottlenecks in the near future, according to a survey by the trade association of metal producers (Wirtschaftsvereinigung Metalle). Bottlenecks in other supplies are mentioned twice as often as for raw materials. This reflects the close integration of the entire industrial supply chain with China. Almost half of those surveyed expect negative effects on product sales; around one in ten anticipates lower sales in the medium term. Since around 30 percent of non-ferrous metal products flow into the transport sector, plant closures in the automotive industry will have a direct impact on sales.[28]

The serious negative consequences of the COVID-19 crisis, which incidentally led to production almost coming to a standstill again, after the major car manufacturers started production due to the disruption of the international supply chain, also forced the aluminium processing companies to reduce their capacities.

The measures taken by the Federal Government, such as the short-time working allowance, initially helped many companies to get over the acute crisis. "The corona crisis is far from over, but companies are already preparing for new crisis scenarios. In the future, supply chain structures are expected to change, and risk management is also expected to look different after the COVID-19 pandemic. According to a survey by Inverto, a management consultancy belonging to Boston Consulting, 40 percent of companies already expect learning effects from the crisis. In the last week of March, 102 companies from 23 sectors in 14 countries were surveyed, the majority in Germany.[29]

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[27] Cf. https://www.alu-web.de/wp-content/uploads/2020/03/APR-4-2020-Screen-kl.pdf
[28] Cf. https://www.wvmetalle.de/presse/artikeldetail/?tx_artikel_feartikel%5Bartikel%5D=7101&tx_artikel_feartikel%5Bback%5D=presse%2Fpressemitteilungen%2F&tx_artikel_feartikel%5Baction%5D=show&cHash=ce56d695d283585df8907ae659643de8
[29] 17.04.2020 – Börsen-Zeitung: Puzzle games in supply chains

As the Börsen Zeitung reports on the basis of current surveys, there are signs of restructuring, with 86 percent of those surveyed perceiving bottlenecks in their supply chains and expecting them to become even more acute in the future. Only every tenth participant assumes that their own supply chain is not affected. The development of sales in the participating companies differs depending on the industry in which they operate. While all respondents in the automotive sector say that they are experiencing a slump of at least 10 percent, only one in two in the mechanical engineering sector confirms this, while the remaining respondents do not expect any clear impact. The participants from the retail sector are strongly polarised: two-thirds of them fear a drop in sales of more than 10 percent, while the remaining third fear an increase of at least 10 percent. The situation in the pharmaceutical sector is different: only 20 percent of the pharmaceutical companies expect sales to increase, while 40 percent expect no impact or a decline in sales.

As expected, almost 90 percent of those involved have taken or planned measures to make the company crisis-proof. These include the establishment of control committees for the daily assessment and management of supply risks [75 percent], the selection of new suppliers [86 percent], the reduction of short- and medium-term investments [83 percent], and strict cash management to secure liquidity [78 percent].

The respondents perceive two major obstacles as problematic: 88 percent complain about a lack of information in view of rapidly changing conditions, while 47 percent complain about a lack of transparency in the supply chain. In addition, travel restrictions and other political measures as well as conflicting priorities have a negative impact on the development of solutions.[30]

[30] Cf. companies develop alternative procurement scenarios – survey shows learning effects in the crisis in Börsen-Zeitung, Frankfurt published in BÖRSEN-ZEITUNG, on 17.04.2020 https://www.börsen-zeitung.de/)

2.2 Structure, shape and importance of the (small and medium-sized) aluminium processing industry: European and German aluminium producing companies and use of aluminium

The shape of the aluminium industry in Germany and Europe has changed considerably in recent years, both externally and internally. It is characterised by

1.) a producer market shaped by small companies (smelting plants)
2.) limited competition from trade barriers.

European and German aluminium producing companies

Currently, there are aluminium smelting plants in a decreasing number of EU Member States producing primary aluminium in all forms (raw material ingots) and value-added products such as foundry alloys, extrusion billets, rolling ingots, and wire rod.[31]
As regards the geographical distribution of production, Germany, France, and Spain are the three countries with the largest share of production. In 2017 they produced about 60 percent of primary aluminium in the EU (compared to 46 percent in 2008). However, these three countries represent only 2.0 percent of the global primary aluminium production.[32] As a result of the significant drops in investments and the resulting closure of several smelting plants, the EU lost more than a quarter of its smelting capacity in the period 2008-2017.

According to European Aluminium[33], the number of smelting plants in operation in the EU fell by 38 percent in the period 2002-2016: the closures generally concerned old smelting plants (mostly built in the 1960s and early 1970s) with relatively small production capacities (average capacity of 104,000 tonnes per year). It is also worth noting that in October last year Alcoa announced the closure of two of its three aluminium smelting plants in Spain (in Aviles and La Coruña) with a total production of 180,000 tonnes per year and 317 and 369 employees respectively. The US-based company aims to restructure production in a single plant (in San Ciprián, with a production capacity of 228,000 tonnes per year and 1,700 employees), which produces both alumina and aluminium. However, Alcoa has also recently warned that the financial viability of the remaining primary aluminium plant in San Ciprián would also be threatened if the Spanish Government did not take specific measures to support large electricity consumers. Alcoa is currently negotiating with employee representatives to discuss the future viability of the aluminium plant. By the end of June 2020, management had begun the formal 30-day consultation period with the works council to achieve the best possible outcome for the company and its workforce.

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[31] For more detailed information see (BGR – Federal Institute for Geosciences and Natural Resources (2019): Germany – Raw materials situation 2018. Hannover: P. 53)

[32] As a precursor for the production of alumina and primary aluminium, Germany imported about 2.6 million tonnes of bauxite and about 1.15 million tonnes of aluminium oxide or hydroxide in 2018. Imports of waste, scrap, slag, and other residues containing aluminium increased by 11.4 % to 1.1 million tonnes). In 2018, the production of unalloyed aluminium in Germany fell by 3.8%. About 529,000 tonnes of aluminium were produced in four primary smelting plants. Germany was thus the largest producer in the EU and ranked 17th in the world with a 0.9% share of total primary production of around 61 million tonnes.
The production of secondary aluminium fell by 0.2% compared with the previous year. It amounted to 761,710 tonnes in the reporting year. Production from secondary precursors was thus higher than primary production and reached 59% of total production in 2018. In 2018, the German aluminium industry employed about 39,000 people in 170 companies. Around 11,000 people were employed in 50 companies processing aluminium. The German aluminium industry generated revenues of €16.9 billion in 2018. Foreign sales amounted to € 8.2 billion (WVM 2019). BGR – Federal Institute for Geosciences and Natural Resources (2019): Germany – Raw materials situation 2018. Hannover: P. 36)

[33] Cf. https://www.european-aluminium.eu/activity-report-2019-2020/market-overview/

The company plans to restructure the aluminium plant, with part of the foundry remaining in operation. A mass redundancy could potentially affect up to 534 employees of the aluminium plant. No final decisions will be taken until the mandatory, formal consultation process is completed. The aluminium smelting plant has suffered considerable and recurrent financial losses, which will remain in the future.[34]

The San Ciprián site has both an aluminium plant and an alumina refinery. The San Ciprián alumina refinery is not affected by this formal consultation process.

A look at the European and German aluminium producing companies shows that six companies account for about 76 percent of the total production capacity in the EU:

- Trimet Aluminium SE (22.5 percent) – correspondingly with smelting plants in Germany;
- Alcoa Corp. (16.8 percent) – correspondingly with smelting plants in Spain;
- Rio Tinto (11.7 percent) – correspondingly with smelting plants in France;
- ALRO S. A. (10.9 percent) – correspondingly with a smelting plant in Romania;
- Aluminium de Greece (7.5 percent) – correspondingly with an aluminium smelting plant in Greece
- Norsk Hydro (6.6 percent) – correspondingly with a smelting plant in Germany.

[34] https://www.finanznachrichten.de/nachrichten-2020-06/49943326-alcoa-to-begin-formal-consultation-process-with-spanish-works-council-regarding-san-ciprian-aluminum-smelter-004.htm

In Germany, the following companies produced quantities of raw aluminium in the following aluminium smelting plants:

Trimet,[35]	Hamburg plant:	130,000 tonnes
	Voerde plant:	95,000 tonnes
	Essen plant:	165,000 tonnes
Hydro:[36]	Neuss plant:	150,000 tonnes

Overview: Foreign trade Germany raw aluminium (in tonnes)[37]

Country	Import 2018	Export 2018	Import 2019	Import 2019
EU 28	1,396,300	350,300	1,182,300	344,000
EFTA	425,700	97,600	442,800	96,200
Eastern Europe	300,100	2,700	268,200	4,300
Rest of Europe	0	0	0	0
Europe Total	2,122,100	450,600	1,893,300	444,500
North America	24,200	800	37,200	1,500
Central and South America	9,600	>0	1,900	>0
Africa	70,400	0	132,200	0
Asia	289,100	9,600	297,000	10,500
Australia / New Zealand	800	0	2,700	>0
Rest of the world	90,000	0	77,300	>0
Total	**2,606,200**	**461,000**	**2,441,600**	**456,600**

Overview: Foreign trade of aluminium semi-finished products in tonnes [38]

Country	Import 2018	Export 2018	Import 2019	Import 2019
EU 28	1,083,100	1,505,500	1,036,600	1,566,700
EFTA	273,800	84,800	280,200	75,800
Eastern Europe	169,600	84,800	162,800	77,800
Rest of Europe	>0	>0	0	>0
Europe Total	1,526,500	1,675,100	1,479,600	1,720,300
North America	33,000	87,800	7,400	134,500

[35] Company information
[36] For reasons of competition law, Hydro only mentions capacities, not production figures
[37] cf. http://www.aluinfo.de/aussenhandel.html
[38] http://www.aluinfo.de/aussenhandel.html

Central and South America	100	71,400	>0	70,500

Country	Import 2018	Export 2018	Import 2019	Import 2019
Africa	20,100	29,300	16,700	15,500
Asia	80,800	83,900	103,300	74,300
Australia / New Zealand	100	5,000	>0	3,700
Total	**1,660,700**	**1,952,500**	**1,606,900**	**2,018,900**

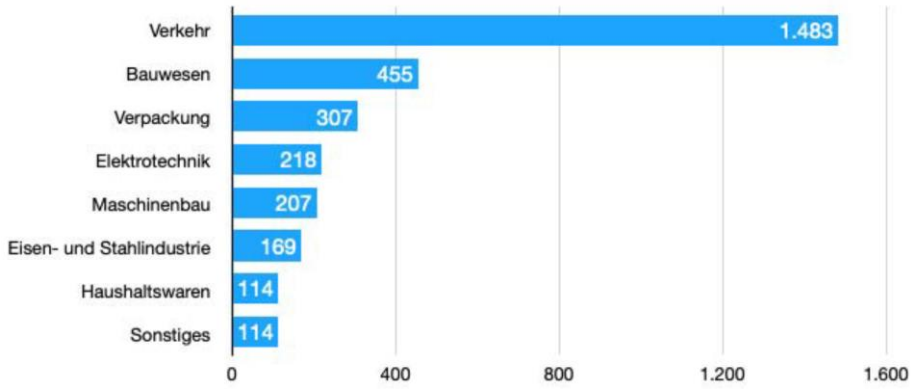
Source: Destatis / Statista 2020

These companies also have about 80,5 % of total European (including EFTA countries) primary aluminium production capacity, with Norsk Hydro and Alcoa together controlling just over 48 % of production capacity (26,2 % and 22,3 % respectively).

Quantity of aluminium used in Germany by sector in 2018
in thousand tonnes
Source: Statist

Quantities of aluminium

Industry	Quantity in tonnes
Transport	**1,483**
Construction industry	**455**
packaging	**307**
Electrical engineering	**218**
Mechanical engineering	**207**
Iron and steel industry	**169**
Household goods	**114**
Other	**114**



Verkehr	Transport

Bauwesen	Construction industry
Verpackung	packaging
Elektrotechnik	Electrical engineering
Maschinenbau	Mechanical engineering
Eisen- und Stahlindustrie	Iron and steel industry
Haushaltswaren	Household goods
Sonstiges	Other

Use of aluminium

The use of aluminium in Germany amounted to about 3.3 million tonnes in 2016. The most important application sector is transport, followed by construction, mechanical engineering, packaging, iron and steel, and electrical engineering. In total, about 547,000 tonnes of aluminium were produced in 2016 and the secondary smelting plants produced 723,000 tonnes of recycled aluminium. The production of semi-finished products (rolled and extruded products as well as wires and forgings) amounted to 2.4 million tonnes, while shaped castings accounted for 1.1 million tonnes.[39]

The largest area of application for aluminium in Germany is the transport sector with vehicle construction, accounting for about 48 percent. The next largest areas of application are the construction industry with about 15 percent and the packaging industry with 10 percent. Electrical engineering accounts for seven percent, and mechanical engineering and the iron and steel industry each account for six percent. Household articles as well as use in office supplies, furnishings, and leisure products account for four percent each.[40]

In terms of consumption of primary aluminium, Germany was in third place worldwide behind China and the USA with a share of 3.6 percent. In the EU, Germany was the largest consumer with 2.1 million tonnes.

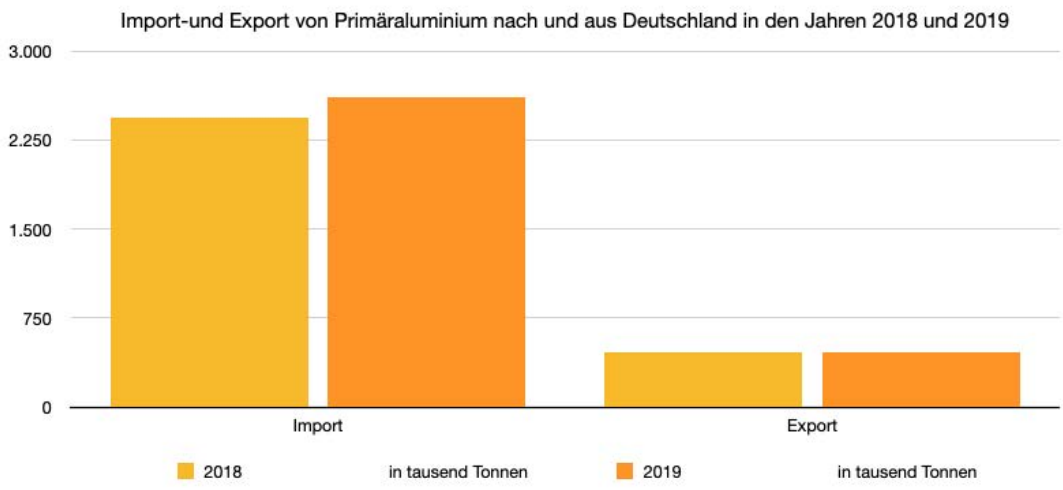


Tabelle 1

	2018 in tausend Tonnen	2019 in tausend Tonnen
Import	2.442	2.606
Export	457	461

Import-und Export von Primäraluminium nach und aus Deutschland in den Jahren 2018 und 2019	Import and export of primary aluminium to and from Germany in 2018 and 2019
Import	Import
Export	Export
2018 in tausend Tonnen	2018 in thousand tonnes
2019 in tausend Tonnen	2019 in thousand tonnes
Tabelle 1	Table 1

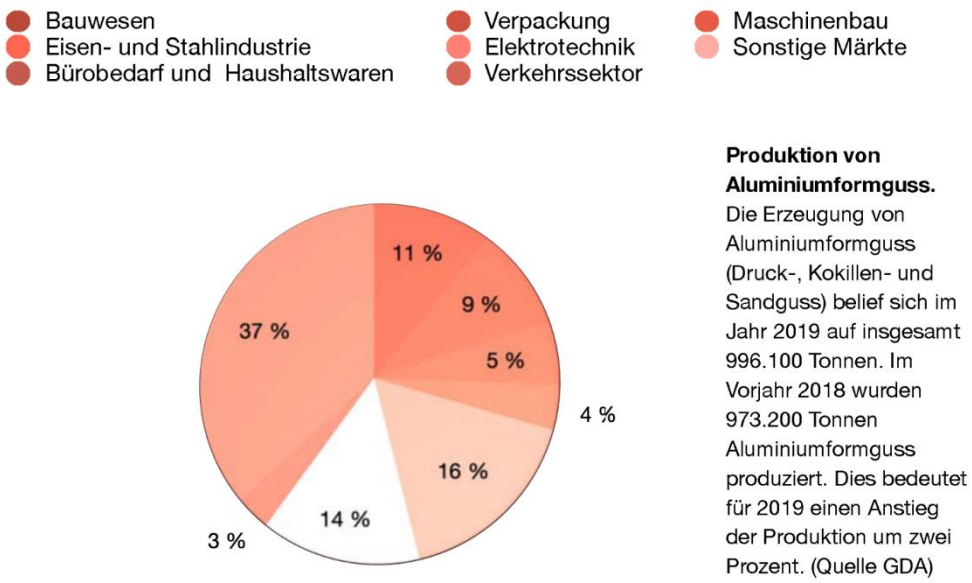
[39] Cf. https://www.wvmetalle.de/die-ne-metalle/#c1001)
[40] GDA 2019

Aluminium processing covers the production of foil and thin strip (2016: 267,000 tonnes), the manufacture of tubes, aerosol and other cans (2016: 42,000 tonnes), and the production of aluminium powder (2016: 28,000 tonnes).

The total industry turnover of 12.5 billion euros is generated by around 41 200 employees in 167 companies.

2.3 Importance of (small and medium-sized) aluminium processing companies in Germany

The Federal Statistical Office reports 105 companies and comparable turnover for the direct processing industry: Here are the calculations: In direct aluminium production alone, companies with up to 249 employees (which can be classified as small and medium-sized enterprises) generate a turnover of over three billion euros (which accounts for 23 percent of the total turnover of aluminium production in 2019 alone). There are also 7,186 employees working directly in small and medium-sized companies involved only in aluminium production, which is about 26 percent of those employed only in aluminium production, although this does not include all the other companies in aluminium downstream.[41]
The focus of this Policy Paper is primarily on aluminium processing companies, not on aluminium producers. Aluminium is used in almost all areas of life.



Bauwesen	Construction industry
Eisen- und Stahlindustrie	Iron and steel industry
Bürobedarf und Haushaltswaren	Office supplies and household articles
Verpackung	packaging
Elektrotechnik	Electrical engineering
Verkehrssektor	Transport sector
Maschinenbau	Mechanical engineering
Sonstige Märkte	Other markets

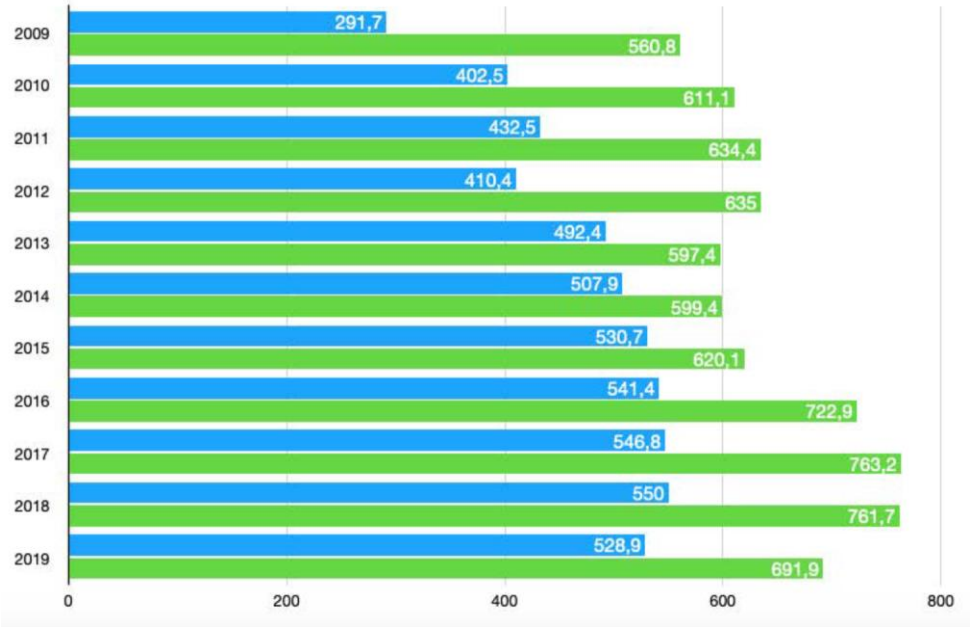
[41] Cf. Own calculations on the basis of the Federal Statistical Office (Destatis), 2020: Fachserie 4 Reihe 4.1.2, Produzierendes Gewerbe, Betriebe, Tätige Personen und Umsatz des verarbeitenden Gewerbes sowie der Bergbau und der Gewinnung von Steinen und Erden nach Beschäftigtengrößenklassen, 2019. published on 05.06.2020 Article number: 2040412197004

Produktion von Aluminiumformguss. Die Erzeugung von Aluminiumformguss (Druck-, Kokillen- und Sandguss) belief sich im Jahr 2019 auf insgesamt 996.100 Tonnen. Im Vorjahr 2018 wurden 973.200 Tonnen Aluminiumformguss produziert. Dies bedeutet für 2019 einen Anstieg der Produktion um zwei Prozent. (Quelle GDA)	Production of aluminium shaped casting. The production of aluminium castings (die casting, gravity die casting, and sand casting) totalled 996,100 tonnes in 2019. In the previous year 2018, 973,200 tonnes of aluminium castings were produced. This means a two percent increase in production for 2019. (Source GDA)

Production of primary and secondary aluminium now from 2009 to 2019
In 1,000 tonnes Source: Statista 2020

Production of primary and secondary aluminium in Germany

Year	Primary aluminium	Secondary aluminium
2009	291.7	560.8
2010	402.5	611.1
2011	432.5	634.4
2012	410.4	635.0
2013	492.4	597.4
2014	530.7	599.4
2015	541.4	620.1
2016	546.8	722.9
2017	550.0	763.2
2018	528.9	761.7
2019	507.9	691.9



In Germany, the aluminium industry directly employs 65,000 people in 2019. In 2019, the aluminium industry generated a turnover of about 21 billion euros (2005 = 17 billion euros). More than two-thirds of this turnover was generated by the producers of raw aluminium and semi-finished aluminium products. Foreign business is of great importance to the German aluminium industry, accounting for more than 40 percent of sales. Ireland, Germany, Spain and Greece represented a cumulative 4.6 percent of global alumina refinery production in 2017

(Alumina = Aluminium oxide. Alumina has the greatest economic importance as an intermediate product for the production of aluminium, 90 percent of world production is used for this purpose), which means that alumina in the EU is mainly imported, and internal production is not sufficient to meet the demand of the Member States. Apart from these countries, there are refineries in France and Romania. However, no data on the production of the smelting plant in the alumina refinery have been reported for 2017.

Hungary finally stopped alumina production along with bauxite mining in 2014 after MAL, the country's leading bauxite and alumina producer, went into liquidation as a result of the October 2010 environmental disaster. Both EU production and market share of alumina decreased over the period 2011-2016, with production falling from around 7.7 million tonnes to 7.2 million tonnes. As a result, the EU's market share of global aluminium production fell from eight percent to six percent.
Within the trend described above, the decline in primary aluminium production in the EU has been particularly marked in recent years). Since 2008 the primary production of primary aluminium has shrunk by 30 percent. In addition, some primary aluminium producing countries such as Italy (Alcoa smelting plants in Fusina and Portovesme, 2013-2014), the UK (Rio Tinto Lynemouth smelting plant in Northumberland, 2012) and the Netherlands (Klesch smelting plant in Vlissingen, 2011) have largely restricted or stopped production in recent years due to rising energy costs and strict environmental regulations as well as falling aluminium prices and lower demand from major customers, especially from the automotive and construction sectors.

2.4 The downstream industry – Aluminium processing companies

The output of primary and secondary aluminium producers, namely aluminium ingot products, is purchased by so-called downstream companies, also called the downstream industry, to produce the semi-finished products needed as input for other relevant sectors such as automotive, aerospace, engineering, packaging, construction, and consumer goods. The downstream segment comprises rolling mills, extruders, foundries and other companies producing aluminium wire rod, powder, and slugs.

These companies use different production processes to produce a very wide variety of goods for a variety of sectors.

