University of Strathclyde Business School

The Aluminium Industry in the UK

Fraser of Allander Institute

ALFED

ALUMINIUM FEDERATION

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The Fraser of Allander Institute

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The report was produced in 2021 in partnership with the Aluminium Federation UK.

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Executive Summary

The aluminium industry is a vital part of the UK manufacturing sector. The strategic importance of this lightweight and highly recyclable metal looks set to increase as the UK economy moves towards more sustainable and circular models of production and consumption.

For the purposes of statistics, industries are defined using Standard Industrial Classification codes (SIC). Aluminium production, which is classified under SIC 24.42, can be considered as the narrowest definition of the aluminium industry. SIC 24.42 includes the production of aluminium but does not include the many manufactured aluminium products.

This report departs from that narrow definition and considers the 'wider aluminium industry', which we define to be the production of aluminium e.g., rods, bars, and pipes but also aluminium products such as casks, drums, cans, boxes, prefabricated buildings, doors, windows, and wheels which do not fall under the narrow definition of aluminium production.

Economic indicators for the wider aluminium industry

- The wider aluminium industry directly employs 37,000 people across the UK, with the largest share of those employed being located in the West Midlands.
- The wider aluminium industry contributes around £2.97 billion in Gross Value Added (GVA) to the UK economy.

Economic impact of the wider aluminium industry

The wider aluminium industry is closely tied to many other parts of the UK economy. The production and manufacturing of aluminium goods requires purchasing from suppliers which supports output and employment across the UK.

Our economic model of the UK has been used to estimate the amount of economic activity supported directly and through spill-over impacts by the wider aluminium industry, we find the wider aluminium industry supports:

- The employment of 97,000 full-time equivalent (FTE) jobs in the across the UK
- The contribution of £6.8 billion in GVA

1. Introduction

The aluminium industry is an essential component of the modern UK economy. Aluminium is a lightweight metal with diverse applications which is highly recyclable and is likely to play a key role in the UK's transition to a more sustainable future.

The purpose of this report is to provide an economic overview of the wider aluminium industry, which we define as aluminium production (SIC 24.42) and a range of aluminium products which are classified in other industries but directly relate to aluminium.

This report first defines the components that we have included in the wider aluminium industry, and those which include aluminium, but data has not allowed for their inclusion. Table 1 includes a description of the products included in each industry definition.

Table 1: Products included in aluminium industry definition

Industry	Constituent SIC	Includes products such as
Narrow aluminium industry	Aluminium production SIC 24.42	Aluminium alloy bars, rods, profiles and hollow profiles (24422250), Aluminium tubes and pipes (24422630), Unwrought non-alloy aluminium (24421130)
Wider aluminium industry	Aluminium production SIC 24.42 + Aluminium products found and quantified in 15.12, 24.43, 25.11, 25.12, 25.29, 25.92, 25.93, 25.99 and 29.32	Aluminium prefabricated buildings (25111050), Aluminium structures (25112370), Metal containers for compressed or liquefied gas (25291200), Casks, drums, cans, boxes (25921240), Aluminium aerosol containers, with a capacity 300 litres or less (25921260), Nails, tacks, drawing pins, corrugated nails and staples (25931400), Aluminium sanitary ware (25991137), Road wheels and parts (29323040)

Industry	Constituent SIC	Includes products such as
Currently not included in the wider aluminium industry	Aluminium products found under SIC codes where it was not possible to quantify aluminium content + Products which are likely to be aluminium and are not specifically labelled as such under SIC codes	Light metal castings for land vehicles (24531010), Articles of aluminium (25992955), Capsules of aluminium (25921350), Bumpers and parts for motor vehicles (29323010), Parts and accessories of vehicle bodies (29322090), Brakes, servo-brakes and their parts (29323020), Suspension systems for motor vehicles (29323050), Radiators and their parts for motor vehicles (29323061), Steering wheels, steering columns, steering boxes and their parts for motor vehicles (29323067), Other parts and accessories, not elsewhere classified, for motor (29323090), Frames and forks for bicycles, other non-motorised cycles and side cars.

We use our classification of the wider aluminium industry to provide a snapshot of the industry in terms of its contribution to the economy through Gross Value Added and employment.

This report includes analysis of spill-over effects to the UK economy. Using the FAI UK Hypothetical Extraction Model (HEM) we estimate the importance of the wider aluminium industry to the UK economy.

The report also features a short discussion about the limitations of the data landscape and possible steps forward.

This report was produced in collaboration with the Aluminium Federation (ALFED). ALFED represents firms and other key stakeholders operating within the wider aluminium industry.

The remainder of the report is organised as follows -

- Section 1 presents an economic overview of the wider aluminium industry;
- Section 2 discusses the economic impact of the aluminium industry;
- Section 3 details the methodology used in this report;
- Section 4 highlights key assumptions, limitations, and next steps;
- Section 5 concludes the report.