Some aluminium semi-finished products are raw materials that compete primarily on price, while others are highly engineered and differentiated and therefore compete on their specific physical properties and performance characteristics, which primarily meet the specific requirements of the end-user industries.
From a structural point of view, a distinction should be made between vertically integrated downstream producers and those that are independently owned.
The former are often subsidiaries of large multinational groups, which also have significant upstream operations (producing primary aluminium and sometimes bauxite and alumina). The latter include local, specialised SMEs, which often serve a single customer, e.g. a car manufacturer (OECD, 2019). In some cases, downstream producers have also diversified their activities by producing various semi-finished products, such as aluminium extrusions and flat-rolled products.

As the purchase of raw aluminium accounts for at least 50 percent of the total production costs of downstream transformers, producers of semi-finished products are highly dependent on the economic conditions and physical availability of raw aluminium.

Price fluctuations at a global level, which are closely linked to quotations on the London Metal Exchange (LME), and local supply and demand conditions have a strong influence on downstream activities and their competitiveness.

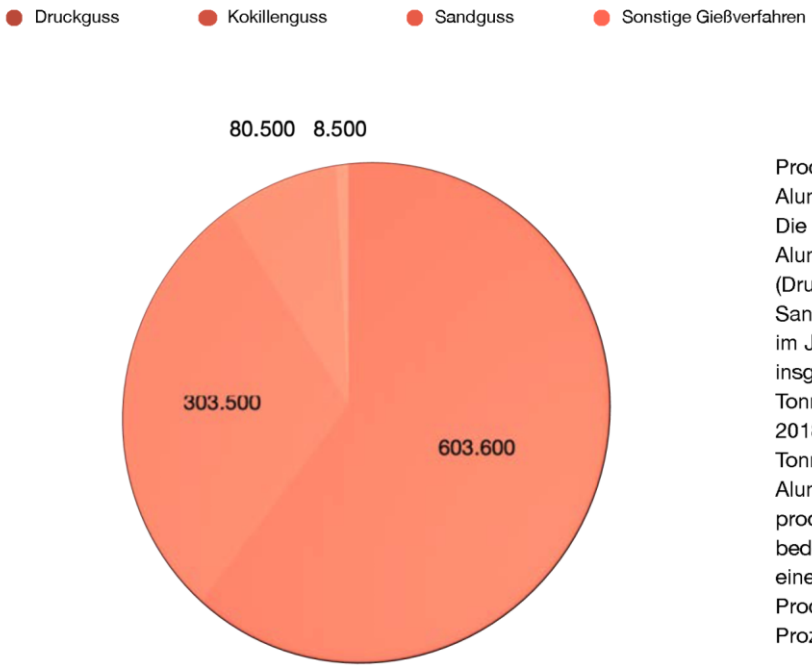
Independently owned downstream producers not only have limited bargaining power towards their suppliers (primary and/or secondary producers) but also face highly concentrated demand for their products.

Particularly in end-use markets where price competition is fierce (especially during economic crises), downstream transformers are under constant pressure from their customers to reduce costs; this pressure inevitably leads to a reduction in their profit margins if corresponding reductions in the cost of production equipment cannot be achieved. Intuitively, limited bargaining power towards their suppliers (primary and/or secondary producers) often hinders small, independently owned downstream producers.
In the following section, we focus on the three main segments of the downstream industry: rolling, extrusion, and casting. Wire and cable segments are not the subject of this study. The three segments of rolling, extrusion and casting account for about 90 percent of the German production of semi-finished aluminium products.

Flat-rolled products (FRPs) are manufactured by a process that reduces the thickness of aluminium alloys to obtain aluminium plate, sheet, and foil. In fact, FRPs are referred to as plates (at least 6 mm thick), sheets (less than 6 mm thick), and films (the thinner ones, less than 0,2 mm thick). Raw materials for the production of FRPs are slabs (A slab is a block of aluminium whose width and length is several times its thickness. Slabs are produced by casting and, if necessary, rolling and are the starting material for sheet and strip) and ingots (for the continuous casting process). Slabs can be produced in smelting plants or by remelting ingots and/or scrap. FRPs can vary not only in thickness but also in weight and length depending on the properties of the final product. The main industrial sector driving the demand for FRPs is the packaging industry. In fact, rolled products are the main component of food and beverage containers, tubes and bottles, semi-rigid containers, wrapping film, refined film, aseptic packaging, and bottle closures. Another sector that uses very large quantities of rolled aluminium in its production process is the transport sector. The automotive industry is one of the main consumers of rolled aluminium, which it uses mainly for radiators and bodies of cars, trucks, trailers, and buses.

FRPs are also used in the aerospace industry for the production of aircraft bodies, wings, or luggage containers. Finally, rail transport is another user of rolled aluminium, as is the maritime sector, which uses rolled aluminium for the production of small boat hulls and ship superstructures.

The electrical sector uses small amounts of rolled aluminium, mainly for the production of cable wrappings, while the mechanical engineering sector needs these products to produce offshore oil and gas platforms, printing plates, general machine parts, and defence and armour equipment.



Produktion von Aluminiumformguss. Die Erzeugung von Aluminiumformguss (Druck-, Kokillen- und Sandguss) belief sich im Jahr 2019 auf insgesamt 996.100 Tonnen. Im Vorjahr 2018 wurden 973.200 Tonnen Aluminiumformguss produziert. Dies bedeutet für 2019 einen Anstieg der Produktion um zwei Prozent. (Quelle GDA)

Druckguss	Die casting
Kokillenguss	Gravity die casting
Sandguss	Sand casting
Sonstige Gießverfahren	Other casting processes
Produktion von Aluminiumformguss. Die Erzeugung von Aluminiumformguss (Druck-, Kokillen- und Sandguss) belief sich im Jahr 2019 auf insgesamt 996.100 Tonnen. Im Vorjahr 2018 wurden 973.200 Tonnen Aluminiumformguss produziert. Dies bedeutet für 2019 einen Anstieg der Produktion um zwei Prozent. (Quelle GDA)	Production of aluminium shaped casting. The production of aluminium castings (die casting, gravity die casting, and sand casting) totalled 996,100 tonnes in 2019. In the previous year 2018, 973,200 tonnes of aluminium castings were produced. This means a two percent increase in production for 2019. (Source GDA)

The construction sector requires rolled aluminium for the production of panelling and cladding, roofs, caravans, and motor homes, road signs, and street furniture.

Finally, rolled aluminium is purchased by sectors producing durable consumer goods, mainly lighting, refrigerators and air conditioning, domestic appliances, and cookware.

Extruded profiles come in a variety of different and complex shapes (profiles) and are produced by placing aluminium in the form of a billet in a container and forcing it under pressure through a steel die.

Aluminium ingots produced in smelting plants or by remelting ingots and/or scrap are basic inputs to the extrusion process. Excellent physical properties, including a high strength-to-weight ratio, workability, and a relatively low melting point make aluminium an ideal material for extrusion. The extrusion molding process for aluminium is therefore relatively simple and cost-effective.

As a result, extruded products are used in a variety of end applications and industries, such as transportation, construction, aerospace, renewable energy, and others.

Moreover, technological advances and the creativity of product designers constantly open the door to new extruded products or new applications. Transport and construction are sectors where extruded aluminium components have been most often integrated into end products.

In the **transport sector**, aluminium profiles are used in the automotive industry (car and truck components), in the aerospace industry (structural components), and in the railway industry (car frames).

In the **building and construction industry**, extruded components are typically installed in windows, doors, parasols, and light shelves

Extruded aluminium components are often used in industries such as durable goods (e.g. household appliances), in the manufacture of technical products (e.g. irrigation systems, machinery, defence equipment, renewable energy).

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Finally, aluminium castings are produced in foundries by melting aluminium casting alloys (either primary or secondary), raw material ingots and aluminium scrap in a furnace and placing the molten aluminium in a mould where it solidifies.

The term "casting" refers to the solidified part that is ejected or extracted from the mould. Aluminium castings range from technical components and structural elements to automotive parts, such as cylinder heads, engine blocks, transmission housings, oil pans, wheels; from aircraft components and structures to ship engines. Although the majority of cast products are supplied to the transport sector, many small appliances, lawnmowers, cookware, and hand tools are made from cast aluminium. The extreme versatility of the cast products is also shown by the possibility of using more than 300 aluminium alloys.

The aluminium processing companies in Germany are particularly characterised by innovation, research, and resource efficiency: Metal processing has a long tradition in Germany, and Germany's downstream aluminium producers have been able to keep German industry profitable despite cost disadvantages.

2.5 Political-regulatory framework conditions / impact with regard to the (small and medium-sized) aluminium processing industry

Even if Federal German economic policy takes place at the national level, it is inconceivable without the European dimension, especially since European framework conditions and EU Community regulations intervene in economic events. As the Policy Paper will make clear, the Federal Government remains called upon to work within the framework of its European policy to influence, through the European institutions, developments that currently affect small and medium-sized enterprises within the sector.

Since 2008, the European Commission has focused on the aluminium industry and other non-ferrous metals such as copper and zinc and has shown its interest in the need for industrial policy measures to revitalise the European economy.

Furthermore, the aluminium industry and the aluminium processing companies associated with it have recently been the direct focus of an international discussion on protectionist measures. Public attention was focused primarily on the aluminium producing companies rather than on the downstream sector, i.e. the companies that process the raw aluminium produced into a wide range of products. And exactly these companies and their interests were very often neglected.

"SMEs are Germany's most important driver of innovation and technology and rightly enjoy a high reputation internationally as well. However, to remain competitive in the future, small and medium-sized companies must constantly reposition themselves.

A study of small and medium-sized companies commissioned by the BMWi shows that the innovative SME sector would continue to be considered a successful model "Made in Germany". Small and medium-sized companies can continue to remain successful with their well-tried specialisation and niche strategies. To achieve this, however, SMEs, in particular, need to take advantage of digitisation and overcome the challenges of the shortage of skilled workers," says the Federal Ministry of Economics and Technology, who is responsible for SMEs.[42]

2.6 European and German policy and its influence on aluminium processing companies

According to the EU treaties, industrial and economic policy in Germany is shaped independently. But even if there is a high degree of autonomy in decision-making, the reality is different. The European Single Market and Economic and Monetary Union require the economic policies of the EU-28 countries to be coordinated. Until 2011, economic policy coordination was mainly consensus-based and, with the exception of the fiscal policy framework laid down in the Stability and Growth Pact (SGP), without legally enforceable rules.
The scope of economic policy coordination was broad and, in practice, allowed for different forms of cooperation depending on the degree of the binding character of the cooperation agreements.

The economic crisis in 2009 brought to light fundamental problems and unsustainable trends in many European countries, and it became clear that the EU economies are closely interlinked. Stronger economic policy coordination within the EU was considered necessary to address problems and to promote growth and job creation in the future.

To this end, the existing system of economic policy coordination bodies and procedures in the EU was revised and strengthened.

Since 2011, a number of legislative acts have been adopted and new institutions have been established. The legal bases are Article 3 of the Treaty on European Union (TEU); Articles 2 to 5, 119 to 144 and 282 to 284 of the Treaty on the Functioning of the European Union (TFEU); the following Protocols annexed to the TFEU: Protocol No. 12 on the excessive deficit procedure, Protocol No. 13 on the convergence criteria and Protocol No. 14 on the Eurogroup.[43] But already since 2008, the European Commission has been showing increasing concern about the aluminium industry and other non-ferrous metals such as copper and zinc, renewing its interest in the need for industrial policy measures to revitalise the European economy [European Commission, 2008], non-ferrous metals are essential for mechanical engineering, transport, aerospace, construction, packaging, electricity and energy, electronics, and medical devices.

[42] cf. Innovative SMEs 2025 – Challenges, trends and recommendations for action for business and politics, Berlin 2016)
[43] https://www.swp-berlin.org/fileadmin/contents/products/studien/2014_S19_bkr.pdf

Although the EU is one of the largest consumers of non-ferrous metals in the world, its dependence on imported raw materials for the production of semi-finished and finished products has increased rapidly in recent years. Therefore, the need for specific measures has become increasingly important in view of the EU's objective to strengthen its industrial base and to increase the share of industry in the EU's gross domestic product (GDP) back to 20% by 2020, as proposed by the European Commission in 2012.

Five years ago, the European Commission made the enforcement of international trade rules a top priority under the "Trade for All" strategy. The removal of barriers to trade is a major task of the Commission. The enhanced EU Market Access Partnership aims to ensure a level playing field for European companies seeking export and investment opportunities in countries outside the EU.

Still in 2019, EU Trade Commissioner Cecilia Malmström stressed: "In the current complex environment of increasing trade tensions and protectionist measures, the EU must continue to defend the interests of its companies on global markets. It is essential that we ensure that the existing rules are respected. As a result of our successful work, 123 trade barriers reducing the EU's export opportunities have been removed since I took office at the end of 2014. By addressing the concrete problems reported to us by our companies, we create economic benefits whose value is equal to that of the EU's trade agreements. These efforts must certainly be continued."[44]

The words of the former competition commissioner sound good, but they are only part of a far more complicated picture. This is because the customs tariff applicable to imports of raw aluminium into the EU-28 influenced the prices of both aluminium from countries subject to duty and that produced in the EU or in countries which have concluded duty-free PTAs with the EU. Concerning imports of unwrought aluminium (both primary and secondary aluminium), the EU import duties for CN code 760110 00 (not alloyed aluminium) are 3 % (third country duty) and 0 % (preferential duty), for CN code 7601 20 20 90 (aluminium alloys, in ingots or billets) and 4 % in 7601 20 80 (aluminium alloys, other), 6 % (third country duty) and 0 % (preferential duty). [45]

[44] cf. https://ec.europa.eu/commission/presscorner/detail/de/ip_19_2994
[45] cf. http://dipbt.bundestag.de/dip21/btd/19/123/1912388.pdf

HS Code	Code description	Tariff (2019)	EU regulation No.
76.01.100000	Aluminium, **not alloyed**," Aluminium content ≥ **99%**	**3%**	R0705010
76.01.202010	Aluminium **alloys**, slabs and billets, containing lithium, Aluminium content < **99%**	0%	R1623900
76.01.202090	Aluminium **alloys**, slabs and billets, Aluminium content < **99%**	**4%**	R1623900
76.01.208000	Aluminium **alloys** (other), Aluminium content < **99%**	**6%**	R9720860

Raw aluminium can be imported into the EU duty free from countries that have signed preferential trade agreements (PTA) with the EU and from less developed countries (SPGA) covered by the Generalised Scheme of Preferences (GSP).[46] As a result, the EU market prices for raw aluminium always include the duty rate and the EU-28 downstream producers paid higher prices for all imported raw aluminium. This is a so-called virtual premium of the large domestic European aluminium producers.

The EU import customs tariff for unwrought unalloyed aluminium also means that the premium for high-purity ingots on the EU market is higher than comparable prices in other world regions.

The approach originally propagated by the EU Commission that import duties should protect primary industry in the European Union does not work. This is because the greatest cost disadvantages compared with international competitors result from the high energy costs of primary aluminium producers within Germany.

In the period 2000-2017, about half of the imports of unwrought unalloyed aluminium came from countries with duty-free access to the EU market. The share of duty-free imports has increased at times when import volumes have been significantly lower, such as during the economic crisis. Among the countries subject to customs duties, Russia accounts for slightly less than 38 percent of the EU's total imports of unwrought unalloyed aluminium, which also represents about 63 percent of total imports subject to customs duties.

[46] vgl. GRUPPO DI RICERCHE INDUSTRIALI E FINANZIARIE - GRIF “FABIO GOBBO”, LUISS GUIDO CARLI UNIVERSITYTHE EUROPEAN UNION ALUMINIUM INDUSTRY (2019): THE IMPACT OF THE EU TRADE MEASURES ON THE COMPETITIVENESS OF DOWNSTREAM ACTIVITIES. June 2019.

Conversely, Mozambique (17 percent) and Iceland (16 percent) are the main exporters among the duty-free countries. The share of imports of aluminium alloys which were duty-free was on average 75 percent in the period 2000 to 2017.
Among the countries with duty-free access to the EU internal market, Norway and Iceland are by far the leading exporters, together accounting for 57 percent of EU imports of aluminium ingots and bars.

Cast alloys account for 47 percent of EU imports. Among the countries subject to duties, the UAE accounts for slightly less than 18 percent of total EU imports of alloy ingots and bars in 2017 (equivalent to about 55 percent of total imports subject to duties in the same year) and 16 percent of total EU imports of foundry alloys (about 39 percent of total imports subject to duties in the same year).

EU trade policy also offers companies the opportunity to process imported products duty-free. Companies may temporarily import raw materials or semi-finished goods from different countries, assemble or transform them so that the products can be re-exported for final consumption in third countries. During the period 2000-2017, inward processing was extensively used by EU companies for both non-alloyed aluminium (on average, four percent of total duty bearing imports) and aluminium alloys (on average, 39 percent of total duty bearing imports).[47]

Import duties on raw aluminium exert upward pressure on the prices of secondary alloys, which further affects the cost competitiveness of downstream transformers in the EU. This trend is set to increase as climate change, rising energy prices, the consequences of the COVID-19 pandemic, and the European Green Deal create deep ruts in the European economy.

Added to this are the interruptions in the supply chains, which cause considerable additional burdens for the aluminium processing companies operating here, including plant shutdowns: Even if the lockdown has been eased in the meantime, this does not mean that the companies can now resume full production.[48] The more networked global value-added relationships are, the greater the impact of force majeure in the supply chain. This is all the more true the more closely companies schedule their just-in-time or just-in-sequence deliveries.

[47] cf. Ebenda
[48] vgl. GRUPPO DI RICERCHE INDUSTRIALI E FINANZIARIE - GRIF “FABIO GOBBO”, LUISS GUIDO CARLI UNIVERSITYTHE EUROPEAN UNION ALUMINIUM INDUSTRY (2019): THE IMPACT OF THE EU TRADE MEASURES ON THE COMPETITIVENESS OF DOWNSTREAM ACTIVITIES. June 2019.

The cause of more and more interruptions in supply chains is man – not a natural disaster. In two out of three cases, the trigger is a fire or explosion. Storms follow in second place, but cause only six percent of the disturbances. Floods are far behind in seventh place. They cause the supply chain to break in three percent of all cases.[49]

This makes the impact of the customs tariffs all the more significant on the situation of the so-called EU downstream sector, which represents a largely artificial additional cost to the EU of around 1 billion euros per year and acts as a hidden subsidy and added value for aluminium producers in and outside the EU.

The additional costs per tonne thus amount to about 85 euros per tonne (current price per tonne of aluminium is 1,428 euros), which corresponds to an annual premium of more than 100 million euros per year on aluminium produced in Germany alone, money that is taken away from SMEs with a price premium, making it more difficult for them to adapt to the competitiveness of future challenges.
Currently, there are aluminium smelting plants in a decreasing number of EU Member States producing primary aluminium in all forms (raw material ingots) and value-added products such as foundry alloys, extrusion billets, rolling ingots, and wire rod.

The maintenance of primary aluminium production in the EU can only be justified on strategic grounds, and the duty should not be considered as a possible instrument to support the upstream industry.
As import duties on raw aluminium have essentially failed to protect unused local primary production capacity and to encourage an increase in EU production and exports of primary aluminium, the question can be raised as to what policy needs to be pursued in upstream activities.

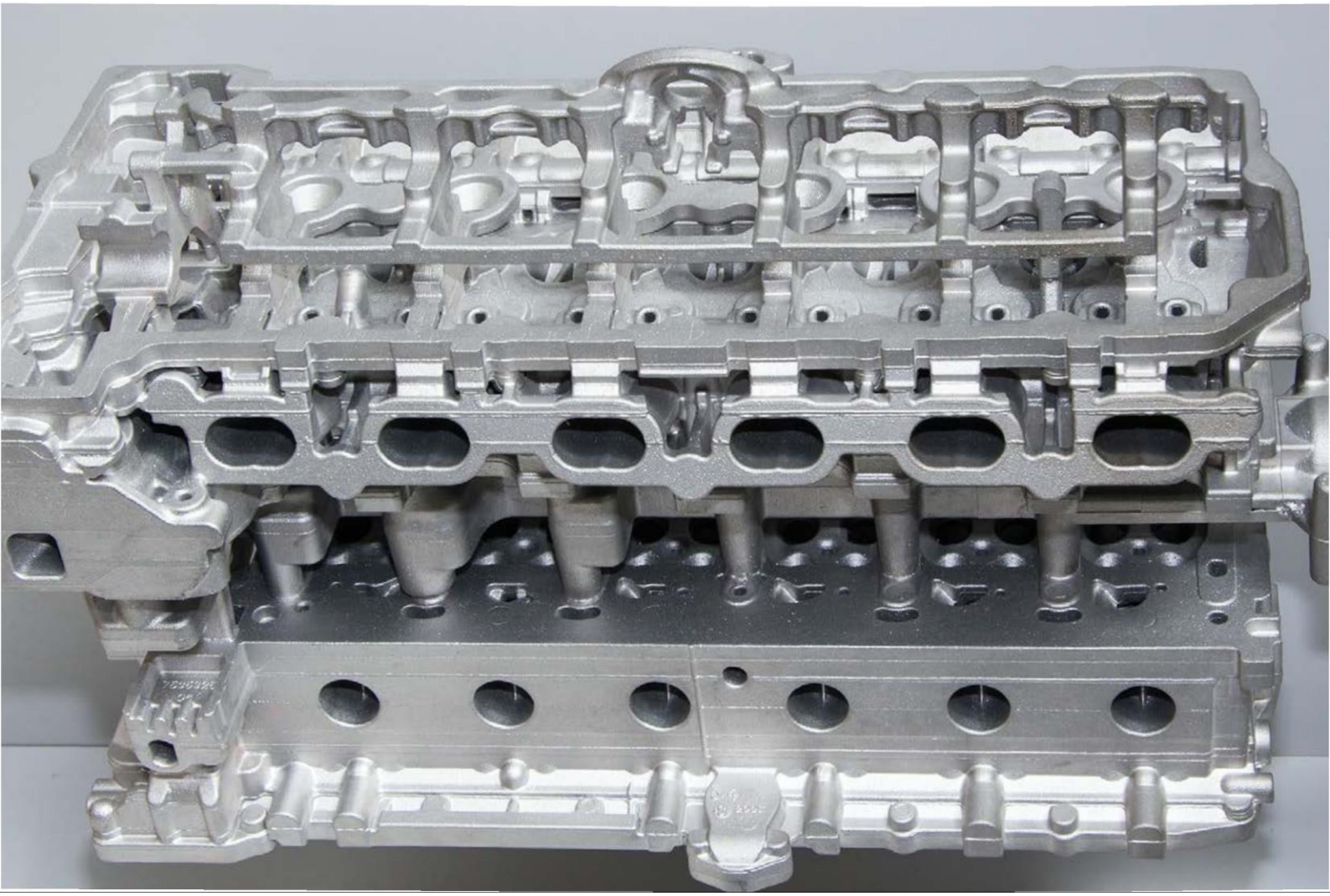
Empirical evidence and recent market developments clearly show that, in the EU context, the maintenance of primary production is only possible with small shares of total apparent consumption. Moreover, recent debates in the United States also show the increasing importance of exploring alternative remedies to address the import dependence of strategically important industries, such as the aluminium industry, particularly in a context characterised by a variety of different government interventions. In fact, government interventions, predominantly in the form of energy subsidies and concessionary funding, are relatively extensive in the case of primary aluminium and thus influence the entire value chain.

As regards the geographical distribution of production, Germany, France, and Spain are the three countries with the largest share of production. In 2017, they produced about 60 percent of primary aluminium in the EU (compared to 46 percent in 2008), but these three countries represent only two percent of the world's primary aluminium production.

[49] cf. https://www.agcs.allianz.com/content/dam/onemarketing/agcs/agcs/risk-barometer/Allianz-Risk-Barometer-2020-Risiken-Global.jpg)

The imbalance between in-house production and demand for aluminium is one of the hurdles in the competitiveness of aluminium processing companies in Germany. On the one hand, German SMEs develop and produce appropriate high-tech solutions for all areas of industrial use of aluminium, and, on the other hand, the companies based here are highly dependent on imports of this important raw material.

The small and medium-sized aluminium processing industry could now be relieved if, as in the COVID-19 pandemic, aluminium as an important raw material were exempted from import tax.