2. The Wider Aluminium Industry

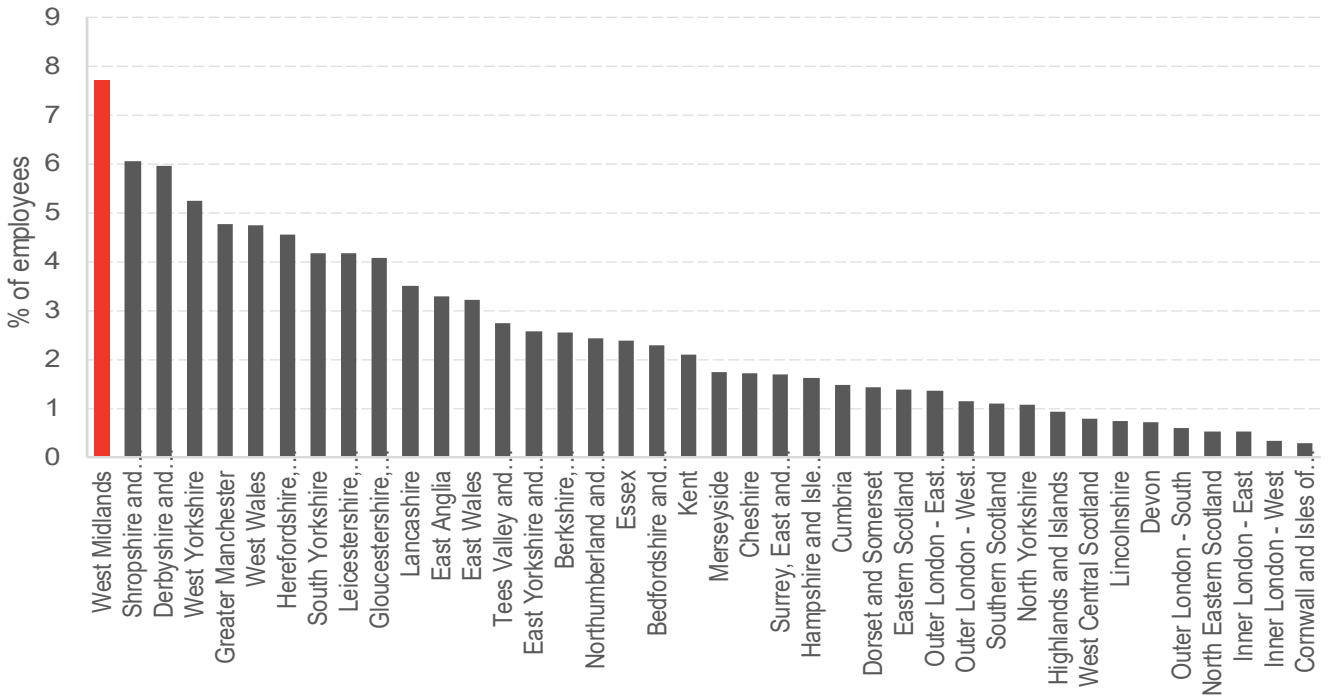
GVA

GVA is a measure of the contribution of a firm or industry to the economy as a whole and is closely linked to GDP.

In 2019 the wider aluminium industry contributed approximately £2.97 billion in GVA to the UK economy, of which aluminium production (SIC 24.42) made up £683 million.

As can be seen in Figure 1, between 2015 and 2019 the industry grew by approximately 4%. The most recent data show that GVA decreased between 2018 and 2019 by around 1.9%. More data is needed before confidently commenting on whether this is a one period change or a reversal of the trend.

Chart 1: Wider Aluminium industry GVA, 2019 prices



Source: *ONS*

Aluminium production alone accounts for 23% of the overall wider aluminium industry GVA. Large contributions can also be seen to come from the sale of aluminium products not classified in SIC 24.42 e.g., aluminium doors, thresholds for doors, windows and their frames. These products are classified under SIC 25.12 and account for the largest share (32%) of wider aluminium industry GVA.