2.7 Aluminium as an important constituent of the German raw material strategy

Aluminium is an important material for the future. The Federal Government adopted a new raw materials strategy at the beginning of 2020 to achieve its industrial policy goal of "strengthening the competitiveness of the industry and preserving jobs in the industry". As one of the world's leading technology locations and as an export nation, Germany is highly dependent on a secure supply of raw materials.[50]
German raw materials policy focuses on four pillars: In addition to

- economic aspects,
- ecological,
- sustainable
- social aspects

should also be addressed.

Germany, which traditionally has a strong industrial sector, is, however, poor in raw materials, not only after the now foreseeable phase-out of coal production. On the other hand, Germany is one of the world's largest consumers of raw materials.

Germany is among the five countries with the highest demand for aluminium, copper or zinc, but does not have significant deposits of these raw materials.

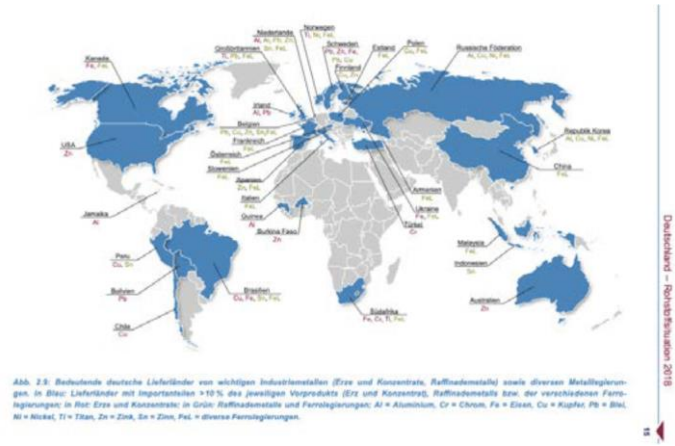
The secure supply of raw materials is becoming essential for Germany, especially against the backdrop of digitisation and climate change.
This underlines the importance of a secure supply of raw materials also for the future economic development of Germany. According to the German government's concept, the German raw materials supply is currently based essentially on three pillars:

- Use of primary raw materials from domestic sources
- Use of secondary raw materials from recycling
- Import of raw materials

The Federal Government has rightly realised that the substitution of primary raw materials by secondary raw materials must be given the widest possible scope in future. The aim is to cover a large part of the demand for raw materials in Germany through domestic raw material extraction, on the one hand, and the use of recycled materials, on the other. For example, the German construction industry is predominantly supplied with raw materials from domestic production. Aluminium in particular will play an important role here.

[50] Cf. Raw materials strategy of the Federal Government. In: https://www.bmwi.de/Redaktion/DE/Downloads/P-R/rohstoffstrategie-der-bundesregierung.pdf?__blob=publicationFile&v=8

German industry is dependent on non-discriminatory supply via the world markets. Even if the German government – also following the presentation of the Raw Materials Strategy – is making efforts to increase resource efficiency and the share of recycled materials, the German economy is dependent on a secure supply of primary raw materials, especially for some basic products.[51]
Functioning raw materials markets – i.e. fair and non-discriminatory access to raw materials – are therefore an indispensable necessity for the competitiveness of German industry, as the following figure on important supplier countries shows (BGR 2019:15)



Source: BGR – Federal Institute for Geosciences and Natural Resources (2019): Germany – Raw materials situation 2018. Hannover: P. 15)

[51] Cf. BGR – Federal Institute for Geosciences and Natural Resources (2019): Germany – Raw materials situation 2018. Hannover: P. 53): **Germany, as an industrial and high-tech location, would continue to depend on a secure and sustainable supply of raw materials in the future**. Securing the supply of raw materials is primarily a task for industry, while political activities focus on enabling fair and reliable framework conditions for a secure supply of raw materials.

In 2018, Germany imported raw materials worth about € 181.4 billion (energy raw materials, non-metals, and metal raw materials: ores, concentrates, intermediate products, downstream products along the value chain including semi-finished products, excluding goods).

This represents a significant increase of around € 19.1 billion (+11.8%) over the previous year. This increase is primarily the result of significantly higher raw material prices, which led to significantly higher expenditures, especially for energy raw materials (+21.4 %). Metal raw materials and non-metals increased by 5.9% and 4.5%, respectively, compared with the same period of the previous year.

According to the trade association of metal producers (Wirtschaftsvereinigung Metalle, WVM 2019), the German non-ferrous metal industry achieved sales of € 52.4 billion in 2018 with 110,867 employees (+2.5 % compared to 2017) in 654 companies, which corresponds to an increase of about 2.1 % compared to the previous year. Germany was by far the most important sales market for the German non-ferrous metals industry with sales of € 27.7 billion.
A total of € 24.7 billion came from foreign business, which corresponds to an export ratio of 47 % as in the previous year. In 2018, about 89% of the exports (crude metal and semi-finished products) of the German non-ferrous metal industry went to the euro zone. The EU countries were thus the second most important sales region for the German non-ferrous metal industry after Germany.

The five EU countries Great Britain (11%), Austria (9%), France (8%), Poland (8%) and Italy (7%) alone accounted for 43 % of total exports in 2018. Outside the European Union, the largest sales markets for raw metal and semi-finished products were Switzerland (6%), the USA (4%), China (2%) and Turkey (2%).

Despite its high dependence on imports of metals, Germany was again a net scrap exporter in 2018 as in previous years.
As a result of the stricter regulations for Chinese scrap imports since mid-2017, the country's importance has declined from being Germany's largest to what is now the fifth-largest destination country for German non-ferrous metal scrap in 2018.

However, there are a number of factors that put German companies at a disadvantage in the competition for raw materials. "This is due to numerous state interventions in raw materials trading, which give their own industries advantages in international competition, often to compensate for comparatively less efficient production processes. For example, subsidies for raw material imports, prohibitively high export taxes, or discriminatory licensing procedures for exports, which secure the raw material base for one's industry, lead to price distortions and shortages for competitors. The increasing formation of market-dominating corporate structures is also a major concern. This development can lead to a lack of competition in the raw material markets and additional burdens for companies.[52]

Not only since the COVID-19 crisis, but already due to the previous trade and customs disputes between the USA and China, but also due to American sanctions against Russia, there have been delivery bottlenecks in some areas – for example, in the construction industry. Such disruptions not only make construction, for example, of housing and infrastructure, more expensive but also lead to greater negative environmental and climate effects, since the necessary supplies have to be transported over even greater distances.

How seriously political sanctions also influence the markets will be briefly outlined at this point. When the US government announced sanctions against the Russian manufacturer RUSAL about two years ago, on April 6, 2018, this led to worldwide market shifts and price increases that kept the industry on tenterhooks for nine months. "The emergency structures that our companies ... have built up over the last nine months in the procurement of alumina have been uneconomical and thus a great burden for the German aluminium industry. We are therefore very pleased that the sanctions against Rusal and thus also against the Irish alumina producer Auginish have been lifted. There is now planning security again," said Franziska Erdle, General Manager of the trade association Wirtschaftsvereinigung Metalle (WVMetalle), in a statement at the time.[53]

The high price increases and the poor supply of alumina had partly led to production shutdowns. "The price increases for alumina have now reached about 65 percent and for some aluminium 30 percent," said Christian Wellner, managing director of Gesamtverband der Aluminiumindustrie [GDA]. "Volatility and price explosions were the reason why aluminium could no longer be produced economically in the meantime. The US sanctions against Russia were the main driver of this development. Beyond alumina, Rusal is an important supplier of primary aluminium in Germany and Europe. "If the sanctions had been kept in place, there could have been a shortage of supply"[54]

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[52] Cf. https://www.vdz-online.de/fileadmin/gruppen/vdz/3LiteraturRecherche/Download/BDI_Grundsatzpapier_Rohstoffpolitik.pdf)

[53] cf. https://www.alu-news.de/index.php id=161&tx_news_pi1%5Bnews%5D=39&tx_news_pi1%5Bcontroller%5D=News&tx_news_pi1%5Baction%5D=detail&cHash=19b805ab1480ae0a0ccaf553dc4d61b6)

[54] cf. Ebenda

"Secure and non-discriminatory access to raw materials is of central importance for Germany as an industrial country and high-tech location. The economic catching-up process and the further industrialisation of developing and emerging countries, as well as the development of innovative technologies, are increasing the global demand for raw materials. Germany, as one of the largest importers of raw materials, is dependent on availability on the international markets. Free world trade is, therefore, crucial for the competitiveness and future viability of Germany as an industrialised country.

However, the developments on the international raw materials markets in recent years have shown that the shortage and increasing price of important raw materials can become a major burden for industry.[55] A secure supply of raw materials includes, in particular, the elimination/avoidance of trade barriers.

2.8 Aluminium as a constituent in shaping the European Green Deal CO2 Border Tax and EU Recovery Plan

When the European Green Deal was officially presented on December 11, 2019, no one had any idea that the biggest economic global crisis would come a few weeks later in the wake of the COVID-19 crisis. In essence, the European Green Deal aims to eliminate net greenhouse gas emissions by 2050 and to decouple economic growth from resource use. These goals should be achieved by 2050. This plan is to go hand in hand with a CO2 pricing system, as it is to apply in Germany from 2021.

"The national emissions trading system (nEHS) will start in 2021 with a fixed price system, i.e. the price per tonne of CO2 is fixed and politically determined. This involves the sale of certificates to companies that market heating and motor fuels. The costs for the certificates are then borne by the fuel trade: when companies sell heating oil, liquid gas, natural gas, coal, petrol, or diesel, they need a certificate as a pollution right for every tonne of CO2 that the substances will cause in consumption. The federal and state governments agreed in the mediation committee to set the CO2 price at an initial 25 euros from January 2021. Thereafter, the price will gradually increase up to 55 euros in 2025. A price corridor of at least 55 euros and at most 65 euros should apply for 2026".[56]

This CO2 price described here would then also be introduced in a similar form in the European Union. As a result, all measures and production methods that are harmful or detrimental to the climate would become more expensive. This applies, in particular, to the energy-intensive industries that operate in Europe. The energy requirements of the aluminium industry amount to 33.14 TWh (as of 2015), with electricity consumption accounting for the largest share at 55 percent (18.17 TWh), whereby – unlike in other industries – it is purchased from outside and not, as in other industries, produced in-house. The heat requirements of the aluminium industry and aluminium processing companies are met by 45 percent and 14.70 TWh, respectively, 74 percent by gases [10.94 TWh] and 18 percent by hard coal [2.67 TWh].

[55] cf. https://bdi.eu/media/presse/publikationen/energie-und-rohstoffe/20151001_Positionspapier_Handels-und-Wettbewerbsverzerrungen_bei_Rohstoffen.pdf
[56] cf. https://www.bundesregierung.de/breg-de/themen/klimaschutz/co2-bepreisung-1673008

The current production of one tonne of aluminium in Germany requires slightly less than 15 MWh of electricity.

The production of primary aluminium from bauxite/aluminium ores is much more energy-intensive than the melting of scrap or secondary aluminium. Secondary aluminium requires only about five percent (0.75 MWhel t/Alu) of the energy used in primary production.

"With a circular economy that will be promoted from 2019 onwards as a result of the Packaging Act (VerpackG) coming into force, it can, therefore, be assumed that there will be a steady decline in energy requirements due to increased recourse to secondary aluminium, not least because 80 percent (2019) and 90 percent (2022) of aluminium must be recycled by law. Depending on the product group, between 90 and 95 percent of aluminium is already recycled today.[57]

This is all the more important because, in the period from 1990 to 2016, the production of primary aluminium remained unchanged at 1,367 kg CO2 per tonne of primary aluminium. The emission-intensive production processes are also reflected in the number of reported emissions. 2,471,000 freely allocated emission certificates are opposed to 2,590,000 verified/registered certificates. Accordingly, the aluminium industry has an additional demand of 119,000 t/CO2 (2015), which, against the backdrop of more stringent benchmarks, is likely to increase in the 4th trading period unless significant emission and primary energy reductions are implemented by the industry.

[57] (cf. GDA (Ed.), 2017)

2.8 Aluminium as part of the Green New Deal due to its energy saving and CO2 emission reduction potential

Aluminium plays a previously underestimated role in the Green New Deal, as the cumulative savings potential in primary and secondary steel production is given as three PJ (0.83 TWh) or ten percent of the aluminium industry's energy requirements. In contrast, only 1.4 PJ (0.38 TWh) or five percent is currently considered economically justifiable.

The savings potentials differ in the primary and secondary aluminium production. The savings potential for primary aluminium is two PJ (0.55 TWh) or 7.6 percent in total, 0.4 PJ (0.11 TWh) or 1.5 percent in economic terms, and for secondary aluminium 0.9 PJ (0.25 TWh) or 28 percent in total, and 0.8 PJ (0.22 TWh) or 25 percent in economic terms.[58] Even today, aluminium producing and processing companies have to live with the disadvantages of high European environmental standards. However, the benefits of better air filters or stricter exhaust gas regulations are also mainly found in the EU. It is often feared that intra-European CO2 pricing could cause energy-intensive companies in the non-ferrous industry to relocate to Brazil or China, i.e. to countries where environmental regulations are more liberal and less stringent. In Germany and Europe, by contrast, well-paid industrial jobs were lost.

To protect against relocation and to prevent climate-damaging products from entering the EU, this is countered by the idea of a Carbon Border Tax, which is similar to a climate tariff that would be equivalent to the European CO2 pricing to ensure equal competitive conditions between domestic and non-European suppliers.

Both the German government and the European Commission have launched different packages to overcome the COVID-19 crisis. These include the German government[59]'s 120 billion economic stimulus package and the European Union's Recovery Programme, which addresses the issue of the environment and climate protection under the heading Repair and prepare for the next generation.[60]
In principle, the high degree of sustainability of the EU Commission's COVID-19 stimulus packages, which focus on the Green Deal, is to be welcomed. It should be noted that both at the national and European levels, the aluminium industry is not part of a problem, but part of the solution.

[58] Foundation Stiftung Arbeit und Umwelt der IG BCE (2020): Effects of a CO2 tax on six energy-intensive industries and on the German electricity industry. https://www.arbeit-umwelt.de/wp-content/uploads/200212_StAU_Auswirkungen_einerCO2-Steuer.pdf
[59] cf. https://www.rnd.de/politik/konjunkturpaket-mit-130-milliarden-euro-gegen-die-corona-krise-OJCR5MGUORFS3EK52HYJFISHAA.html.
[60] cf. https://ec.europa.eu/commission/presscorner/detail/en/ip_20_940

As a measure, the EU should provide support measures for secondary aluminium producers who recover the metal by recycling a low-carbon minting product that requires only five percent of the energy compared to the primary metal. Aluminium has the valuable property of being infinitely recyclable.

In addition, its properties as an important material (see above: recyclability, lightweight construction, etc.) contribute to the climate and energy revolution and a low-carbon Germany and Europe.

aluminium can and will be applied

- in a massive wave of the renovation of buildings and infrastructure;
- in the further development of the circular economy;
- in the introduction of renewable energy projects (especially wind, solar and hydrogen)
- in clean transport and logistics (e.g.: electric vehicles, rail transport – lightweight construction)

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In this context, as a simple measure – especially to relieve the suffering of small and medium-sized companies and to revive the economy – the immediate lifting of import duties on raw aluminium is considered to be a simple, easy to implement and immediately available measure which would reduce the production costs of downstream companies and thus support their ability to regain or maintain their competitiveness in Europe and on international markets.

It makes no sense to transfer many billions into the German economy for its survival and to maintain a trade barrier that the aluminium processing industry pays for instead of burdening it. An abolition of these customs tariffs is therefore both economically and systematically logical.

In addition, the German government should work towards establishing an effective and reactive EU trade defence policy against unfair and carbon-intensive semi-finished aluminium products manufactured in China and imported into the EU.

3. SURVEY AMONG ALUMINIUM PROCESSING COMPANIES AND COMPANIES ENGAGED IN THE ALUMINIUM SUPPLY CHAIN ON THEIR CURRENT SITUATION AND THEIR OUTCOMES – SITUATION OF THE TRANSFORMATION THREATENING THEIR EXISTENCE

Many shortcomings in the regulatory environment, high energy costs, the further shaping of the European Green Deal with the resulting transformation challenges and the switch to more circular business models, many small and medium-sized enterprises are facing dramatically poor figures in May 2020 – also due to the economic distortions of the COVID-19 crisis. A survey (completed on June 21, 2020) will provide a snapshot of the situation of aluminium processing companies. 600 companies were contacted in the survey, i.e. more than the 250 companies identified by GDA as those in which aluminium is produced or processed in Germany.

The authors of this study deliberately included companies that use aluminium, whether in the construction industry, electrical engineering, car manufacturing, or other sectors. The main aim was to create a broader picture of how the economic situation of small and medium-sized enterprises that produce aluminium as a raw material or semi-finished products – or use aluminium as part of their production – currently looks economically viable.

The following questions have been sent to the companies, first management level of companies, in an online version. Right from the start, great importance has been attached to absolute data protection conformity and anonymity of the survey to ensure that responses are as truthful/true as possible.

1.) How big is your company?
2.) Where do you process aluminium?
3.) Share of aluminium processing in total production? (in percent)
4.) What share of the total turnover is accounted for by the purchase of the aluminium raw material?
5.) Do you have an R&D department? If so, what is the percentage of its research and development as a percentage of total sales? (in percent)
6.) From the point of view of your company, how will the use of the raw material aluminium develop in the coming years?
7.) What are the reasons for the statement you made about the future development of the use of aluminium?
8.) Is the topic of digitisation or digital transformation of the entire company or parts of it on your agenda?
    8.a.) When the topic of digitisation is on your agenda, is the company already digitised or will it be digitised?
9.) Are you aware of the planned European Green Deal?
10.) Will the measures planned therein have an impact on the aluminium downstream industry/the aluminium industry?

11.) The circular economy will play an important role in the green "recovery plan" of the coronavirus pandemic. Have you heard of this plan and what do you think of it?
12.) Do you see a threat to your company from aluminium processing industries originating in India or China?
13.) The COVID-19 pandemic has thrown all business expectations of the industry out of joint. Take a look at the past 2019 financial year: How has business developed so far?
14.) How do you assess the development of your business, your division for the near future (in the year 2021)?
15.) How do you assess the development of your business, your division for the foreseeable future (in the year 2023/2025)?
16.) From the point of view of your company, what are the biggest obstacles to further development in the aluminium processing industry?
17.) Are you aware that the European Union imposes import duties of up to six percent on the import of raw aluminium?
18.) Did you know that there is price equality between imported aluminium (including an extra duty) and aluminium produced in the EU?
19.) If import prices for primary aluminium were to fall as a result of the abolition of import duties, how would this affect your business development.
20.) In which area would you use the funds thus released? (multiple responses possible)

3.1 Current situation of the (medium-sized) aluminium processing industry – results of a survey and interviews – a graphic illustration of the results of the survey in the Annex from P. 67

3.2 Summary of the survey results and conclusions

A total of 580 companies in the downstream aluminium processing sector (including trade, building activity, lightweight construction, car manufacturing, and suppliers) were contacted and received the questionnaire. (Sample population: 580).

In view of the economic situation of the companies, it was to be expected that the response or return rate would be very low. In this case, this was pleasing. There was a questionnaire filled in completely with 61 qualified responses, which the author was able to achieve via the online questionnaire, i.e. a response rate of 10.5 percent.

This is more than astonishing in view of the crisis situation with which many companies have to struggle and probably also indicates the importance of this topic, although this is, of course, multi-causal. The vast majority of responses came from companies with up to 200 employees; in addition, 16 respondents employed between 200 and 500 people.

For more than a third of the companies surveyed (25), aluminium as a raw material accounts for 51 to 100 % of total production.
The surveyed companies work in a wide variety of industries so that a broad picture of the opinion formation and current situation of medium-sized businesses is presented. About one third (21) are assigned to the **construction industry**, and about twenty percent (14) are active in **automotive engineering**.

It is interesting to note that **the purchase of aluminium** accounts for a considerable share of the turnover of many companies, in one third (21 companies) it accounts for more than 40 percent of turnover, and in one of the companies surveyed it accounts for more than seventy percent of turnover in the company.

Almost two-thirds of the companies believe that **the use of aluminium** would increase in the coming years (40), with those companies that believe that the use of aluminium would remain the same in the coming years (13), the figure is around 90 percent of companies that believe in the future of aluminium as a raw material. Of particular interest are the **influences** which, from the companies' point of view, will have an impact on the development of the raw material. More than 90 percent (58 companies) see international competition as an important indicator for business, and the companies also expect changes in demand (they were not asked whether it would decrease or increase). Two-thirds see changes in competition in the Union as an important indicator (44 companies), while the regulatory environment (taxes, customs duties, etc.) is still seen by more than 50 percent of the companies surveyed as influencing their future business development.

The **innovative ability** of the companies was also examined. The total R&D expenditure of German industry in 2017 was 68.8 billion euros.[61]
The average R&D expenditure of the companies surveyed is up to 5 percent of turnover, with slightly less than half of the companies (28) not carrying out any research and development.

Interestingly, more than two-thirds of the surveyed companies (49) are concerned with **the topic of digitisation**, with more than half (43) of the companies that have already been digitised or are in the process of being digitised, while very few companies have not yet made a decision, and about 20 percent of the surveyed companies (13) will take steps toward digitalisation in the next two years.

Surprising is the knowledge of the companies about the **Green Deal of the European Union**. Slightly more than 50 percent (32) have already heard of it, the rest 45 percent (29) have not yet heard of the Green Deal. There still seems to be some need for information and communication within the industry.

Slightly less than half of the companies surveyed, incidentally, believe that the **European Green Deal would have no impact** on their business, while just over a third (21) of them believe that it would stimulate the markets. The situation is similar with regard to the regulatory impact on companies: two-thirds of the companies surveyed (and only those that have dealt with the Green Deal) see strong to very strong effects on their company, one-third little to no effects.

Interesting results emerged from the survey on **the threat from competitors**, two-thirds of them are considered to be from China and India (38 companies), only 1/6 see no challenge in them, while almost twenty percent take a neutral stance.

The greatest obstacles to the further development of companies are seen in the **regulatory measures; both volatile customs duties and tax burdens, as well as official and statutory environmental requirements**, are perceived by all companies as potential brakes on development. Only then do regulatory uncertainties, high energy costs, changes in demand due to changes in customer demand, and increased international competition follow. Consequently, the legal duties and taxes are considered to be the biggest obstacle to the development of the companies.

This survey was conducted in May and June 2020, at a time when the vast majority of companies were still in **lockdown**, home offices were the order of the day and business activity was in some cases only possible to a limited extent due to the faltering supply chain. At the time of the survey, the author of this study wanted to know how companies view their business development. On the one hand, the year 2019 and the first quarter of 2020 were used for this purpose. The survey also asked how companies view business development by the end of 2020 and in the years thereafter. This resulted in a picture that is at least similar to the one that many industries are currently experiencing in Germany:

[61] Cf. https://www.bmbf.de/upload_filestore/pub/Bildung_und_Forschung_in_Zahlen_2019.pdf

For more than two-thirds of all companies, the past year was better than the year before, only 12 percent (7 companies) stated that 2019 was worse than the previous year, two companies provided no response.

It should come as no surprise that **51 of the 61 companies surveyed describe the economic outlook for 2020 as very poor and bad**, and the same applies to the coming year. The picture only brightens up for the following years up to 2025, where just over half of the companies surveyed believe in a positive business development leading to the level of 2019 or beyond.

It is not surprising in this context that most of the companies surveyed had **not yet heard of the EU Recovery Plan**, almost three-quarters of all companies surveyed (44) had not heard of it, and only a quarter stated that they had heard of the plan. Of this quarter, slightly more than two-thirds of the companies saw the plan as neutral or good for their business, while only three companies feared negative consequences.

Interestingly, **only one-third of the companies surveyed were aware that an import tariff, i.e. a duty, is levied on imported aluminium** (19). Even worse is the knowledge of the downstream industry that aluminium produced in the EU and aluminium imported into the EU have the same price. Almost three-quarters of the companies surveyed were unaware of this, so they did not know that they were paying a virtual premium when purchasing the raw material aluminium.

Subsequently, the responses showed that if **import duties were removed, the impact of the removal of duties would be consistent, rather positive, positive, and very positive for more than three-quarters of all companies**, exactly 58 out of 61. Only four companies consider such a development as rather negative, negative, and very negative.