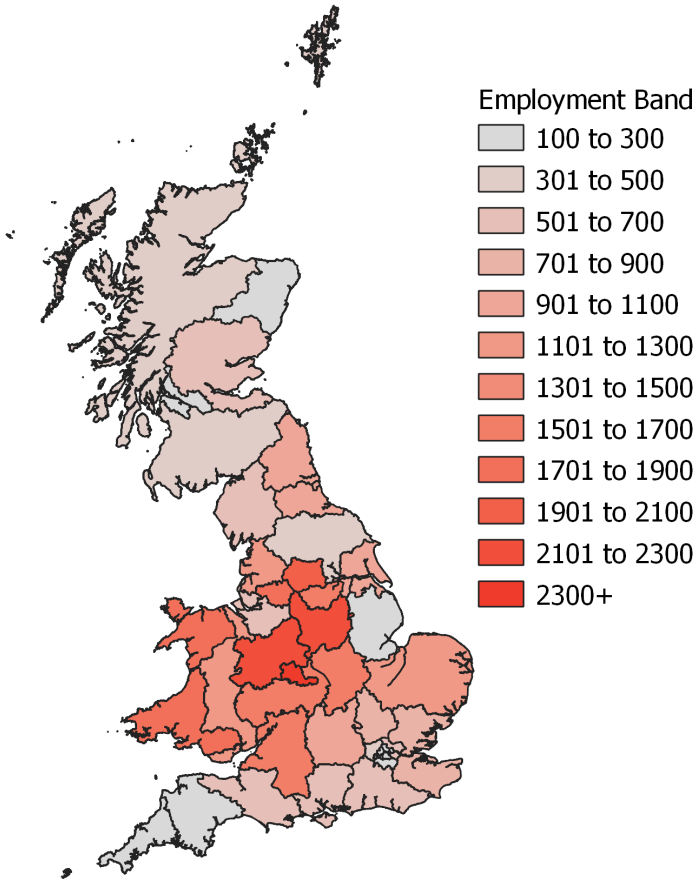
Since 2015, growth in this product group appears to have outpaced the wider aluminium industry as

a whole. GVA contributions from the aluminium products within SIC 25.12 have experienced a 20% increase since 2015 in comparison to the 4% rise across the wider aluminium industry.

Employment

The wider aluminium industry directly employs around 37,000 people across the UK. Figure 2 highlights how industry employment is distributed across the UK, with the darkest red areas accounting for the highest share of industry employment.

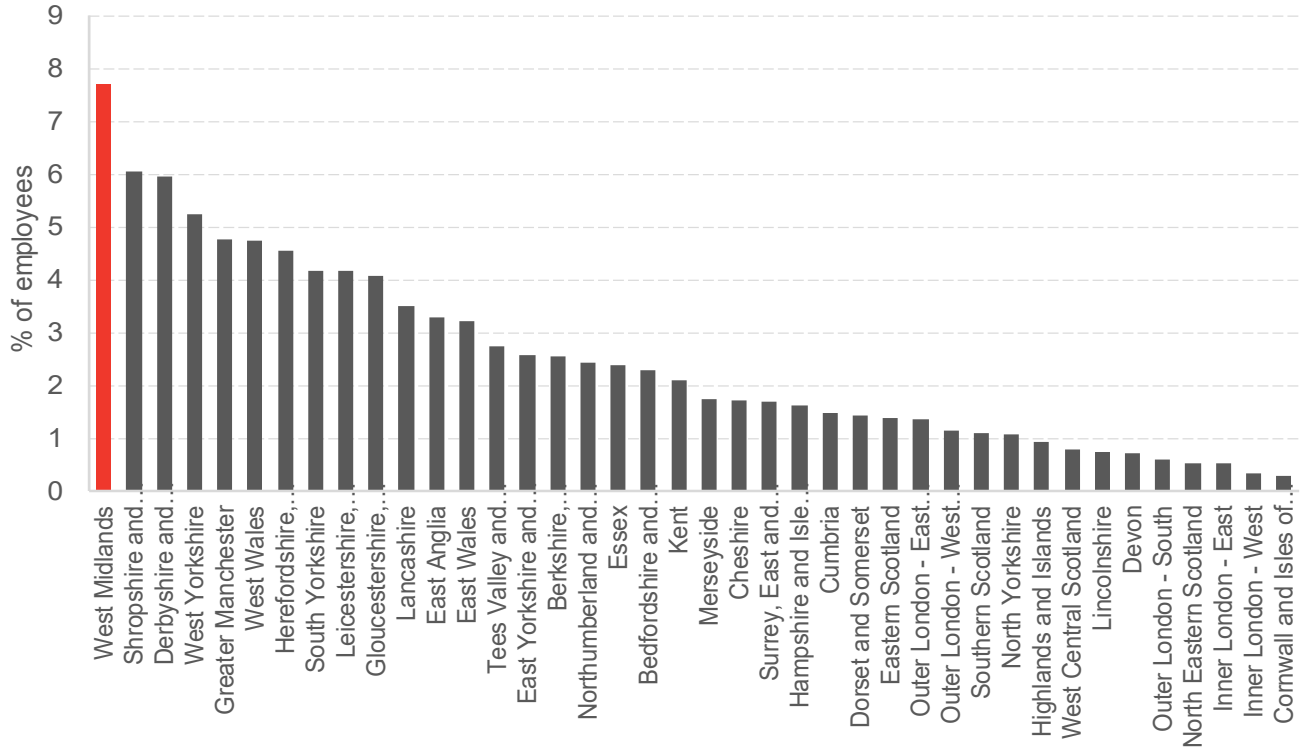
Diagram 1: Employment in the wider aluminium industry (count), NUTS2 level



Source: *BRES*

As can be seen below in Chart 2, the largest share of wider aluminium industry employment is located in the West Midlands. Approximately 7% of employees in the industry are located in the West Midlands at NUTS 2. Shropshire, Staffordshire, Derbyshire and Nottinghamshire are other regions where wider aluminium industry employment is concentrated.