Interesting is also the result of the survey, for what the companies would use the funds thus released. As there were several possible responses to this question, the rankings include business security, investment in innovation, investment in jobs, and energy-saving measures. Here you can clearly see the important priorities of the companies and the typical attitude of German small and medium-sized businesses.

Small and medium-sized companies are the backbone and important innovation driver of German industry. Small and medium-sized companies make valuable and indispensable contributions, both independently and in association with other small and medium-sized companies and as partners of large companies.

Medium-sized companies are characterised by **innovative strength, flexibility, competitiveness, and quick decision-making, efficiency, and speed in the reliable provision of services**. The key to maintaining the performance capability of these German SMEs is to create fair conditions for them to compete both nationally and internationally. Therefore, political decisions and specific measures must be consistently aimed at **maintaining the competitiveness and strength of SMEs**.

3.3 Assessment of the current situation of the aluminium processing industry and recommendations for action – statements from interviews with experts

For some of our interview partners, especially entrepreneurs, we have agreed to strict anonymity. Otherwise the author would not have received the responses to reflect the current situation of the aluminium industry (reality).
Various methods are used for data collection in qualitative social research; the author has opted for a qualitative one. Guide based short interviews. In these interviews, there is "a conversational situation that is consciously and purposefully created by the participants"[62] in which one asks the questions that are answered by the other.

These types of interviews are "compared to other research methods in the social sciences, particularly closely linked to approaches of understanding sociology. [63]They can be characterised by the fact that they are oral, personal, and non-standardised, i.e. adapted to the situation. They consist of open questions, the interviewer style is neutral to soft. The research question is to be answered in a qualitative interview with the help of the narrated knowledge from the life-world of the interviewee.[64]

The investigation in this thesis will be carried out by means of a kind of qualitative interview. To make a well-founded decision, all forms should first be briefly described in their properties. In addition, the author has opted for expert interviews, since here the interviewee "as an expert in a specific field of action" is [65]at the centre and thus represents a specific group. The expert can provide knowledge at various levels; knowledge of processes, rules, and mechanisms in institutionalised contexts (...,) knowledge of interpretation (...), (or) "contextual knowledge". [66] The specifications of a guideline limit at the outset the field of knowledge to be surveyed and thus also the scope of data. The interviewee should provide specific data, so that contents deviating from the topic must be blocked. This explorative, qualitative approach was chosen as a supplement to the survey to generate hypotheses. The findings are not representative and are used to obtain a better assessment and to map the requirements, although the hypotheses obtained would, of course, have to be validated in further research.

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[62] Cf. Lamnek Qualitative social research, 1995, 2002 P. 35 et seq.
[63] Cf. Hopf, Weingarten, Qualitative social research, Stuttgart 1993,
[64] Cf. Flick, Qualitative research. Theory, methods, application in psychology and social sciences 2009: 224, Hermanns, Harry: The evaluation of narrative interviews. An example of qualitative methods. In: Hoffmeyer-Zlotnik: Analyse of verbal data. Opladen: Westdeutscher Verlag, 1992
[65] (Lamnek 2002: 176)
[66] Przyborski/Wohlrab-Sar, Qualitative social research, Berlin 2009: P. 135 et seq.

Expert interviews

The survey among the companies was accompanied by background and expert discussions. Most experts did not want to be named because of the sensitivity of the topic. We have complied with this request. For this reason, a brief characterisation of the respective expert and then the presentation of the statements are given below. This statement was recorded in a log, as most of the experts did not wish to have a record of the conversations.
The catalogue of questions was oriented in the categories/topics and dimensions along with the most important cognitive interests and the necessary assessments of aluminium and its importance as a raw material today and in the future as well as the current and future regulatory framework.

The experts were asked the following questions:

- How do you assess the development of prices for raw aluminium and the further recycling stages? How have the markets for this developed?
- What future potential do you see for the use of aluminium – also against the backdrop of the growing overall ecological assessment of raw materials?
- What significance do tariff and non-tariff barriers have for the export and import of aluminium?
- To what extent are innovations – material/technical,
- application innovations downstream (especially in the field of energy and vehicle construction) – hindered by the terms of trade?
- How do you assess the importance of aluminium as a base material for the energy/transport revolution and climate protection?
- Against the backdrop of the European Raw Materials Strategy, what, in their view, are the most important prerequisites for securing the basic raw material?
- What do you think about the idea of a CO2 Bordertax?
- Are trade barriers between Germany / Austria and other countries an effective measure for industry and small and medium-sized enterprises, and do they not make it more difficult for an exporting nation?

Expert 1:

The expert is a production manager of a medium-sized company in the field of aluminium window construction in Northern Germany. The company has existed for over eighty years and employs between 50 and 100 people.

How do you assess the development of prices for raw aluminium and the further recycling stages? How have the markets for this developed?
The purchase prices for the raw material account for about 55 percent of our costs. We are particularly sensitive to this because price fluctuations affect our margin. Since we sell a lot via catalogue and online shop, we are not able to adjust our prices flexibly per offer, also because we have many European competitors who can offer cheaper prices due to personnel costs.

What future potential do you see for the use of aluminium – also against the backdrop of the growing overall ecological assessment of raw materials?
Because of its outstanding properties, aluminium is also becoming increasingly prevalent in the construction industry. Its advantages, compared to the other materials, are especially high resistance and insensitivity to external influences. As aluminium is highly resistant to corrosion, it requires virtually no maintenance, which extends the life of buildings and reduces long-term renovation costs. Architects have been swearing by our products for years. This is because they achieve smooth, soft lines, precise edges, and curved surfaces on all types of buildings. Aluminium is also an excellent solution for roofing because it is modern and extremely durable. In addition, due to the nature of the material, aluminium requires virtually no maintenance. In addition, the use of aluminium as a material in the manufacture of window frames, gutters, facades, blinds, and other construction elements is becoming increasingly widespread.

What significance do tariff and non-tariff barriers have for the export and import of aluminium?
This is not relevant for us because we purchase our aluminium from German manufacturers. However, the prices are linked to the London Metal Exchange. Tariffs and trade barriers naturally make themselves felt in the price.

To what extent are innovations – material/technical, application innovations downstream (especially in the field of energy and vehicle construction) – hindered by the terms of trade?
The more expensive the basic product is, the less margin remains for our company in terms of investment.

How do you assess the importance of aluminium as a base material for the energy and transport revolution, and climate protection?

Well, what you won't know is that buildings account for about 40 percent of global energy requirements. There is huge potential for savings here, especially when it comes to energy. Using aluminium as a construction material not only enables buildings to save energy.

Against the backdrop of the European Raw Materials Strategy, what, in their view, are the most important prerequisites for securing the basic raw material?

Germany is a country poor in raw materials; we are particularly dependent on imports. This applies in particular to raw materials that we process further. Our know-how is not in the extraction and mining of raw materials but in the ability to produce the best products based on engineering knowledge and techniques.

What do you think about the idea of a CO2 Bordertax?

Now more important for us is, first of all, to hold back imports from China, which are mostly semi-finished products. In this respect, we welcome the fact that the EU Commission has initiated an anti-dumping investigation which will examine profiles (including hollow sections) and tubes, not assembled, whether or not preformed for structural purposes (e.g. cut to length, bent, bevelled, or threaded), manufactured from aluminium, whether or not in alloys, with an aluminium content of 99,3 % or less.
We have not yet figured out the consequences for the CO2 Bordertax, we were too busy with the consequences of the pandemic.

Are trade barriers between Germany and other countries an effective measure for industry and small and medium-sized enterprises, and do they not make it more difficult for an exporting nation...?
This is a bilateral view, of course, we are interested in buying our products as cheaply as possible, preferably also without duties on the raw material, because this increases the margin. I get angry when I find out that there is a virtual price premium on aluminium; I didn't know that. But at the moment we have no choice but to pay it. In addition to the extra pay, I am concerned about the energy costs and especially the pricing of CO2 consumption. But I can't calculate it yet. This is what we are facing in the coming week.

Expert 2:

Expert 2 is a managing director in a medium-sized company with about 200 employees in the northwest of Germany. The company manufactures alloys specifically for the automotive and aerospace industries.

How do you assess the development of prices for raw aluminium and the further recycling stages? How have the markets for this developed?

Until before Corona, we did not doubt the development of the markets, the demand for our products was good, but now we are facing a headwind. The supply chain is not working because production has more or less come to a standstill in both the automotive industry and the aviation sector. How will the future develop? Hard to say, our business is still functioning (as of 5.6.2020), but supply chains are stagnating, especially in the automotive industry. We have also announced short-time working.

What future potential do you see for the use of aluminium – also against the backdrop of the growing overall ecological assessment of raw materials?

Ask me that, please, at the end of next year. We currently have to deal with the survival of our company. The banks are not prepared to take risks despite the greatest possible protection by the state; even a ten percent risk is still too high for them. We would not run this company as a family business if we did not believe in the future of our products, but it is tough right now. But I believe that the future belongs to aluminium, just look at the weight savings that our products create, for example, in engine blocks or e-mobility.

What significance do tariff and non-tariff barriers have for the export and import of aluminium?

We are always annoyed by taxes and customs duties, we can't insult Trump, but we can still act the same way. Besides, there is no price difference in the EU between imported and locally produced aluminium. I find this annoying, especially as the cost of purchasing aluminium is a rather large cost item for us. Any relief is welcome there.

To what extent are innovations – material/technical, application innovations downstream (especially in the field of energy and vehicle construction) – hindered by the terms of trade?

Oh you know, I have stopped getting upset about the measures of the legislator, I would be too much at risk of a heart attack, but joking aside. If you now see how we SMEs are suffering, then all regulatory measures are all for nothing. I would like to come back to import duties. How can you, on the one hand, insult Trump and act like that yourself? Well, I understand that you want to protect jobs here too, but the high aluminium prices tend to destroy them. We buy aluminium for about 85 million euros, six percent more or less is already quite a lot. We could invest this money in innovations or the sustainable restructuring of the company, for example.

How do you assess the importance of aluminium as a base material for the energy/transport revolution and climate protection?

Aluminium is a proven tool for the energy and climate revolution. I see the raw material as one of the central ingredients of the Green Deal. Moreover, it has already fulfilled the requirement of being completely recyclable. I think that aluminium is wrongly demonized. Even though I know, of course, how energy-intensive the production is. However, I think that hydrogen could become an exciting alternative as an energy source for production.

What do you think about the idea of a CO2 Bordertax?

Now our company is completely behind the Paris Agreement, so we can only welcome this. After all, it makes no sense, and we have seen this time and again in the past, that the entire industries were dismantled in Germany and rebuilt elsewhere. Here the location and small and medium-sized businesses are getting lost. In so far as these distortions of competition are to be offset by a Bordertax, I think that is right and proper. I can well imagine that, for example, a manufacturer that produces aluminium abroad in an environmentally friendly way, with low CO2 emissions or even CO2-free, will then be given preference.

Are trade barriers between Germany and other countries an effective measure for industry and small and medium-sized enterprises, and do they not make it more difficult for an exporting nation...?

I've mentioned this before. Trade barriers and duties are never good for manufacturing companies. Particularly against the backdrop of increasing aluminium consumption, for which the aluminium recycled here is not sufficient. This means that we are dependent on imports and artificially increase the price of a raw material that is useful and necessary for the industry. Things can't remain this way.

Expert 3:

Is a director of a recycling company in the aluminium industry. The company is highly innovative and is a member of a corporate group.

How do you assess the development of prices for raw aluminium and the further recycling stages? How have the markets for this developed?

Due to the increased demand for aluminium, we expect the price of raw aluminium to increase slightly over the next ten years. We also think that it will remain at a stable level despite the overcapacity of primary smelting plants in the Far East. Due to the political interest and the increased attention paid to the increasing shortage of raw materials and their recovery, we assume and hope for a significantly increased willingness to collect, recycle and re-introduce them into the production process of secondary aluminium.

What future potential do you see for the use of aluminium – also against the backdrop of the growing overall ecological assessment of raw materials?

With regard to the recyclability of aluminium, especially in comparison with the very complex and, therefore, very energy- and cost-intensive plastics that have to be produced or recycled, we see the possibility that aluminium, for example, in various forms of packaging, will replace plastic partially or completely. Particularly with regard to ecological concerns, such as the increasing pollution of the oceans with plastic waste, aluminium should prevail in the medium term. This is also against the backdrop of the much simpler separation of the different alloys and the resulting simplified "single-variety" feeding of aluminium scrap into the manufacturing process by using the S.A.A.L.T. technology developed by us using LIBS laser. Based on our experience in the recycling sector, we are now convinced that this separation of numerous aluminium alloys is much simpler than the complex separation of the most diverse plastic compounds, as used in the packaging sector in particular.

What significance do tariff and non-tariff barriers have for the export and import of aluminium?

We can't estimate that.

To what extent are innovations – material/technical, application innovations downstream (especially in the field of energy and vehicle construction) – hindered by the terms of trade?

We can't estimate that.

How do you assess the importance of aluminium as a base material for the energy/transport revolution and climate protection?

The use of lightweight materials will continue to grow significantly across all industries. While most of the so-called "light materials" are currently processed in the aviation industry (at almost 80 percent), current forecasts assume that, due to the government-imposed trend towards electromobility and the associated use of battery systems that are currently still very heavy, this additional weight must be saved elsewhere. We therefore expect the share of "light materials" in the automotive industry in particular to rise rapidly from currently 30 to 70 percent by 2030. Overall, it can be expected that the use of lightweight materials in the automotive, shipbuilding, mechanical engineering, aviation, and wind energy sectors will increase significantly over the next two decades.

Against the backdrop of the European Raw Materials Strategy, what, in their view, are the most important prerequisites for securing the basic raw material?

As a producer of secondary raw material, we believe that the European Raw Materials Strategy lacks specific measures in terms of the sustainability of raw materials that would lead to a timely increase in recycling and recovery rates. It must also be attractive for manufacturers (of, e.g., packaging) to use secondary raw materials, preferably. This, of course, with the same quality.

What do you think about the idea of a CO2 Bordertax?

If the aim of the "CO2 Bodertax" is to protect energy-intensive industries within the EU against imports from countries with much less stringent requirements regarding production processes and climate policy, we would welcome it. This is above all to finally make fair and equal competitive conditions possible, and thus to be able to demand and secure global environmental protection.

Are trade barriers between Germany and other countries an effective measure for industry and small and medium-sized enterprises, and do they not make it more difficult for an exporting nation...?

Germany is an economic and trading nation. The export secures hundreds of thousands of highly qualified jobs and worldwide partly unique know-how in various industries. Trade barriers can definitely do more harm than good. There must be fair access to both raw materials and markets worldwide. To prevent this by means of trade barriers in the short term or even longer is, in our view, rather short-sighted. The best example is currently provided by the United States, where arbitrary duties have, in some cases, damaged the domestic economy far more than the importing nations.

Further statements of experts:

By and large, the experts' statements are repeated. Surprisingly, two distinctive features can be noted here. On the one hand, there is the impression that a certain restraint can be observed towards the authors with regard to the statement about the economic situation of the company. However, this is essential in times when it is not clear whether banks will provide or secure extensive corporate financing during the crisis. Anonymity was also assured because of the issue of import duties on aluminium, whose virtual price premium is attributable to oligopolistic structures. The fear that negative statements could lead to disruptions in the supply chain was explicitly expressed, "I'm not starting an argument with my suppliers"... In Germany, only Trimet and Nordsee Hydro produce aluminium.

Trade policy instruments such as tariffs or taxes – less is more: On the one hand, interventions produce uncertainty and more dynamism (and with COVID-19); the uncertainty and dynamism are already high anyway, and above all, they attract the attention of management, which can then NOT be oriented towards sustainability and has questionable effects.

A differentiated perspective on the metal industry, which politicians should also have, shows that the aluminium industry should be more closely involved in the segmentation of aluminium according to quality classes and circular life cycle assessment (LCA). Compared to steel, it has a high culture of innovation – they are innovative and want to produce other innovative products and more sustainable solutions through new production methods but also integration and cooperation with design.

The exchange between the aluminium processing industry and designers, as well as customers, should be intensified to enable more circular business models, as vertical integration is already taking place at the moment.

The recycling activities and the establishment or upgrading of capacities will lead to a global change in capacities (shuffling of capacities). Within a global holistic raw materials policy, there is also a potential for the expansion and development of recycling in Germany and Europe, but also in Africa, where instead of trade policy measures, regional, community-based economic and development policy is needed to combat the COVID-19 crisis and achieve more technology and innovation transfer for more sustainable innovative and sustainable products.

4. Conclusions/Recommendations

This chapter, following the previous **exploration/probing** of the current situation and the experts' assessments, will discuss which political steps are necessary **to support and revitalize** the German aluminium downstream industry, which is mainly characterised by small and medium-sized enterprises, against the backdrop of the recovery programme in the context of the COVID-19 pandemic and the forthcoming European Green Deal with all its associated challenges with new growth impulses through ecological, transformation, and circular business models.

Aluminium is part of complex upstream and downstream supply chains. For these supply chains to work, it must be possible to run up all stages simultaneously. When the global economy starts up again, Germany will have to secure a competitive advantage – especially as China is boosting production and threatening Germany's market share.
The government must, therefore, support the low-carbon innovation and high-quality manufacturing that will make us an attractive investment destination and trading partner.

As a lightweight and highly recyclable material, aluminium contributes significantly to the low-carbon and circular economy. Its role will continue to expand, from replacing disposable plastics to supporting more sustainable transport. There will be a wide range of design innovations. Material innovations regarding aluminium will contribute to the design of new processes and products. Entrepreneurs will recognise these opportunities and thus develop new, more circular value-added and circulation and business models and create more jobs in knowledge-intensive areas. The expansion of existing capacities and the conversion of production will help to reduce Germany and Europe's dependence on carbon-intensive imports – and to achieve the government's goals for sustainable growth.

However, further steps are needed to support the aluminium producing and above all the aluminium processing industry – and primarily the existing and yet to be founded small and medium-sized companies – and this especially in times of the effects of Corona still being felt. These include:

- Increased R&D support: Greater support for research into metallic alloys[67], exploration, and trials on the use of aluminium (including above all recycled aluminium and the use of aluminium scrap) for high-quality and durable packaging solutions and design products in the home and leisure sector
- Acceleration of R&D and applications – so that innovative products – related to developments in the aluminium industry (lightweight construction, etc.) can reach the market faster.
- Reduction of bureaucracy – to reduce costs and increase agility. Administrative burdens stress small and medium-sized enterprises disproportionately.
- Effective safeguards and remedies – to ensure security of supply and protect against dumping from countries such as India and China, which are flooding the markets with high-carbon semi-finished products
- The recovery plan in response to the coronavirus-induced challenge must support long-term growth in domestic production, high-quality manufacturing and low-carbon innovation. It must maintain a strategic advantage in aluminium to ensure security of supply for key sectors. And it must involve working with key trading partners to share best practices in adapting to the new conditions.
- The small and medium-sized aluminium processing industry could now be relieved if, as in the COVID-19 pandemic, aluminium as an important raw material were exempted from import tax.

It is important to keep in mind that

- raw materials are one of the pillars of the circular economy. Aluminium is one of the raw materials of the future for the circular economy. Companies (SMEs and large companies) in Germany and Europe can benefit from the properties of aluminium – especially its durability – in new circular-oriented business models and create new products with design innovations. Thus, in addition to growth impulses, an increase in resource efficiency, and a contribution to climate goals, greater independence of the German and European high-tech industry can be achieved.

[67] In the downstream manufacturing following primary production, the overall yield losses occurring through liquid metal processing, forming and fabrication of aluminium and steel are 40% and 25% by mass, respectively These arise primarily from challenges involving the form of upstream products, the nature of upstream processing, the surface finish requirements, the supporting materials needed for shaping, and defects. Energy savings based on eliminating metal loss are estimated at around 5% and 15% for aluminium and steel, respectively. Alloy-specific high-quality material recovery already occurs inside casting and rolling plants where closed-loop procedures are established. Only a few producer-customer groups have established closed chains of returning alloy-specific scrap, so there are still substantial opportunities here that could be aided by data-driven approaches to process control and scrap sorting (see section ‘From geo-mining to urban mining’).

- For aluminium, where 250 specialized alloys are stocked but only 65 are regularly used, such crossover alloys could combine features of heat-treatable and non-heat-treatable wrought alloys at broad composition tolerance and with wide application ranges, establishing a universal alloy concept. (Raabe, D., Tasan, C.C. & Olivetti, E.A. Strategies for improving the sustainability of structural metals. Nature 575, 64–74 (2019). https://doi.org/10.1038/s41586-019-1702-5)

- Despite its partly ambivalent perception and reputation, aluminium is one of the materials of the future for the circular economy. Aluminium, both as raw material and in its properties, still offers great potential for material, process, and, not least, product design innovations in a wide range of industries important for Germany and Europe. Greater attention needs to be paid to trade and industrial policy aspects in the context of an SME-oriented, growth-oriented, knowledge-based growth policy. In terms of trade policy, a permanent reduction of tariff and non-tariff trade barriers is important – in terms of industrial policy, support through these trade policy measures in the transformation of production processes and business models.
- Due to its metallurgical properties, aluminium still offers potential for design innovations in the production and refinement of aluminium as well as in various high-tech and product areas that are important for Germany, such as automotive engineering (by reducing weight), the packaging industry and directly in the design of electronics, leisure, and household appliances. These design innovations offer growth opportunities, especially for the aluminium processing industry and existing as well as newly founded design-intensive companies. However, these growth opportunities can only be exploited if an adequate supply of aluminium at adequate prices is secured in the long term.
- To exploit this potential for reducing Co2 emissions and aluminium, aluminium and the industrial and above all trade policy consideration of aluminium should become one of the key recyclable materials and strategies in the Green New Deal: To enable the transformation to (more) circular economies, especially for small and medium-sized enterprises, and also to create a potential for the establishment of new knowledge- and design-intensive companies, it is essential to take a more differentiated approach to trade policy, in addition to the main focus of innovation activities on recycling and design solutions and product innovations.

- The excess capacities, also with regard to aluminium, will increase in the short term in the first effects of the COVID-19 crisis. However, against the backdrop of the existing consolidation, especially in aluminium production, and the international long-term increase in demand for aluminium (mainly due to demand from the mobility and automotive sectors), there is a long-term need for trade and industrial policy to be shaped. Against the backdrop of megatrends, the demand for high-quality aluminium will increase (especially in China (cf. CM Group 2020 – also after COVID-19)[68]: securing imports at good prices will, therefore, play a more important role.

[68] (vgl. CM GROUP 2020: AN INITIAL ASSESSMENT OF THE IMPACT OF THE COVID-19 PANDEMIC ON GLOBAL ALUMINIUM DEMAND. In: http://www.world-aluminium.org/media/filer_public/2020/05/28/ initial_assessment_of_the_impact_of_the_covid-19_on_global_al_demand_.pdf.)

- Within the extensive transformation and internal reorganisation processes in the Green New Deal, small and medium-sized enterprises and the aluminium processing industry in Europe are being hit comparatively harder by direct, tariff-based trade barriers, such as customs duties (which are not so important for larger companies), in the transformation towards "greener" economies and more circular business models. However, they are also affected by trade barriers from the non-tariff barriers (NTBs) sector.[69]

- International raw materials policy and international trade policy should be part of the move towards circular economies – especially for small and medium-sized enterprises.

- Straight within the framework of a growth policy that is also oriented towards small and medium-sized companies, growth-oriented and knowledge-based, aluminium should be given greater attention as a strategic raw material. Alongside other raw materials, aluminium should be given greater consideration in the political agenda because of its importance. This was to enable growth dynamics based on transformation efforts and resulting design innovations through aluminium processing – also on the basis of recycled, but also new aluminium – to enable SMEs downstream.

[69] https://www.ifo.de/DocDL/ifo_Forschungsberichte_91_2017_Yalcin_etal_Protectionism.pdf

Trade policy design impulses – more evidence-based use – and less is more

There are two types of tariff measures: so-called tariff measures, which directly restrict trade, and non-tariff barriers, which are often arbitrary and justified on the grounds of "protecting the domestic economy from foreign competition and generating additional state revenue". Duties, minimum prices and export subsidies are among the tariff barriers, with increased use of customs duties compared to other tariff measures.[70]

The amount of duty is based on tariff lists. World Trade Organisation (WTO) law states that all members must set maximum tariffs, which may not be exceeded at any time. An exceedance is only possible with justified exceptions. The political consideration of introducing a duty is to improve the terms of trade of the domestic market if its market position can influence the world market price.

However, the introduction of a duty can also deliberately distort consumption and production decisions, as import duties make domestic goods more attractive and thus increase domestic production.

However, duties levied do not always have the effect expected by politicians. Import duties on aluminium are a perfect example: the additional costs incurred by import duties on downstream transformers in the EU represent a net transfer of financial resources to upstream activities and, as such, represent additional revenues for primary and secondary producers and the EU customs authorities.

These additional financial resources should in principle be used by primary and secondary aluminium producers in the EU to compensate for cost differences between them and their competitors from third countries and to invest in the improvement of their products and production technologies (in particular in the field of energy efficiency and environmental technologies) thus increasing their competitiveness. The EU's goal of securing jobs is not yet comprehensible. On the contrary, there are indications that jobs have been lost in aluminium producing companies both in Europe and in Germany. The main focus of the political debate that arose at that time was on the competitiveness of the aluminium industry and concentrated on energy and CO2 costs and only to a lesser extent on labour costs.

In particular, most attention was paid to the primary aluminium production sector in Germany and Europe rather than to the downstream sector, which, unlike the large producers, was mostly small and medium-sized and not very representative. This strategy proved successful, because even a few years after the introduction of the duties, the aluminium-processing SMEs hardly find a hearing in the political establishment dominated by the interest groups of the large smelting plants located in the EU.

[70] ca. Hoffmann, Melanie (2020): Tariff and non-tariff measures restrict trade. GTAI. 20.05.20. In: https://www.gtai.de/gtai-de/trade/zoll/zollbericht/wto/handelshemmnisse-bestimmen-den-freien-handel-157400)

Now the EU has presented its SME strategy in March 2020. Industry plays a key role in economic growth and prosperity in Europe. European industry is a world leader in many sectors and, with 35 million employees, generates 20 percent of total EU value added.

In March 2019, the European Council called for the presentation of a comprehensive and long-term EU industrial policy strategy and an integrated approach to deepening and strengthening the internal market. President von der Leyen's political guidelines, the priorities set by the European Parliament and the strategic agenda of the European Council for the period 2019-2024, as well as the European Green Deal and the Commission's strategy for shaping Europe's digital future, make it clear that new paths must be taken for the industry.

SMEs play a key role in the industrial landscape of Europe. Two out of three employees work for an SME. Without SMEs, this new industrial approach cannot be successful. The strategy aims to help SMEs to **take the lead in the double transfer**. This also means ensuring access to the right skills. To facilitate the activities of SMEs within and outside the Internal Market, the Commission proposes measures to remove regulatory and practical barriers that prevent SMEs from doing business or expanding.[71]

As part of such a holistic policy approach, measures affecting the sector – such as export bans and taxes, import duties, energy subsidies, etc. – should be analysed on the basis of their overall impact on the competitive conditions of companies operating at different stages of the aluminium value chain and on the competitiveness of large industries using semi-finished products in manufacturing processes (automotive, transport, construction, etc.).

For trade policy measures to be effective, they should be embedded in a broader industrial policy framework and considered in terms of the expected costs and benefits in terms of growth, employment, investment, and competitiveness along the entire value chain, including end-user industries and European consumers.

In the past, the task of supporting the aluminium industry from the EU side was mainly based on trade rules, and the application of import duties served as the main measure of industrial policy. The German national measures were primarily aimed at supporting existing upstream industries, i.e. the aluminium producing companies and the non-aluminium processing companies, by reducing their energy costs as part of a wider regulatory intervention for energy intensive sectors. Import duties on aluminium in Germany have meant that increasing international competition from developing countries and limited bargaining power towards their customers have considerably restricted the ability of downstream German aluminium processing manufacturers to pass on import duties directly.

[71] cf. https://ec.europa.eu/info/files/commission-communication-sme-strategy-sustainable-and-digital-europe_en)

Due to a lack of raw materials and with primary production having fallen sharply in recent years, the value chain of the German aluminium processing industry depends heavily on foreign metal production. Import duties inevitably lead to a cost disadvantage for the EU semi-finished product manufacturers compared to their foreign competitors; the imposition of a duty on raw aluminium has the effect of increasing the unit production costs of downstream aluminium by about 1 billion euro/year.

As the costs related to raw aluminium represent a significant percentage of the total costs, import duties on raw aluminium are gradually eroding the profit margins of downstream aluminium processing companies in Germany and jeopardising the survival of these companies, in particular SMEs. Here the German government is called upon to exert its influence on the EU Commission so as to relieve the burden on German aluminium-producing companies, especially in view of the COVID-19 crisis and the pending recovery plans.

What counts here is a very strong evidence-based design of trade interventions. As a political decision-maker who wants to do justice to the small and medium-sized industry in particular, it is important to focus on the actual, proven effects of instruments and the experience with these instruments, including the undesired and anticipated side effects, especially with regard to the innovative activities of companies (including and especially SMEs). A review of the evidence so far shows that a highly differentiated holistic perspective on duties and other supporting measures is important. As a result of this and the somewhat ambiguous findings on the effects of the various measures[72], the "less is more" principle, which originates from design/architecture, should be applied, and interventions should be implemented on the basis of the evidence and the experience gained with it. At the European level, it is important to support this by anchoring industrial and trade policy measures and impulses within the framework of the overall European raw materials strategy. This raw materials strategy and the shaping of trade and industrial policy impulses should also take account of the differently pronounced European needs for raw materials and also bear in mind that raw materials and the permanent supply of raw materials are part of a transformation in the sense of the Green New Deal. Part of this raw materials strategy, however, is also based on research to bring material innovations into application and to achieve greater independence from raw material imports through the process and product-oriented design innovations. It is mainly about very long-term transformation processes and at the same time the support of the application of knowledge, technologies and design competence – and this in Germany and other European countries – preferably based on regional cooperation of the respective research institutes and companies (also with the consideration of small and medium-sized companies).

[72] Vgl. OECD (2019), "Measuring distortions in international markets: the aluminium value chain", OECD Trade Policy Papers, No. 218, OECD Publishing, Paris, https://doi.org/10.1787/c82911ab-en.

POLITICAL RECOMMENDATIONS

The aluminium producing companies in Germany are (actively) structurally and acutely at risk. This is the result of a survey that FAIReconomics conducted specifically for this Policy Paper in May and June 2020: Due to the pandemic, many companies in the aluminium processing industry are working with restrictions. Almost all the companies surveyed are pessimistic about the near future.

The consequences of the COVID-19 crisis, interruption in the supply chain, the deepest recession since 1945, the challenges to the transformation of companies through the Green Deal, and the upcoming CO2 pricing are the biggest challenges. Besides, the climate and energy revolution not only in Germany, but, above all, also in China, and the increasing importance of aluminium and aluminium scrap as well, makes it necessary to adopt a more differentiated corporate and political approach towards securing reliable access to raw materials.

Aluminium is considered a key raw material in the forthcoming Green Deal, as its material properties offer very good starting conditions

- in a massive wave of the renovation of buildings and infrastructure;
- in the further development of recycling management due to the high recyclability. This offers far-reaching potential for design innovations
- in the introduction of renewable energy projects (especially wind, solar and hydrogen)
- In further efficiency improvement and clean transport and logistics (e.g.: electric vehicles, rail transport in lightweight construction) [73]

This current threatening situation, which is intensified by the effects of the COVID-19 crisis, is accompanied by structural changes, why it is now also appropriate to actively shape and provide trade and industrial policy initiatives to help (support) this part of the industry, which is important for Germany and the EU, in its transformation. In the past, the aluminium industry has been supported by the EU and the German government mainly through the creation of trade rules. The application of import duties served as the main measure of industrial policy. The German national measures were primarily aimed at supporting existing upstream industries, i.e. the aluminium producing companies, by reducing energy costs through political intervention as part of wider regulatory interventions for energy-intensive sectors. The aluminium processing companies – above all the many knowledge- and design-intensive small and medium-sized enterprises – were not the main focus of political impulses.

[73] Wie das Paper von Raabe et al zitiert: "Worldwide, approximately 12% of steel products (about 121 Mt per year) and about 27% of aluminium products (12 Mt per year) are used in transportation, incentivizing efforts to reduce weight in automotive, aerospace and railway components. In the case of vehicle lightweighting, the potential is considerable given that 20% of our global energy and process CO2 emissions originate from transportation and about 20% of that could be reduced through lightweighting". (Raabe, D., Tasan, C.C. & Olivetti, E.A. Strategies for improving the sustainability of structural metals. Nature 575, 64–74 (2019). https:// doi.org/10.1038/s41586-019-1702-5)

But the situation has changed for them in particular, and thus also for the Federal Government and the EU. As discussions with experts show, import duties on aluminium in Germany have contributed to considerably limiting the ability of downstream German aluminium processing producers to pass on import duties directly. In times of tougher and increasing international competition from fast-developing countries, and limited bargaining power towards their customers, the situation for companies in the aluminium processing industry is changing.

Due to a lack of raw materials and with primary production having fallen sharply in recent years, the value chain of the German aluminium processing industry depends heavily on foreign metal production.[74] Import duties lead to a cost disadvantage for German semi-finished product manufacturers compared to foreign competitors. As a result of the imposition of a duty on raw aluminium, the annual production costs of downstream aluminium have increased by about 100 million euros in Germany alone and by about one billion euros in Europe.

A sum which, as will be shown in the following Policy Paper, is withdrawn from small and medium-sized companies in Germany by the virtual premium – i.e. the price equality between imported aluminium and aluminium produced in the EU28. However, the companies need these resources for their transformation costs, both in the area of sustainable, CO2-free, and digital transformation, and for the promotion of design innovations.

Per tonne of aluminium, the virtual aluminium purchased by the companies – since the EU primary aluminium producers also produce aluminium within EU 28 – amounts to about 85 euros per tonne. These are resources which the companies lack and which benefit a few primary aluminium producers in Germany and Europe.

From the point of view of the bodies responsible for world trade (UNCTAD and OECD), the duties levied are not systematic and their effects are not systematically comprehensible to all economic agents.[75] Finally, the question remains unanswered as to what form these trade policy instruments take and whether they produce the desired effects. This question is important because the situation and landscape in the aluminium processing industry are also changing structurally: In fact, a few companies across Europe are producers of primary aluminium.[76]
What aluminium processing companies in Germany now need in the wake of the COVID 19 crisis and the intensifying international competition for better positioning and transformation is rapid relief from all superfluous cost blocks.

[74] Vgl. BGR – Bundesanstalt für Geowissenschaften und Rohstoffe (2019): Deutschland – Rohstoffsituation 2018. – 144 S.; Hannover: S. 54.
[75] gl. OECD (2019), "Measuring distortions in international markets: the aluminium value chain", OECD Trade Policy Papers, No. 218, OECD Publishing, Paris, https://doi.org/10.1787/c82911ab-en. UND Nicita, Alessandro. Trade and trade diversion effects of United States tariffs on China. UNCTAD Research Paper No. 37. November 2019. UNCTAD/SER.RP/2019/9.
[76] Vgl. GRUPPO DI RICERCHE INDUSTRIALI E FINANZIARIE -GRIF, LUISS GUIDO CARLI UNIVERSITY (2019). THE EUROPEAN UNION ALUMINIUM INDUSTRY THE IMPACT OF THE EU TRADE MEASURES ON THE COMPETITIVENESS OF DOWNSTREAM ACTIVITY. Roma. p. 139-140.

These include:

- Increased R&D support: Greater support for research into metallic alloys[77], exploration, and trials on the use of aluminium (including above all recycled aluminium and the use of aluminium scrap) for high-quality and durable packaging solutions and design products in the home and leisure sector
- Acceleration of R&D and applications – so that innovative products – related to developments in the aluminium industry (lightweight construction, etc.) can reach the market faster.
- Reduction of bureaucracy – to reduce costs and increase agility. Administrative burdens stress small and medium-sized enterprises disproportionately.
- Effective safeguards and remedies – to ensure security of supply and protect against dumping from countries such as India and China, which are flooding the markets with high-carbon semi-finished products
- The recovery plan in response to the coronavirus-induced challenge must support long-term growth in domestic production, high-quality manufacturing and low-carbon innovation. It must maintain a strategic advantage in aluminium to ensure security of supply for key sectors. And it must involve working with key trading partners to share best practices in adapting to the new conditions.

[77] Wie Raabe et al 2019 in ihrem Nature-Beitrag ausführen, sind die potenziellen Einsparungen umfassend. „In the downstream manufacturing following primary production, the overall yield losses occurring through liquid metal processing, forming and fabrication of aluminium and steel are 40% and 25% by mass, respectively These arise primarily from challenges involving the form of upstream products, the nature of upstream processing, the surface finish requirements, the supporting materials needed for shaping, and defects. Energy savings based on eliminating metal loss are estimated at around 5% and 15% for aluminium and steel, respectively. Alloy-specific high-quality material recovery already occurs inside casting and rolling plants where closed-loop procedures are established.

Only a few producer–customer groups have established closed chains of returning alloy-specific scrap, so there are still substantial opportunities here that could be aided by data-driven approaches to process control and scrap sorting (see section ‘From geo-mining to urban mining’)....For aluminium, where 250 specialized alloys are stocked but only 65 are regularly used, such crossover alloys could combine features of heat-treatable and non-heat-treatable wrought alloys at broad composition tolerance and with wide application ranges, establishing a universal alloy concept.

(vgl. Raabe, D., Tasan, C.C. & Olivetti, E.A. Strategies for improving the sustainability of structural metals. Nature 575, 64–74 (2019). https://doi.org/10.1038/s41586-019-1702-5)

- The small and medium-sized aluminium processing industry could now be relieved if, as in the COVID-19 pandemic, aluminium as an important raw material were exempted from import tax.

It is important to keep in mind that

- raw materials are one of the pillars of the circular economy. Aluminium is one of the raw materials of the future for the circular economy. Companies (SMEs and large companies) in Germany and Europe can benefit from the properties of aluminium – especially its durability – in new circular-oriented business models and create new products with design innovations. Thus, in addition to growth impulses, an increase in resource efficiency, and a contribution to climate goals, greater independence of the German and European high-tech industry can be achieved.
- Despite its partly ambivalent perception and reputation, aluminium is one of the materials of the future for the circular economy. Aluminium, both as raw material and in its properties, still offers great potential for material, process, and, not least, product design innovations in a wide range of industries important for Germany and Europe. Greater attention needs to be paid to trade and industrial policy aspects in the context of an SME-oriented, growth-oriented, knowledge-based growth policy. In terms of trade policy, a permanent reduction of tariff and non-tariff trade barriers is important – in terms of industrial policy, support through these trade policy measures in the transformation of production processes and business models.
- Due to its metallurgical properties, aluminium still offers potential for design innovations in the production and refinement of aluminium as well as in various high-tech and product areas that are important for Germany, such as automotive engineering (by reducing weight), the packaging industry and directly in the design of electronics, leisure, and household appliances. These design innovations offer growth opportunities, especially for the aluminium processing industry and existing as well as newly founded design-intensive companies. However, these growth opportunities can only be exploited if an adequate supply of aluminium at adequate prices is secured in the long term.
- To exploit this potential for reducing Co2 emissions and aluminium, aluminium and the industrial and above all trade policy consideration of aluminium should become one of the key recyclable materials and strategies in the Green New Deal: To enable the transformation to (more) circular economies, especially for small and medium-sized enterprises, and also to create a potential for the establishment of new knowledge- and design-intensive companies, it is essential to take a more differentiated approach to trade policy, in addition to the main focus of innovation activities on recycling and design solutions and product innovations.

- The excess capacities, also with regard to aluminium, will increase in the short term in the first effects of the COVID-19 crisis. However, against the backdrop of the existing consolidation, especially in aluminium production, and the international long-term increase in demand for aluminium (mainly due to demand from the mobility and automotive sectors), there is a long-term need for trade and industrial policy to be shaped. Against the backdrop of megatrends, the demand for high-quality aluminium will increase (especially in China[78]: securing imports at good prices will, therefore, play a more important role.
- Within the extensive transformation and internal reorganisation processes in the Green New Deal, small and medium-sized enterprises and the aluminium processing industry in Europe are being hit comparatively harder by direct, tariff-based trade barriers, such as customs duties (which are not so important for larger companies), in the transformation towards "greener" economies and more circular business models. However, they are also affected by trade barriers from the non-tariff barriers sector.[79]
- International raw materials policy and international trade policy should be part of the move towards circular economies – especially for small and medium-sized enterprises.
- Straight within the framework of a growth policy that is also oriented towards small and medium-sized companies, growth-oriented and knowledge-based, aluminium should be given greater attention as a strategic raw material. Alongside other raw materials, aluminium should be given greater consideration in the political agenda because of its importance. This was to enable growth dynamics based on transformation efforts and resulting design innovations through aluminium processing – also on the basis of recycled, but also new aluminium – to enable SMEs downstream.

[78] Dies belegen aktuelle Projektionen der CM Group auch nach COVID-19 (vgl. CM GROUP 2020: AN INITIAL ASSESSMENT OF THE IMPACT OF THE COVID-19 PANDEMIC ON GLOBAL ALUMINIUM DEMAND. In: http:// www.world-aluminium.org/media/filer_public/2020/05/28/ initial_assessment_of_the_impact_of_the_covid-19_on_global_al_demand_.pdf.)

[79] For a discussion of the effects of non-tariff barriers (NTB), see
Erdal Yalcin, Gabriel Felbermayr, Luisa Kinzius (2017): Hidden Protectionism:Non-Tariff Barriers and Implications for International Trade. Ifo Institut. In: https://www.ifo.de/DocDL/ ifo_Forschungsberichte_91_2017_Yalcin_etal_Protectionism.pdf

1. Current industrial policy is deliberately aimed at extending the aluminium value chain by moving from upstream to downstream activities and more efficient and higher quality solutions. But this may change in the light of the challenges of the COVID-19 crisis and the sustainable oriented transformation towards a more circular economy. The policy areas, which have so far only partly been brought together, should be thought of in the context of a more holistic raw materials industry and trade policy in which the maintenance of technological leadership and possibly the strengthening of the competitiveness of German companies producing semi-finished aluminium products is ensured through state intervention and the selected use of instruments based on the "less is more" principle.

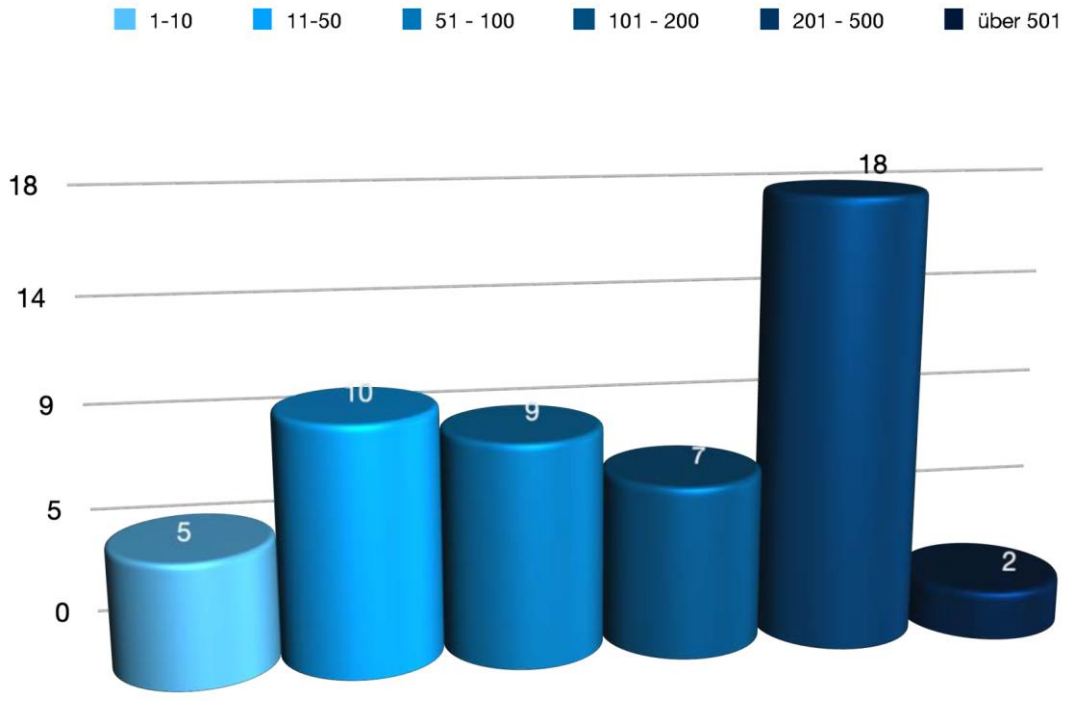
2. Sectoral policies and incentives for downstream activities should, therefore, be primarily aimed at enhancing their innovation, research and technological capacities and promoting improvements in sustainability, resource efficiency and environmental performance to both reduce the carbon content of products and facilitate the subsequent recycling and re-use of aluminium waste in a circular economy perspective.

Annex

Current situation of the (small and medium-sized) aluminium processing industry – Findings of a survey and interviews – graphical representation of the results of the survey

Question 1: Size of companies (how big is your company?)

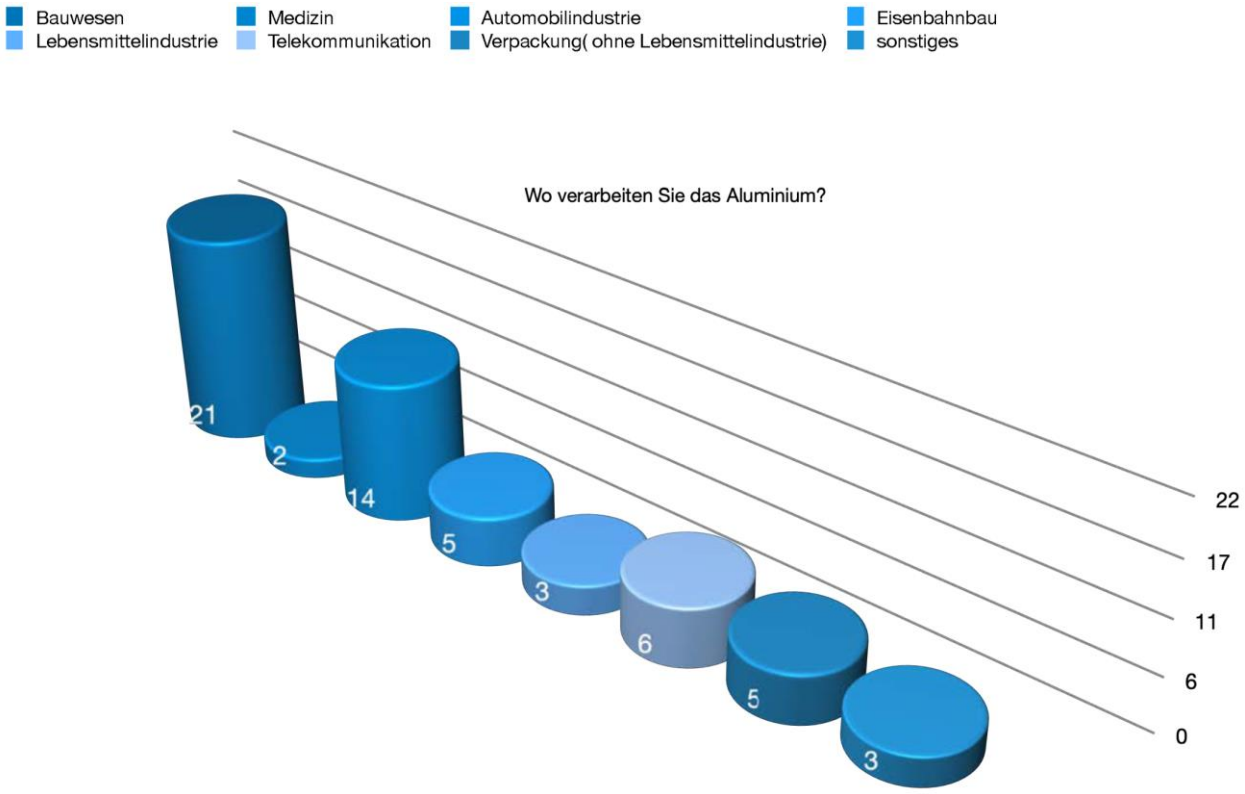
Employee	Number of companies
1 – 10	5
11 – 50	10
51 – 100	9
101 – 200	7
201 – 500	16
Over 501	2



über	over

Question 2: Use of aluminium (where do you process the aluminium?)

Where do you process the aluminium? Industry	Number of companies
Construction industry	21
Medicine	2
Automotive industry	14
Railway construction	5
Food industry	3
Telecommunications	6
Packaging without food	5
Other	3

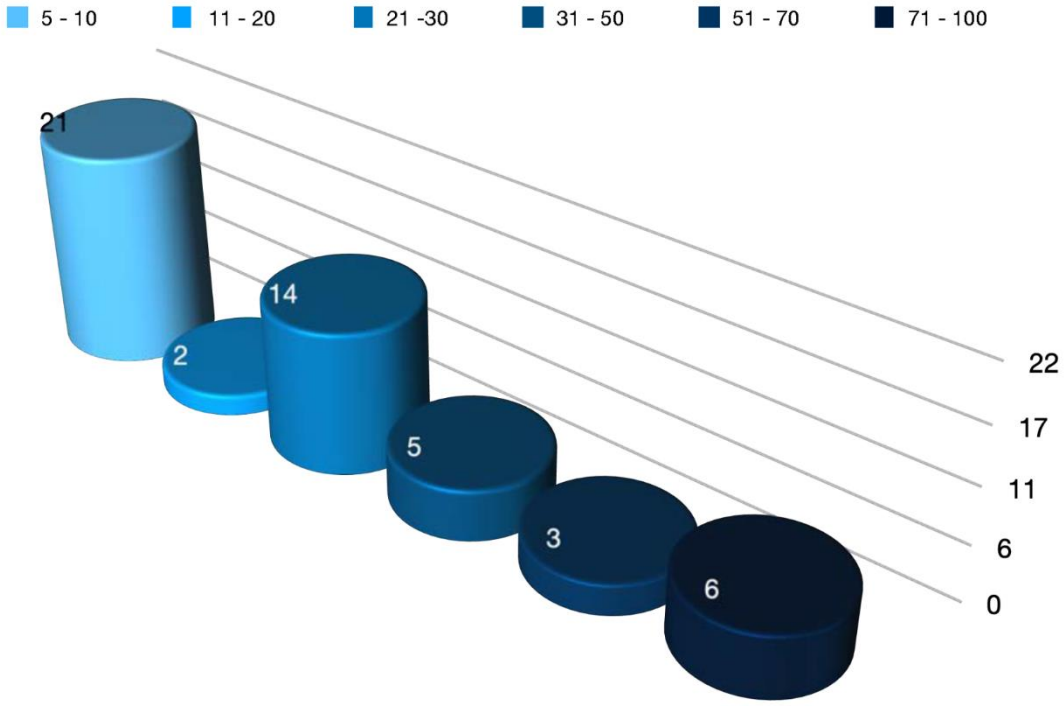


Bauwesen	Construction industry
Lebensmittelindustrie	Food industry
Medizin	Medicine
Telekommunikation	Telecommunications
Automobilindustrie	Automotive industry
Verpackung(ohne Lebensmittelindustrie)	Packaging (without food industry)
Eisenbahnbau	Railway construction

sonstiges	other
Wo verarbeiten Sie das Aluminium?	Where do you process the aluminium?

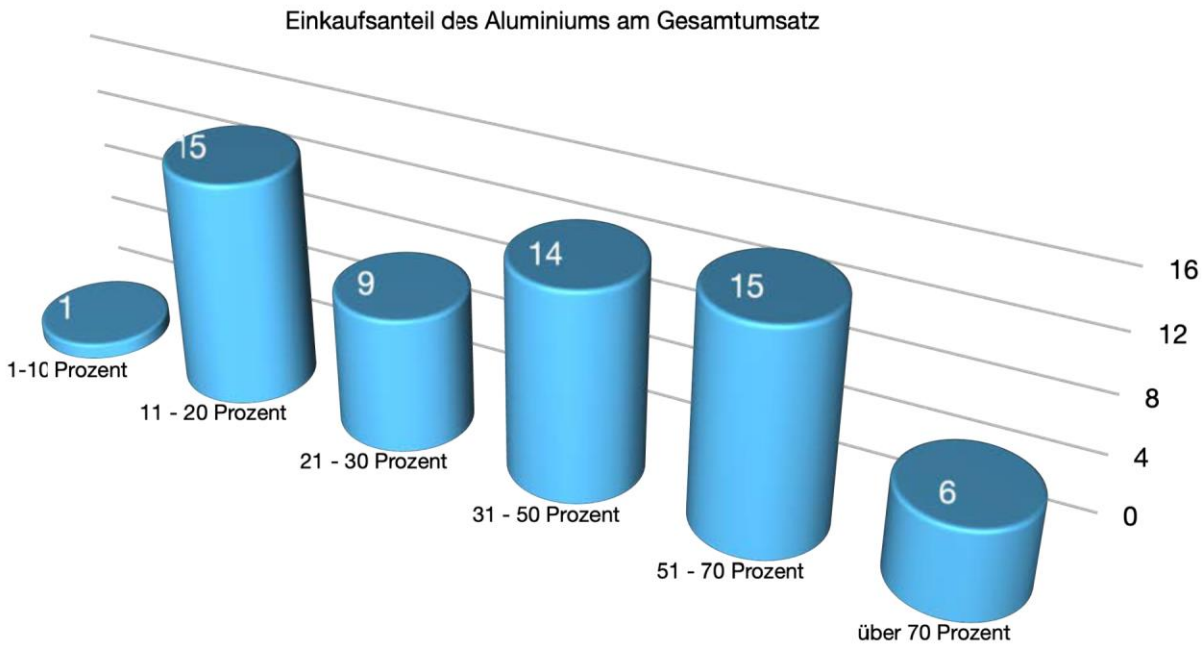
Question 3: Share of aluminium processing in total production? (What share of the total production is accounted for by aluminium processing)

Share of aluminium in total production?	Number of companies
5 – 10	21
11 – 20	2
21 – 30	14
31 – 50	5
51 – 70	3
71 – 100	6



Question 4: What share of the total turnover is accounted for by the purchase of the aluminium raw material?

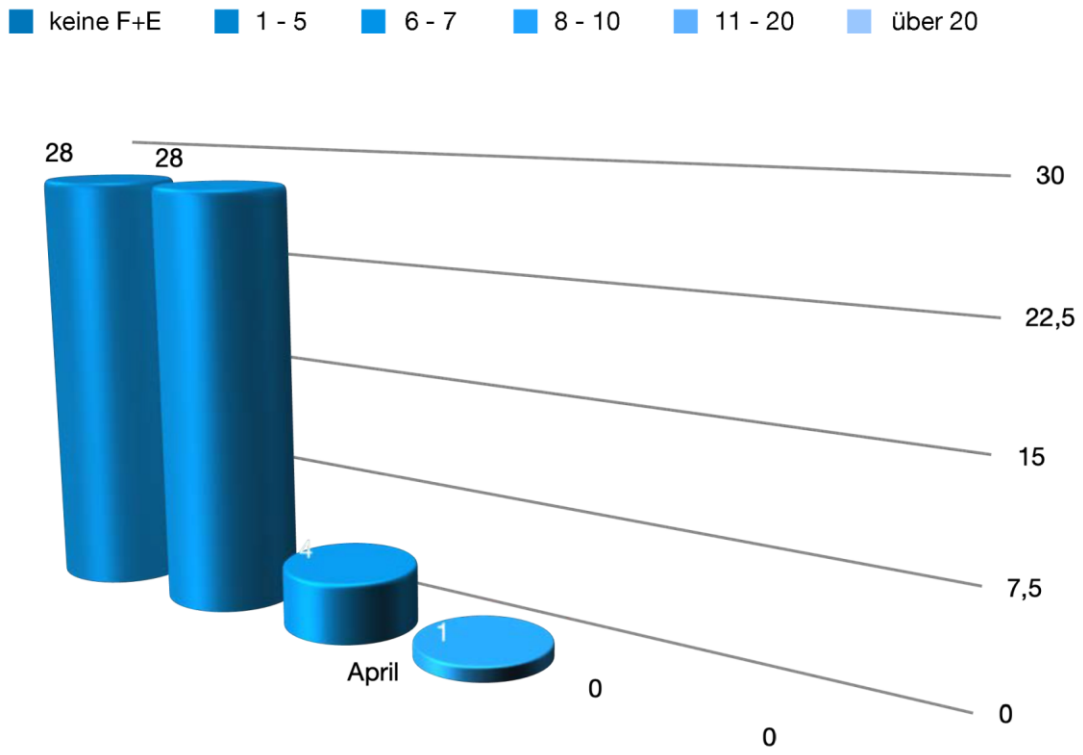
Percent	Number of companies
1 – 10	1
11 – 20	15
21 – 30	9
31 – 50	14
51 – 70	15
Over 70	6



Einkaufsanteil des Aluminiums am Gesamtumsatz	Purchasing share of aluminium in total turnover
1-10 Prozent	1-10 percent
11-20 Prozent	11-20 percent
21-30 Prozent	21-30 percent
31-50 Prozent	31-50 percent
51-70 Prozent	51-70 percent
über 70 Prozent	over 70 percent

Question 5: Does your company have an R&D department? If so, what is the percentage of its research and development as a percentage of total sales?

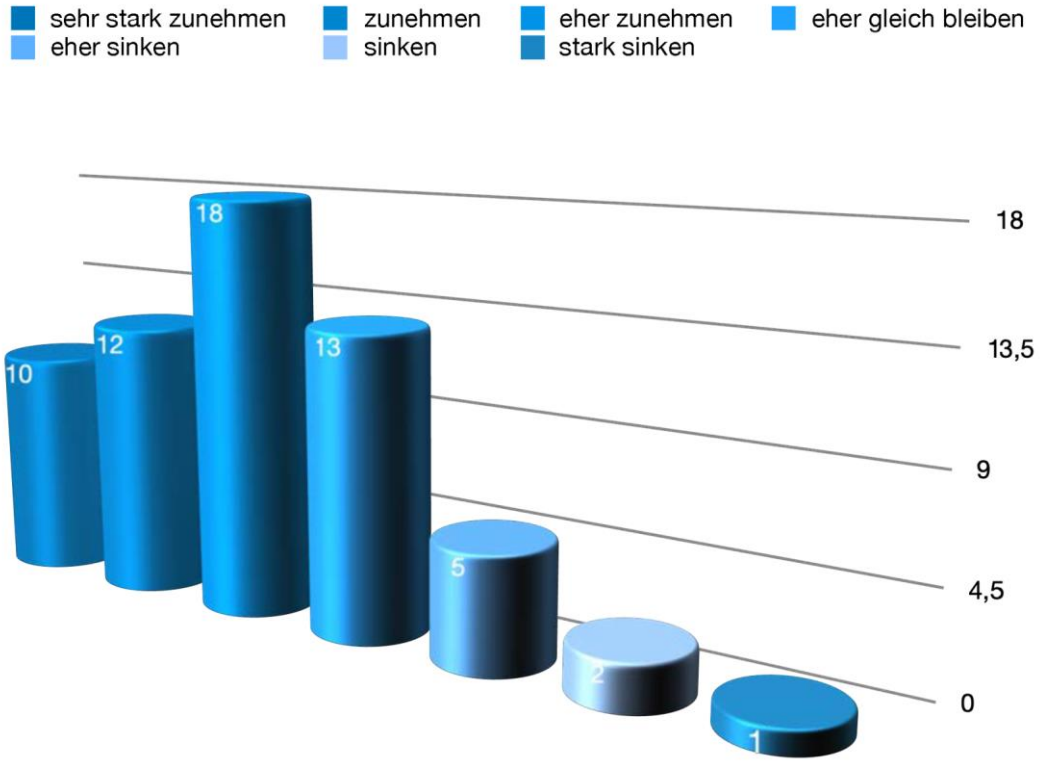
Percentage of sales	Number of companies
No R&D	28
1 – 5	28
6 – 7	4
8 – 10	1
11 – 20	0
Over 20	0



keine F+E	No R&D
über 20	over 20
April	April

Question 6: From the point of view of your company, how will the use of the raw material aluminium develop in the coming years?

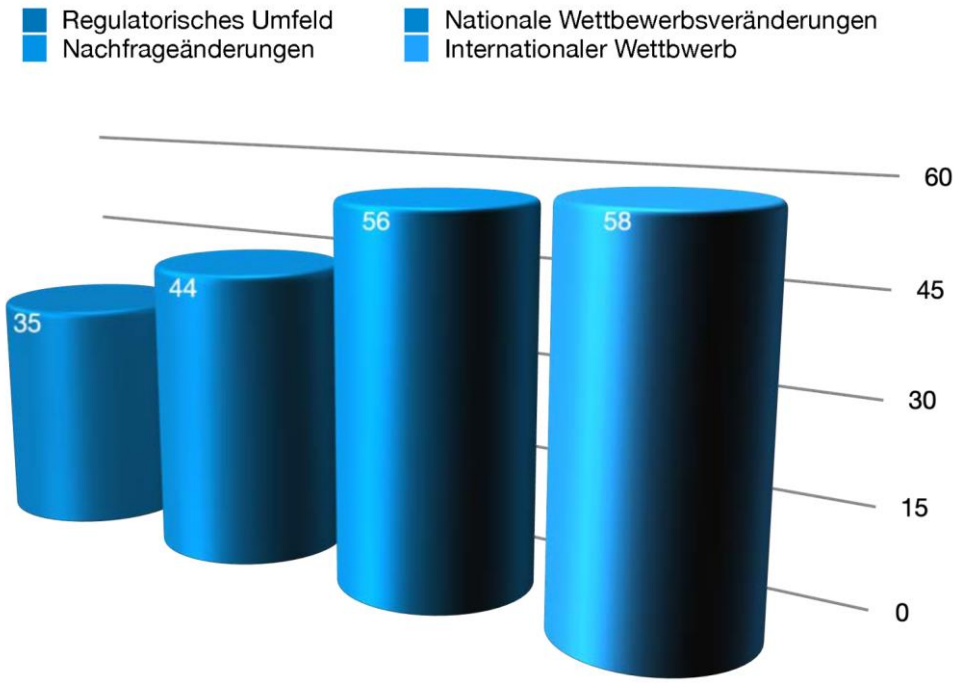
Development	Number of companies
Increase very strongly	10
Increase	12
Rather increase	18
Rather stay the same	13
Rather decrease	5
Decrease	2
Decrease strongly	1



sehr stark zunehmen	increase very strongly
zunehmen	increase
eher zunehmen	rather increase
eher gleich bleiben	rather stay the same
eher sinken	rather decrease
sinken	decrease
stark sinken	decrease strongly

Question 7: What are the reasons for the statement you made about the future development of the use of aluminium? (multiple statements possible)

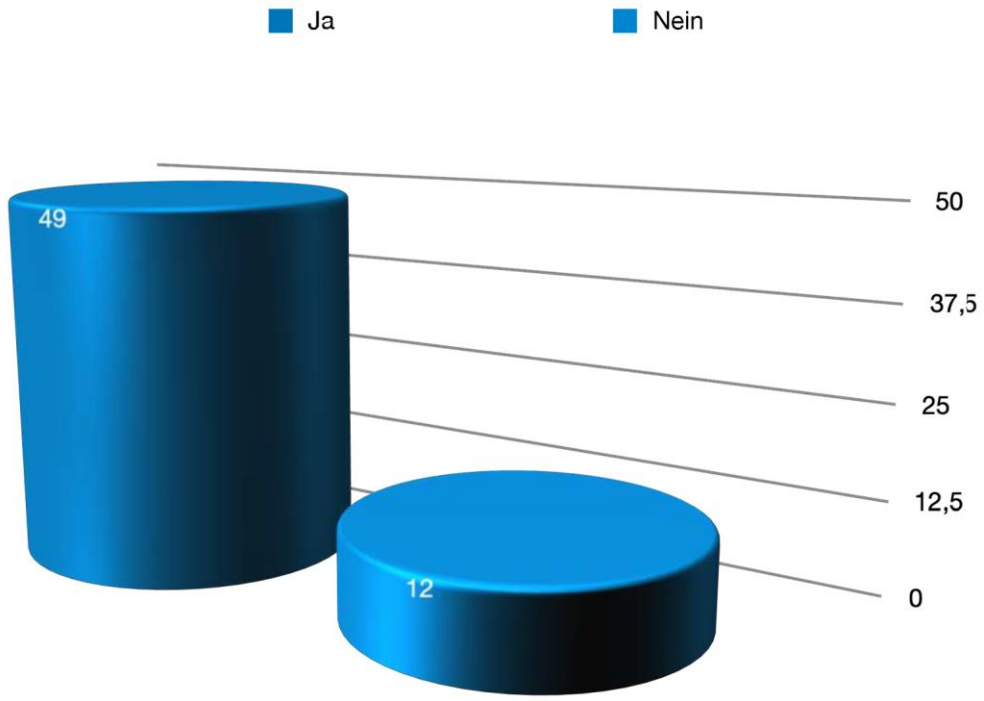
Reasons	Number of companies
Regulatory environment	10
National changes in competition	12
Changes in demand	18
International competition	13



Regulatorischen Umfeld	Regulatory environment
Nationale Wettbewerbsveränderungen	National changes in competition
Nachfrageänderungen	Changes in demand
Internationaler Wettbewerb	International competition

Question 8: Is the topic of digitisation or digital transformation of the entire company or parts of it on your agenda?

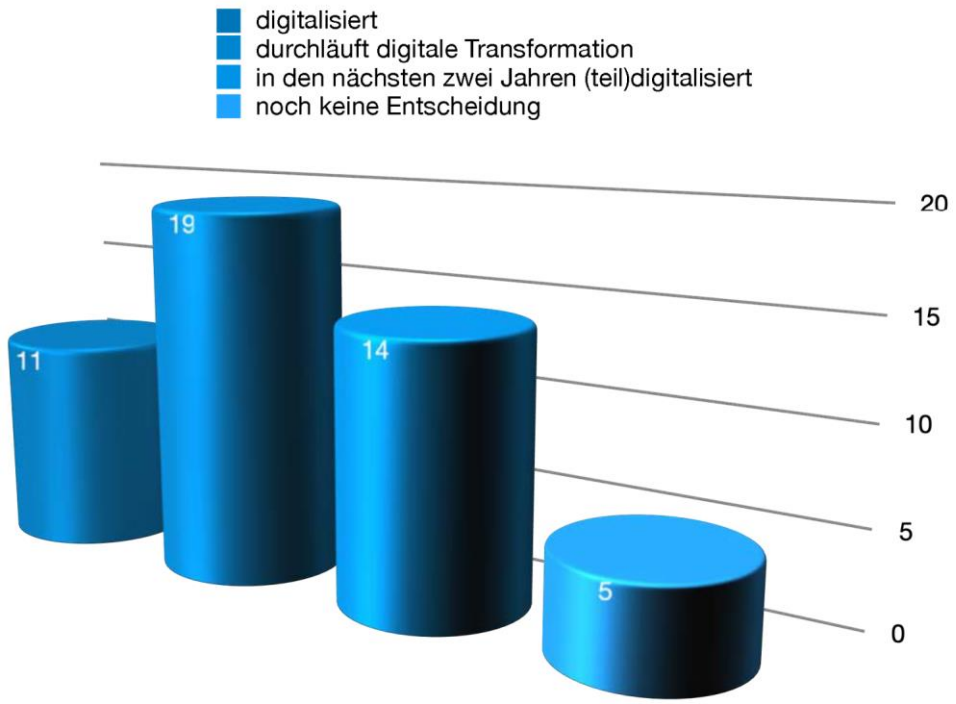
Yes	49
No	12



Ja	Yes
Nein	No

Question 9: When the topic of digitisation is on your agenda, is the company already digitised or will it be digitized?

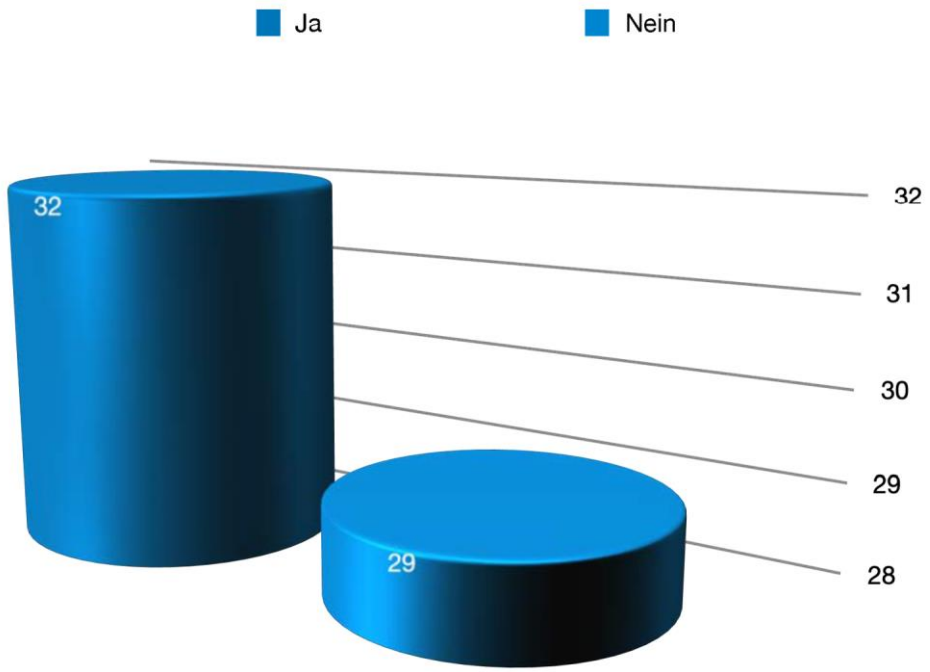
	Number of companies
The company is digitised	11
The company is undergoing a digital transformation	19
The company will undergo a digital (partial) transformation over the next two years	14
No decision yet	5



digitalisiert	digitised
durchläuft digitale Transformation	undergoing a digital transformation
in den nächsten zwei Jahren (teil)digitalisiert	(partly) digitised over the next two years
noch keine Entscheidung	No decision yet

Question 10: Are you aware of the European Green Deal?

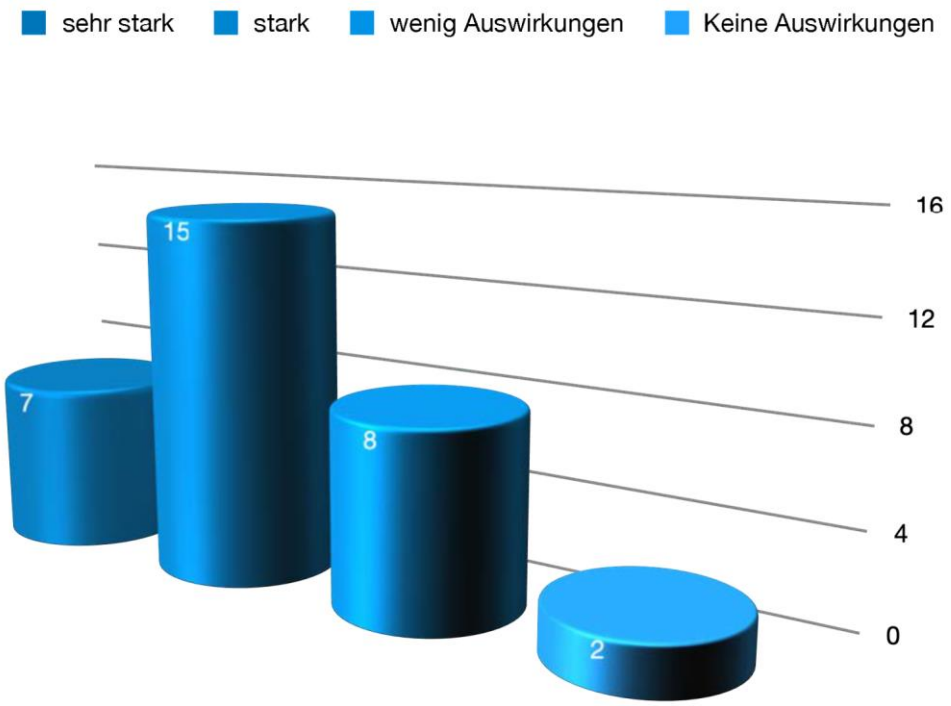
Yes	32
No	29



Ja	Yes
Nein	No

Question 11: Will the measures planned for the European Green Deal affect aluminium processing companies (downstream)?

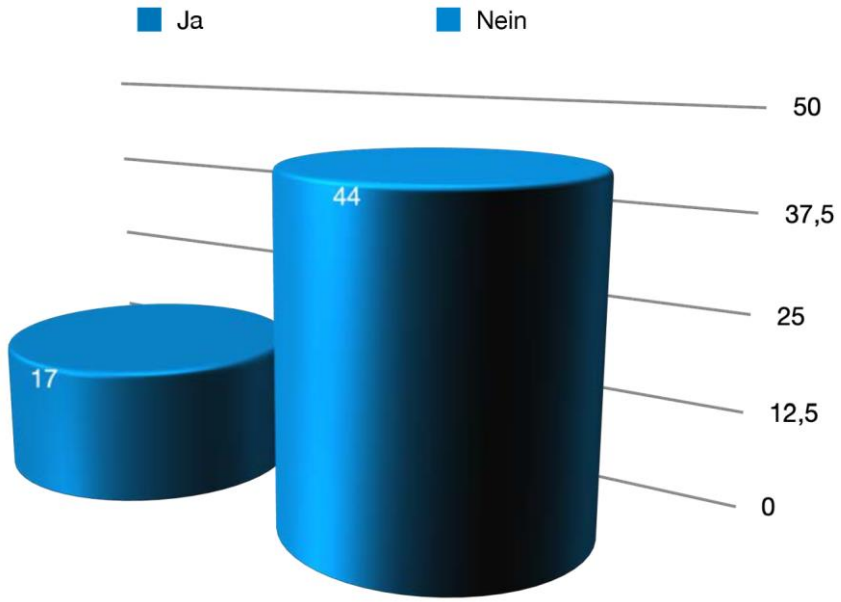
	Number of companies
Affect very strongly	7
Affect strongly	15
Little affect	8
No affect	2



sehr stark	very strong
stark	strong
wenig Auswirkungen	Little affect
Keine Auswirkungen	No affect

Question 12: The circular economy will play an important role in the green "recovery plan" of the coronavirus pandemic. Have you heard of this plan and what do you think of it?

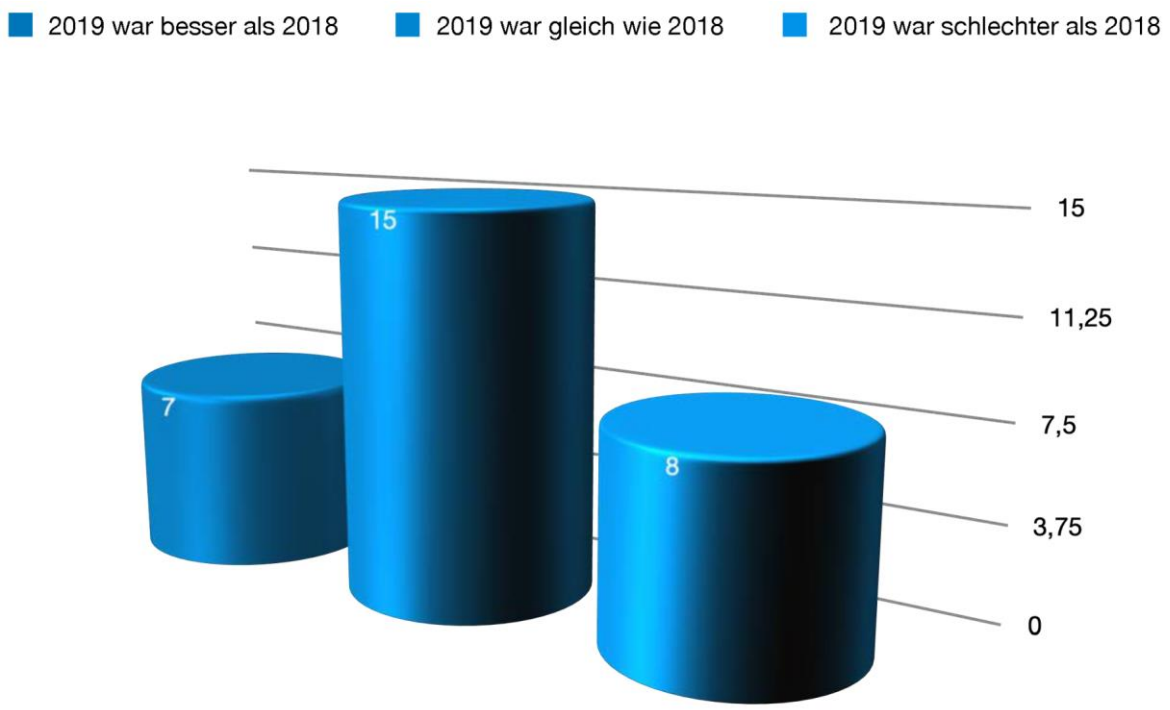
Yes	17
No	44



Ja	Yes
Nein	No

Question 13: The COVID-19 pandemic has thrown all business expectations of the industry out of joint. Take a look at the past 2019 financial year: How has business developed so far?

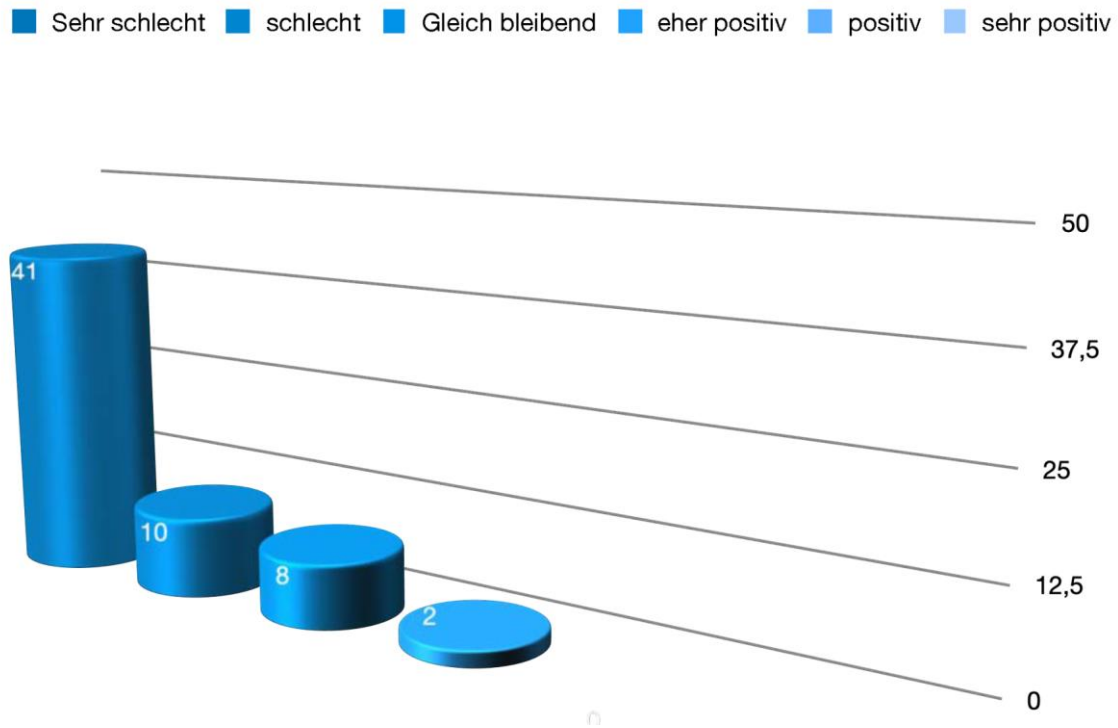
	Number of companies
2019 was better than 2018	33
2019 was the same as 2018	19
2019 was worse than 2018	7



2019 war besser als 2018	2019 was better than 2018
2019 war gleich wie 2018	2019 was the same as 2018
2019 war schlechter als 2018	2019 was worse than 2018

Question 14: How do you assess the development of your business or your division for the near future? (for the year 2021)

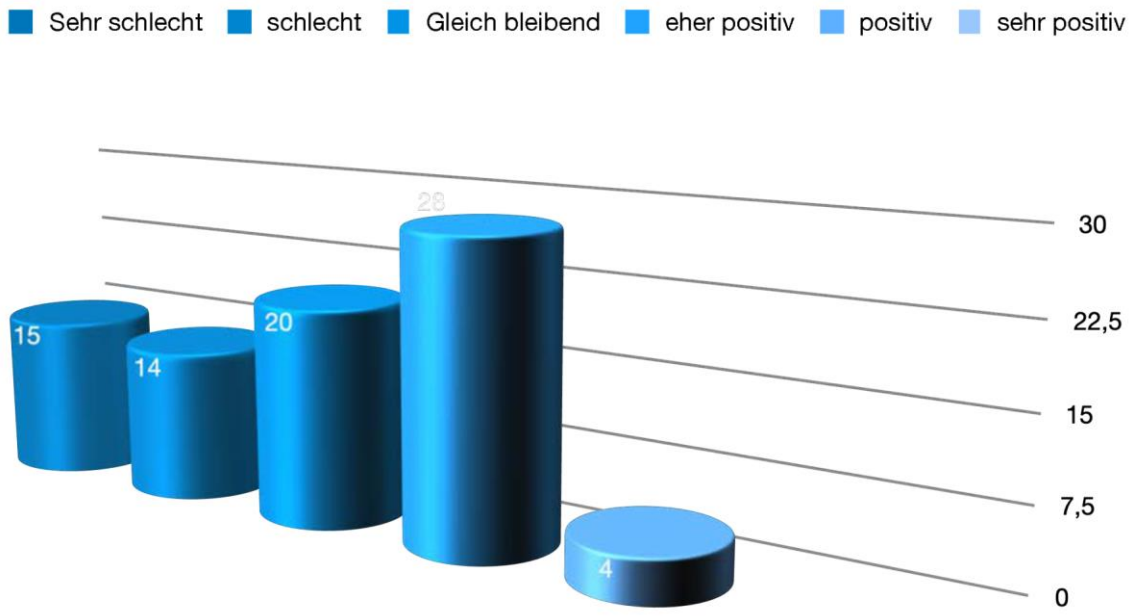
	Number of companies
Very bad	41
Bad	10
Unvarying	8
Rather positive	2
Positive	0
Very positive	0



Sehr schlecht	Very bad
schlecht	bad
Gleich bleibend	Unvarying
eher positiv	rather positive
positiv	positive
sehr positiv	very positive

Question 15: How do you assess the development of your business, your division for the foreseeable future (in the year 2023/2025)?

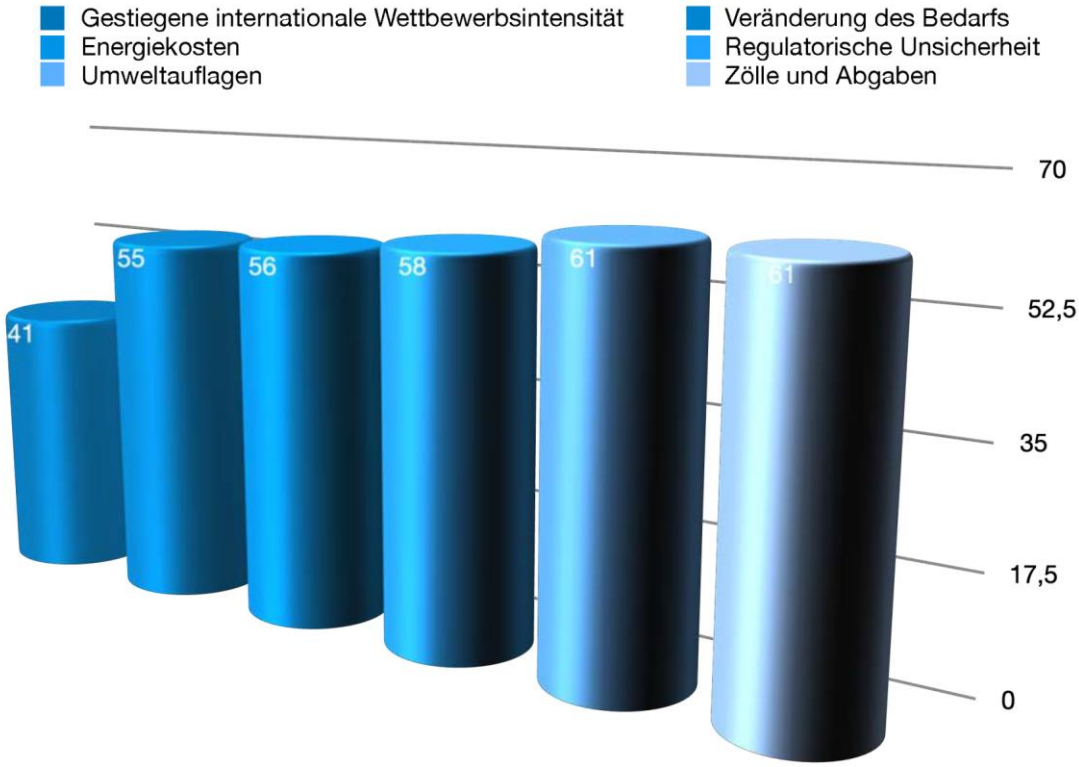
	Number of companies
Very bad	15
Bad	14
Unvarying	10
Rather positive	8
Positive	4
Very positive	0



Sehr schlecht	Very bad
schlecht	bad
Gleich bleibend	Unvarying
eher positiv	rather positive
positiv	positive
sehr positiv	very positive

Question 16: From the point of view of your company, what are the biggest obstacles to further development in the aluminium processing industry? (multiple choice possible)

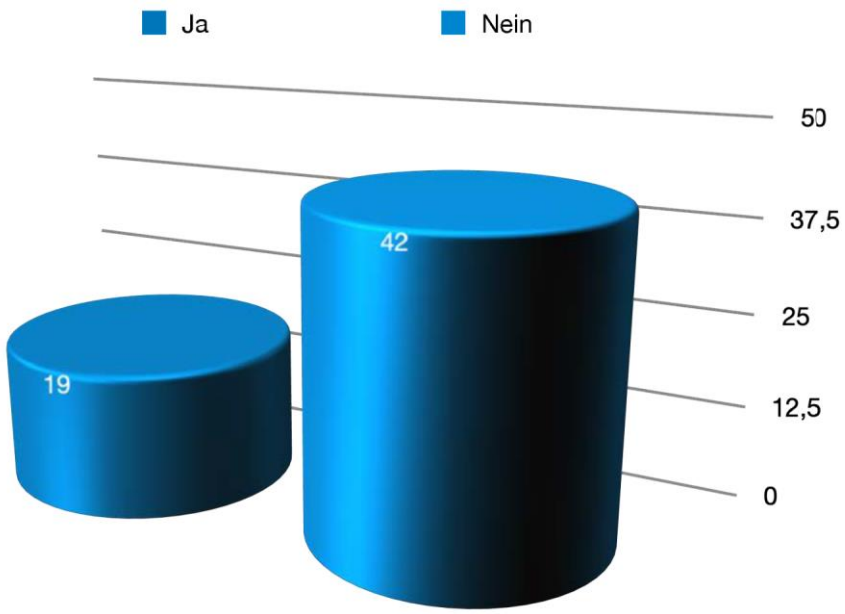
	Number of companies
Increased intensity of international competition	41
Change in demand (collapse in demand from important (end) customers	55
Energy cost	56
Regulatory uncertainty	58
Regulatory and legislative environmental requirements	61
Highly volatile customs duties and charges	61



Gestiegene internationale Wettbewerbsintensität	Increased intensity of international competition
Energiekosten	Energy cost
Umweltauflagen	Environmental requirements
Veränderung des Bedarfs	Change in demand
Regulatorische Unsicherheit	Regulatory uncertainty
Zölle und Abgaben	Customs duties and charges

Question 17: Are you aware that the European Union imposes import duties of up to six percent on the import of raw aluminium?

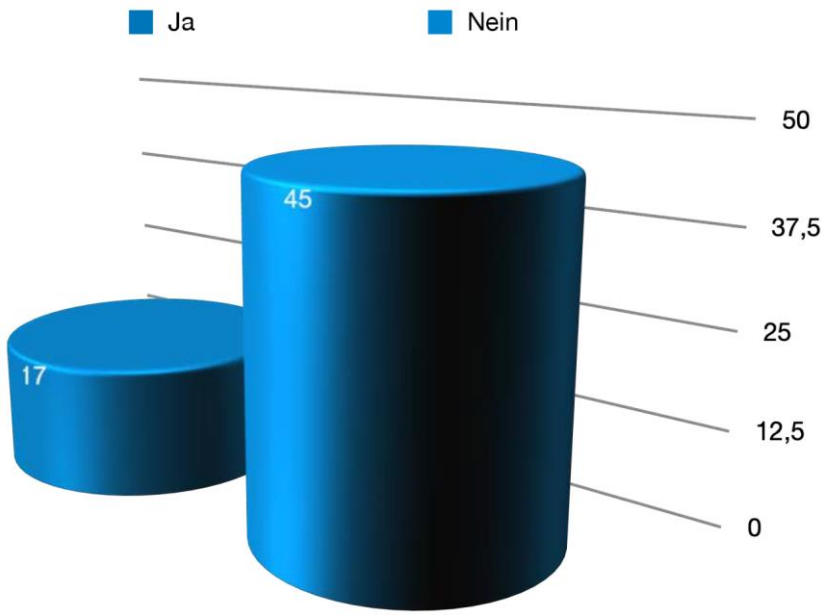
	Number of companies
Yes	19
No	42



Ja	Yes
Nein	No

Question 18: Did you know that there is price equality between imported aluminium (including an extra duty) and aluminium produced in the EU?

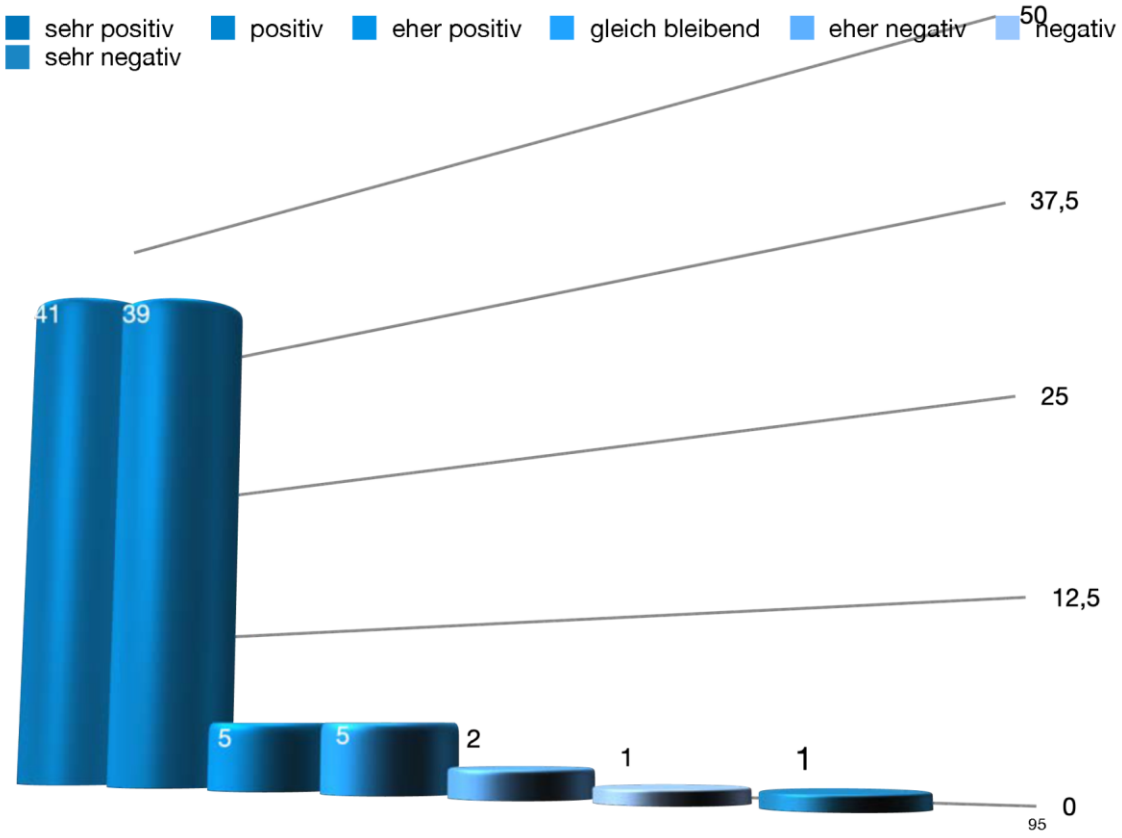
	Number of companies
Yes	17
No	45



Ja	Yes
Nein	No

Question 19: If import prices for primary aluminium were to fall as a result of the abolition of import duties, how would this affect your business development.

	Number of companies
Very positive	9
Positive	39
Rather positive	5
Unvarying	5
Rather negative	2
Negative	1
Very negative	1

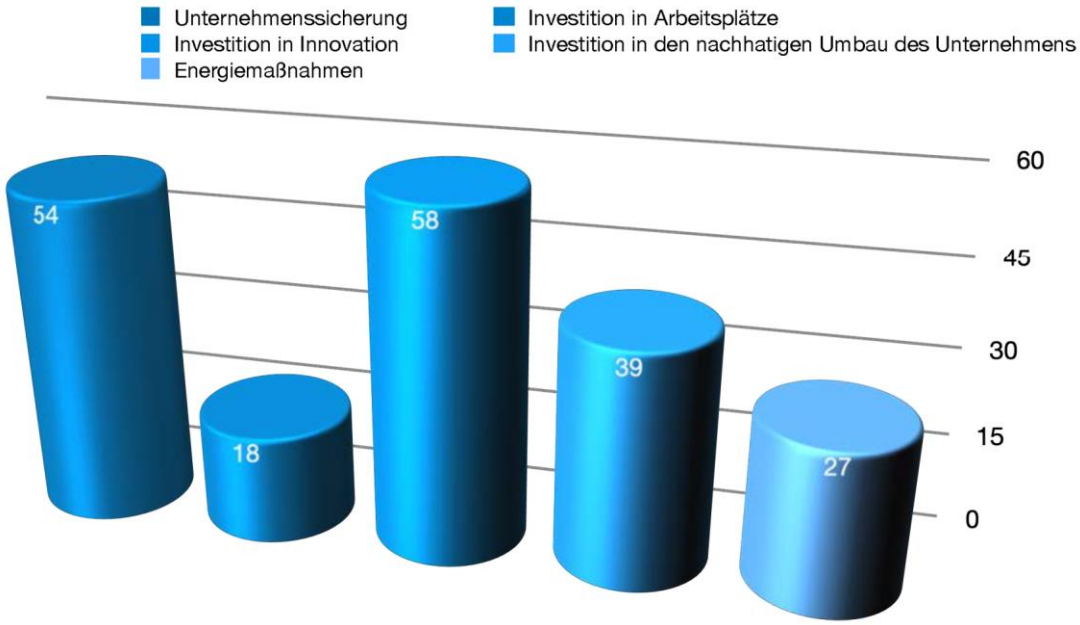


sehr positiv	very positive
positiv	positive
eher positiv	rather positive
gleich bleibend	unvarying
eher negativ	rather negative
negativ	negative

sehr negativ	very negative

Question 20: In which area would you use the funds thus released? (multiple responses possible) (multiple choice possible)

	Number of companies
Corporate security	54
Investment in jobs	18
Investment in Innovation	58
Investment in the sustainable conversion of the company	39
Energy measures	27



Unternehmenssicherung	Corporate security
Investition in Innovation	Investment in Innovation
Energiemaßnahmen	Energy measures
Investition in Arbeitsplätze	Investment in jobs
Investition in den nachhatigen Umbau des Unternehmens	Investment in the sustainable conversion of the company

EXECUTIVE SUMMARY.
THE IMPACT OF EU POLICIES ON THE COMPETITIVENESS OF THE EU ALUMINIUM INDUSTRY: A FOCUS ON NON-INTEGRATED DOWNSTREAM USERS

1. THE EU DOWNSTREAM ALUMINIUM INDUSTRY: SECTOR ANALYSIS

Primary aluminium

- In Europe, aluminium industry represents an important and strategic sector. During the last decades, it has experienced several structural and technological changes. Nowadays the aluminium market includes very few firms in the upstream, some firms in the midstream and lots of firms in the downstream part. Referring to the upstream, due to high energy and labour costs, most of the firms have de localised their activity to cheaper inputs countries such as Brazil, Russia, India, China and the Middle East. This development has defined a different market structure where fully vertically integrated firms are very rare in Europe. As a result the market appears quite fragmented and independently owned, only partially integrated (foundries and casters e.g.) or linked to clients with specific contractual connections especially in case of asset specificity.

- In EU28, primary aluminium production decreased by 32% in 2000-2013, but it experienced different development where considering annual changes. In fact, the EU28 production increased reaching 3256 Mt in 2000-2005, while in 2006-2008 it fell to about 9 Mt (-29%) as a consequence of the economic crisis that has strongly hit the downstream aluminium demand. In the following years, the sector recovered up to 2011, but in 2012 it experienced a new downturn trend, recording a -22.0% in 2011- 2013.

- The reduction of production volumes is due primarily to the economic downturn started in 2008, but also to the closing down of some EU smelters that delocalise plants in cheaper input countries such as the Middle East or China e.g. In more detail, EU28 production capacity had slightly increased up to economic crisis while in the following years it started to steadily decrease. However, at the moment, production capacity is not fully exploited despite what recorded in the pre-crisis years (about 65% of 2013 against about 95-100% of pre-2008 years).

- Even if production capacity would be fully exploited, it could not cover the EU primary aluminium demand. Apparent consumption, that represents the actual EU primary aluminium needs, is higher than production and production capacity for the entire period 2000-2013. It means that about 70% of primary aluminium needs are satisfied by importation and that EU primary aluminium production is not sufficient to cover EU demand at the moment. This implies that EU primary aluminium buyers should burden not only higher costs from purchasing outside Europe (e.g. higher transport costs) but also the European duty applied to primary aluminium importation.

- In 2013, in EU28 only 10 countries owned smelting plants. The main European primary aluminium producers are Germany (18% of European production), Spain (17%), and France (17%). Other countries produced lower but still significant quantity of primary aluminium such as Romania (10%), the Slovak Republic (8%), Greece (8%), Sweden (6%), Italy (5%), the Netherlands (4%), and the UK (3%).

- Looking at the downstream segment, in 2011, 38% of European primary and secondary aluminium was purchased by rollers (4.5 Mtonnes), 25% by extruders (3.0 Ml), 27% by casters (3.2 Mt), and 10% mainly by wires, rod, and cable producers. In the same year, the semi-finished products realised by the aluminium downstream segment were purchased mostly by transport sector (38%) that is expected to grow by 2.4% in 2014-2015, followed by building (25%), packaging (16%), engineering (14%), and other sectors (7%).

Secondary Aluminium

- Secondary aluminium is produced from aluminium-bearing scrap or aluminium-bearing materials, other than aluminium-bearing concentrates (ores) derived from a mining operation. As for the production process, two different techniques are employed depending on the subsequent downstream use: *refining and re-melting.*

- As for the production of secondary aluminium in Western European countries, the production level in 2013 was estimated to be of 2.4 million tonnes. Production fell by 17% between 2007 and 2008 and by 20% between 2008 and 2009. Current production levels have not matched yet pre-crisis levels (roughly 3 million tonnes).

- In terms of geographical distribution of production, Germany and Italy are the two countries with the largest share of production. In 2013, they both produced more than 60% of secondary aluminium in Western Europe.

Aluminium rollers

- Metal rolling is a production technique used as early as the first of the 16th century. However aluminium rolled products in the form of sheets appeared only at the beginning of the 20lh century. Nowadays, rolled products have reached a large and growing use in several industrial sectors such as food and beverage, aerospace, automotive and engineering e.g. In EU28, after an output increase of 10.7% in 2000-2007, the production dramatically decreased by 21% in 2007-2009, reflecting the strong demand reduction of the manufacturing sectors occurred after the economic crisis started in 2008. In 2009-2013 the trend inverted and production grew by 23.1%, almost reaching the pre-crisis level. Even if EU28 represents the second biggest world producer after China, its world share decreased from 29% to 20% in 2000-2013. Over those years, the country which experienced the highest increase in its world share is China which passed from the 5% of 2000 to the 35% of 2013. Other Asian countries accounted for almost 13%.

- In EU28, the demand for aluminium rolled products increased by 35% in 2000-2013, against the +66% recorded at the global level. In more detail, in 2000-2007 the EU28 demand had grown from 3650 Mtonnes to 4466 Mtonnes (+22.4%), to fall sharply in 2008-2009, reaching the lowest level in the period considered for the analysis (3311 Mtonnes, -25.8% in 2007-2009). Starting from 2009, the segment showed a new upward trend, and aluminium rolling demand grew up to 4132 Mtonnes in 2011, and then decreased again in 2011-2012 (-1.3%). In 2012-2013, demand increased only by 2.6%. For 2015, a new growth is expected. Over those years, the main rolled products users were foil stock and packaging producers, and automotive industry.

- In 2013, rolled products companies were 52, owing 55 plants, mainly located in Germany (12), Italy (II), and France (5). The number of companies was quite stable in 2000-2013, and there were not important delocalisation process as plants are quite big and characterised by important scale economies which means relevant initial investment and high exit costs. Employment had grown by 114% in 2000-2013 and, after a decrease of 6.3% in 2007-2009, it has started to slowly grow again since 2009, almost reaching the pre-crisis employment level. The rolled products segment accounts for about 12-13% of the work force employed in the whole aluminium sector.

- EU28 rolled products net export was positive in 2003-2012, except for 2011. In the pre-crisis years, net export was quite relevant (e.g. 388,9 Mtonnes in 2005), signalling that the European rolled products firms were competitive at the global level. After 2006, the value kept falling until 2011 (-106,2 Mtonnes). In 2012, the segment registered a slight recover compared to the previous year (+26,3 Mtonnes). These data confirm that the sector was strongly hit by the economic crisis, and that Europe is suffering the extra-European competitive pressure coming mainly from China as highlighted by the increased European imports from China.

Aluminium extruders

- As of 2013, 255 companies have at least one extrusion plant in the European Union. The total number of extrusion plants installed amounts to 288. These plants produce about 2.9 million tonnes of extruded products, that is 28% of the European production of semi-finished aluminium products. The installed production capacity for extrusions is 4.9 million tonnes. In addition, about 50,000 workers are estimated to work in European extrusion plants. This figure corresponds to 35% of the overall workforce employed in the aluminium downstream industry.

- Production of aluminium extruded products (bars, rods, profiles, and tubes) in the EU amounted to 2.93 Mega Tonnes in 2013. Production is deeply affected by macroeconomic conditions and is procyclical. As a matter of fact, the financial turmoil that hit the global economy in 2008 caused European production to fell by 12% between 2007 and 2008 and by 21% between 2008 and 2009. Production returned to growth in 2010 but production levels before the crisis (more than 3 million tonnes per year) have not yet been matched.

- Demand for extruded products is not only affected by macroeconomic conditions but also by sectorial trends in customer industries. Construction and transport are the industries that demand and consume the largest share of extrusions. In 2013, 46% of EU extrusions were used in the building and construction industry while 26% were used in transports. Other relevant sectors that demand significant amounts of extrusions are the industries for machinery and equipment (13%), for electrical equipment (5%), and for consumer durables (5%).

- The global market for aluminium extrusions has grown steadily over the last decade. Prom 2001 on, the world production of extrusions has always exhibited positive rates of growth, even during the financial turmoil that hit the global economy in 2007-2009. In 2013, 23.4 million tonnes of extrusions were produced worldwide, that is more than twice as much as the production levels registered in 2000- 2002.

- In spite of the strongly positive trend in the global production of aluminium extrusions, the share of production that takes place in the EU has dramatically decreased. As a matter of fact, almost one third of the world production of aluminium extrusions took place in Europe in 2000-2003. Since then, this share has dropped up to 12.5% in 2013. The current small European share of production stems from the large investments that took place in extra-European Countries, especially China.

- The European Union has constantly been a net importer of extruded products over the past few years. The EU trade deficit skyrocketed in 2006-2007 and amounted to 120.3 thousand of tonnes of extruded products in 2013. A large share of this trade deficit is explained by the increasing trend in imports from Turkey and especially China over the last decade.

Aluminium castings

- Casting is the oldest method of manufacturing aluminium shaped components. As of 2013, the EU28 production of aluminium castings amounted to about 3 millions of tonnes almost recovering pre-crisis values. Nevertheless, the share of EU28 countries in the world production of aluminium castings has decreased since the world production of aluminium castings has almost doubled in the period 2000-2013. In 2013, the EU28 countries account for almost 19% of the world production of aluminium castings compared with the 29% registered in 2000. In the same period, the share of China in the world production of aluminium castings has dramatically increased passing from 9% to 34%. The production has increased also in the other Asian countries that today account for 12% of the world production of aluminium castings.

- The demand for aluminium castings in EU28 has increased in the period 2000-2013 from 2.6 to 3.0 Mtonnes. The global consumption for aluminium casting products has been mainly driven by Asian countries. In 2011, the 52% of the global aluminium castings were directed to the Asia Pacific area, while Western Europe and North America respectively accounted for 18% and 16% of the global demand.

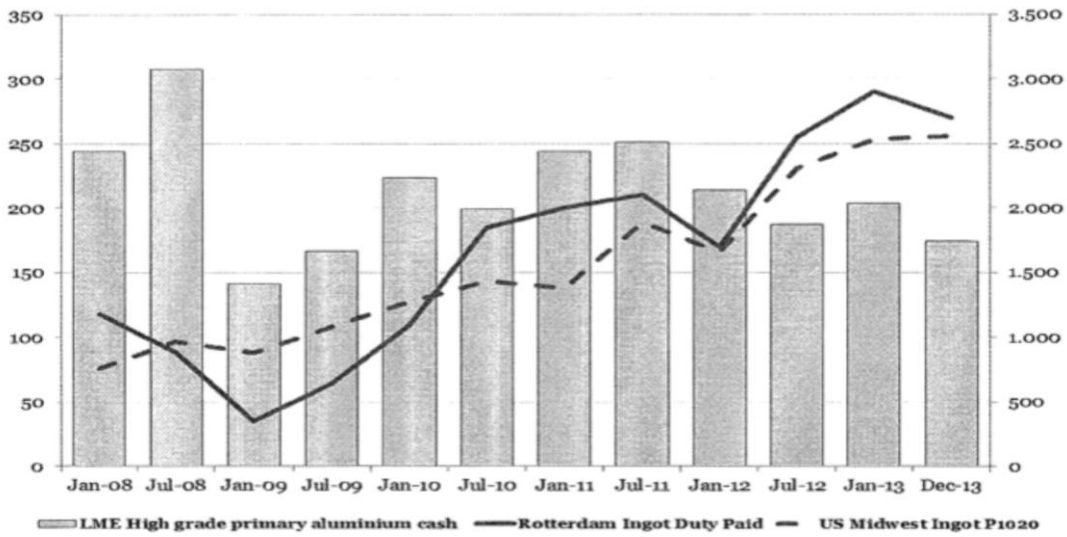
- As other sectors, the increasing competitive pressure coming from non-EU manufacturers combined with the demand fall occurred after the economic crisis of 2008 has generated overcapacity problems and financial difficulties also for European casters. Several plants have been consequently closed in EU, while new investments in aluminum casting were concentrated outside Europe also driven by the growing investments of the end-use industries, especially automotive. Aluminium casting still remains a fragmented sector much less concentrated than the other downstream segments. As of 2013, the aluminium casting plants in operation in EU-28 are 2.148. About 2/3 of aluminium casting plants are located in just four countries (Italy, Germany, France and UK). In 2013, about 73.500 workers are employed in the aluminium castings industry. This figure corresponds to more than 51% of the overall workforce employed in the aluminium downstream industry.

- Over the last decade, EU28 has gradually strengthened its position as a net importer of aluminium casting products. Besides a modest fall between 2011 and 2012, net imports of castings has constantly grown especially during the economic crisis. European trade flows of aluminium casting products are not significant at least in comparison with extruded and rolled products. In the period 2002-2013, the yearly amount of aluminium castings' exports averages less than 30 thousands of tonnes, while imports only recently reach values larger than 50 thousands of tonnes.

2. PRICE FORMATION IN THE ALUMINIUM INDUSTRY

- In the EU, competition policy aims at ensuring that competition in the internal market is not distorted. Referring to aluminium industry as a whole, EU competition policy creates negligible direct regulatory costs for aluminium producers and non-integrated downstream users. However, in Europe and outside Europe, concerns regarding competition issues have been recently raised on rules governing price formation in the aluminium wholesale market and on the use of different practices to restrict competition. In more detail, it has been argued that the strong increase of the aluminium price component known as "premium" is reflecting the alleged anti-competitive behaviour of financial banks and institutions that entered the aluminium market over the latest years, acquiring some of the biggest London Metal Exchange (LME) licensed warehouses of the world.

- Aluminium markets such as other commodity markets has been interested by a financialisation process over the latest years due to many drivers such as the easier access to credit after the financial deregulation, to the removing of subsidies, duties and other barriers to international trade, and to technological development Even if the financialisation process is aimed to align the aluminium returns with the financial assets, after some of the worldwide biggest financial banks have entered the LME warehouses network, aluminium prices, which are influenced also by the EU trade policy since the duty component is normally included in the premiums paid regardless the primary aluminium country of origin, seem to follow a different path moved by different incentives where compared to the ones of the physical markets.
- LME cash and forward prices decreased after the economic crisis (-30% in 2008-2013), while premia quotations experienced an upward trend in almost all regions, compensating in this way part of the decrease of the LME cash and forward price (e.g. Rotterdam Ingot Duty Paid +129%, and US Midwest Ingot P1020 +230% over the same years). It means that aluminium full prices stand at about the pre-crisis level despite the aluminium over-supply registered in many regions.
- Cash LME High grade primary aluminium price (right axe), and Rotterdam Ingot Duty Paid and US Midwest Ingot P1020 premia (left axe) (US dollar/tonne, average monthly prices, 2008-2013)



Source: Own elaboration on CRU (2014).

Jan-08	Jan-08
Jul-08	Jul-08
Dec-13	Dec-13
LME High grade primary aluminium cash	LME High grade primary aluminium cash
Rotterdam Ingot Duty Paid	Rotterdam Ingot Duty Paid
US Midwest Ingot P1020	US Midwest Ingot P1020
Source. Own elaboration on CRU (2014).	Source. Own elaboration on CRU (2014).

- This situation is the result of the economic incentives and profit opportunities provided by the current configuration of the aluminium financial market. In more detail, the LME system creates a set of economic incentives to LME licensed warehouses owners: (i) to increase the storage fee in order to collect higher profits; (ii) to rise the quantity of stored metal in order to gain growing revenues from the storage fee; (iii) to prolong the aluminium delivery activities to collect higher revenues from the storage fee, standing at the minimum aluminium daily delivery level set by LME rules (3000 tonnes per day since 2012), creating an artificial bottleneck.

- Those incentives may determine 2 main effects: (i) extending the delivery queue: (ii) and, as a consequence, rising the aluminium premium price component, to the detriment of downstream producers and final consumers.
- Actually, those incentives have been realised since 2010, when some of the biggest financial banks (Goldman Sachs and J.P. Morgan e.g.) entered the LME warehouses network business.
- In fact, LME stocks have grown substantially since 2008, and almost doubled in 2010-2013. This is due to the combined effects of low interest rate, contango, a drop of demand, and aluminium over-supply. Over the same years, storage rate paid to on-warrants warehouses owners increased (by 10% on average in 2010-2013; +27.5% in Detroit and +22% in Vlissingen for primary aluminium storage over the same period). In the same way, the length of the delivery queues increased (from almost 0 to 363 days in Vlissingen warehouses, and from almost 0 to 399 days in Detroit warehouses, in 2008-2013).
- The longer delivery queues than when financial banks where outside the warehouses network have been determined by an unexpected increase in the number of cancelled warrants (from almost 0 tonnes to more than one million in 2010-2013 in Vlissingen warehouses; from less than 200 tonnes to more than 1,2 million in Detroit over the same years). This situation is probably due to the inability of the LME warehouses to deliver materials exploiting at the best their load-out capacity, and to the incentive for warehouses owner to deliver at the minimum load-out rate set by LME (3000 tonnes per day) in order to create bottleneck and benefit from higher storage rate.
- Over the last year, some big financial players have expressed the intention to exit the market by selling the warehouses acquired in 2010-2013. This choice is not really surprising as it is probably the result of the pressure coming from different political and judicial initiatives, especially in the US.
- In sum, the increasing weight of financial institutions in the LME network has generated a detachment of the financial transactions from physical market requirements. There is evidence that the current aluminium price does not fully mirror the underlying of physical markets because of the growing regional premium component which creates distortions to the detriment of non-integrated downstream producers and final customers. In other words, there are few doubts that end-users and non-integrated downstream producers bear the highest part of the costs originated by price movements and earning-profit strategies of financial players.
- Policy makers should consider the case to investigate further the functioning of the LME system in the attempt to find the right regulatory framework to protect the competitiveness of the high number of European firms that are primary aluminium purchasers. This is the policy strategy adopted by the US, one of the main European competitors in the aluminium downstream segment, as the Federal Reserve is considering new rules for the trading of several materials such as aluminium, and policy makers are studying the best way to limit the presence of financial banks in the commodity markets. This step seems necessary in order to preserve the competitiveness of European industrial system and to find new paths to overcome the economic downturn experienced since 2008.

3. TRADE POLICY

- The EU aluminium industry crucially depends on imports. In 2013 the EU *primary aluminium* production was equal to 30% of primary aluminium apparent consumption. In the same year the total installed smelting capacity was about 45% of the EU primary aluminium apparent consumption. As the domestic demand for primary aluminium is much larger than internal production as well as installed capacity, imports from third countries are crucial to satisfy the EU demand.

- As regards secondary aluminium, the EU turned out to be a net exporter in 2012, and this surprising trade surplus was largely due to a sudden increase of exports to Japan. Future data on imports and exports will show whether this surplus is occasional or not.

- The EU has constantly been a net exporter of *aluminium waste and scrap.* The trade surplus has even increased over the last few years. In particular, Asian countries such as China, India, and South Korea, are markets where an increasing quantity of waste and scrap has been exported over the last few years.

- The EU is a net importer of *extruded products.* In addition, the EU trade deficit has increased over the last few years and the increasing share of imports coming from China and Turkey explains this fact. A similar trend has been found also for aluminium wires.

- The EU is a net exporter of *rolled products.* However, this trade surplus has declined over the last few years and is threatened by the increasing share of imports coming from China and Turkey.

- The EU is a net importer of *cast products.* This trade deficit has deteriorated over the past years and the dramatic increase in imports from China is the main explanation to this fact.

- The tariff suspension on imports of unwrought unalloyed aluminium introduced by the EU in 2007 does not seem to have exerted any significant effect on aluminium production, trade flows, and prices. In particular, macroeconomic conditions and structural disinvestments from the primary aluminium industry, which started in 2006, outweigh the tariff suspension in explaining the most recent trends in primary aluminium consumption and trade flows. Surprisingly, imports from duty free areas have been growing since 2007. Furthermore, the downward pressure on aluminium market prices has been outweighed by other contrasting factors such as competition issues.

- The key consequence of the import tariffs on unwrought aluminium that are currently in force in the EU is to inflate market prices for both primary and secondary aluminium. The EU duty-paid regional premiums for primary aluminium are generally higher than the corresponding premiums in other world regions.

- The total extra-costs borne by EU downstream transformers over the period 2000-2013 as a consequence of the EU import tariffs on unwrought aluminium have been assessed in this Study. In particular, these costs have been estimated under four different scenarios, depending on different assumptions about the magnitude of the impact of the duty on EU market prices and the proportion of primary and secondary aluminium affected by the price increase. As summarized in the following (able, the total extra-costs range between €5.6 billion and €15.5 billion over the period 2002-2013.

- These extra-costs translated in additional customs revenues collected by EU Member States in the area of €0.9 to €1.7 billion. The largest share of these extra-costs contributed to the revenue expansion for primary (between €2.2 and €4.0 billion) and secondary producers (between €3.0 and €5.3 billion) based in the EU and foreign smelters (between €2.5 and €4.4 billion) based in countries that are connected to the EU Custom Union by zero-duty PT As.

Table 1 Total extra-coats imposed by the EU import tariffs on unwrought aluminium on EU downstream transformers over the period 2000-2013 (€ billions)

Scenario	Cumulative extra- costs for EU downstream transformers	Duty revenues	Extra-revenues for EU primary producers	Extra-revenues for primary producers with duty free access to the	Extra-revenues for EU secondary producers
Lower bound	5.6	0.9	2.2	2.5	n.a.
Lower bound "plus"	8.7	1.0	2.2	2.5	3.0
Upper bound	9.6	13	3.8	43	n.a.
Upper bound "plus"	153	1.7	4.0	4.4	5.3

Source: Authors' own elaboration

4. CONCLUDING REMARKS

- Our results show that the duty on primary aluminum penalizes the downstream segment - in which typically operate SMEs characterized by high added value productions and by product and process innovations - while favouring primary (vertically integrated) big firms. This is firmly contrary to the spirit and the letter of the EU Treaty (Article 173 TFEU, ex Article 157 TEC) and policy plans (among which the most relevant are the Lisbon Treaty, the Small Business Act (2008), as well as the plans "An integrated industrial policy for the globalisation era" (2010) and "A Stronger European Industry for Growth and Economic Recovery" (2012)).

- In the case of the European primary aluminum segment, the duties protects operators distorting the market price without assuring any perspective economic advantage to the EU economic system: the production capacity of EU primary aluminium firms is already nearly fully exploited and, moreover, a profound process of disinvestment is occurring. In fact, as shown European consumption of primary aluminium strongly relies on imports, being the installed production capacity in the EU well below half of the EU primary aluminum apparent consumption. It seems clear, hence, that the duty is not meant to protect unexploited local production capacity, nor to favour an increase in the domestic production of primary aluminum. Moreover, the aluminium downstream sector in EU accounts for nearly the 93% of the total employment in the whole aluminium industry (data as of 2011) - compared to a 4.5% in the primary segment and a 1.7% in the secondary segment - so that the choice to protect primary operators' rents to the detriment of the segment employing the 93% of total aluminum workers appears to be incomprehensible even under the mere economic point of view.

- Particularly relevant is also the fact that a very low share of the amount of duties paid by EU downstream operators is actually collected by EU customs (only 11-16%, depending on the scenario considered). 39-51% of the overall cost imposed to EU downstreamers eventually becomes rents for EU primary and secondary aluminium producers, while 28-45% enriches non EU aluminum producers (with duty-free access to the EU) i.e. represent a net loss for the European economic system.

- To complete the picture, it must be recalled here that the estimated costs of the duty are referred to a time span (2000-2013) 6 years of which (2008-2013) have been characterized by a deep recession. In these years of economic crisis, primary aluminum consumption has shown a slowdown, which means that in absence of the crisis the costs imposed by the duty to EU downstream firms would have been even higher. This fact must be adequately taken into account when looking at the future, since expectations of an increasing demand for aluminum products are in every operators', market experts' and investors' forecasts. Aluminum global demand is

expected to grow at a 6% annual pace (for instance see Alcoa, 2014; Harbor, 2014), mainly drawn by the automotive sector. In general, being aluminum a light metal, it is expected to be used more intensively by manufacturers to produce more efficient and environmentally friendly products. As highlighted by market analysts, aluminium is winning market share from galvanised steel in the transport industry and copper in the electricity cable industry.

- **The evidence collected in the study strongly supports the case for the tariffs suspension on primary aluminum products.**

- Finally, greater attention should be paid in EU to the aluminum industry and to its segments also in terms of data collection. Official statistics are based upon product classifications that typically downplay the importance of downstream operators and are not always useful to gather a comprehensive picture. As a matter of fact, the aluminium industry is often treated as a whole, without any dividing line between upstream and downstream activities. The lack of disaggregated statistical evidence is not a second-order problem. Poorly analytical data are in fact typically mirrored by low awareness. As a result, it is a common mistake to identify the aluminium industry with primary (and secondary) producers, that are generally bigger companies. This leads to design of policies that do not account for specific needs of downstream players, which, has already highlighted are actually the economic and the employment core of the aluminum industry.

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