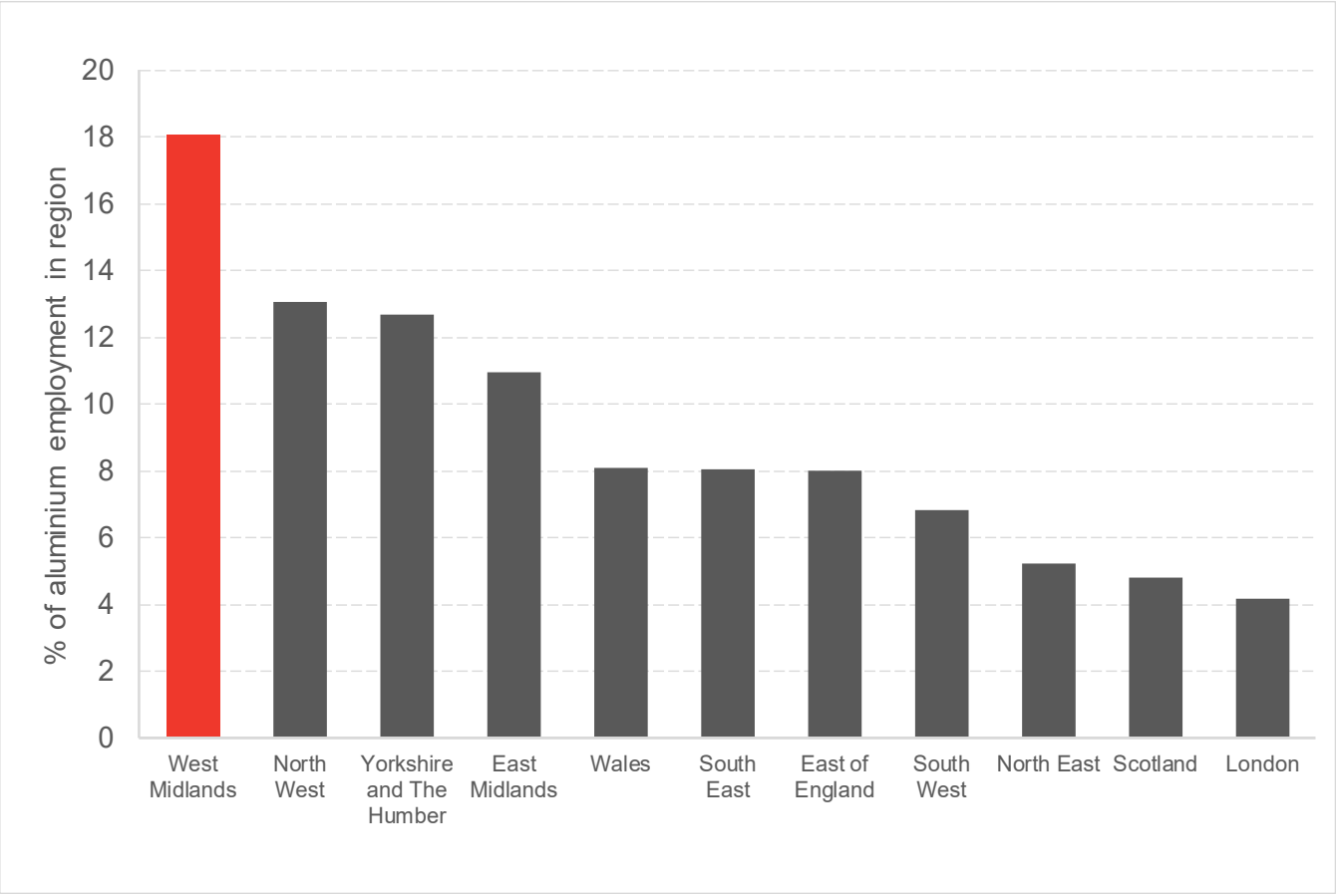
Chart 2: Employment in the wider aluminium industry (%), NUTS level 2



Source: *BRES*

At NUTS 1 the West Midlands includes NUTS 2 regions Herefordshire, Worcestershire, Warwickshire, Shropshire, Staffordshire, and the West Midlands. When employment is measured at this level of classification, the West Midlands accounts for around 18% of wider aluminium employment. The distribution of industry employment at the NUTS 1 level can be seen below in Chart 3.

Chart 3: Employment in the wider aluminium industry (%), NUTS1

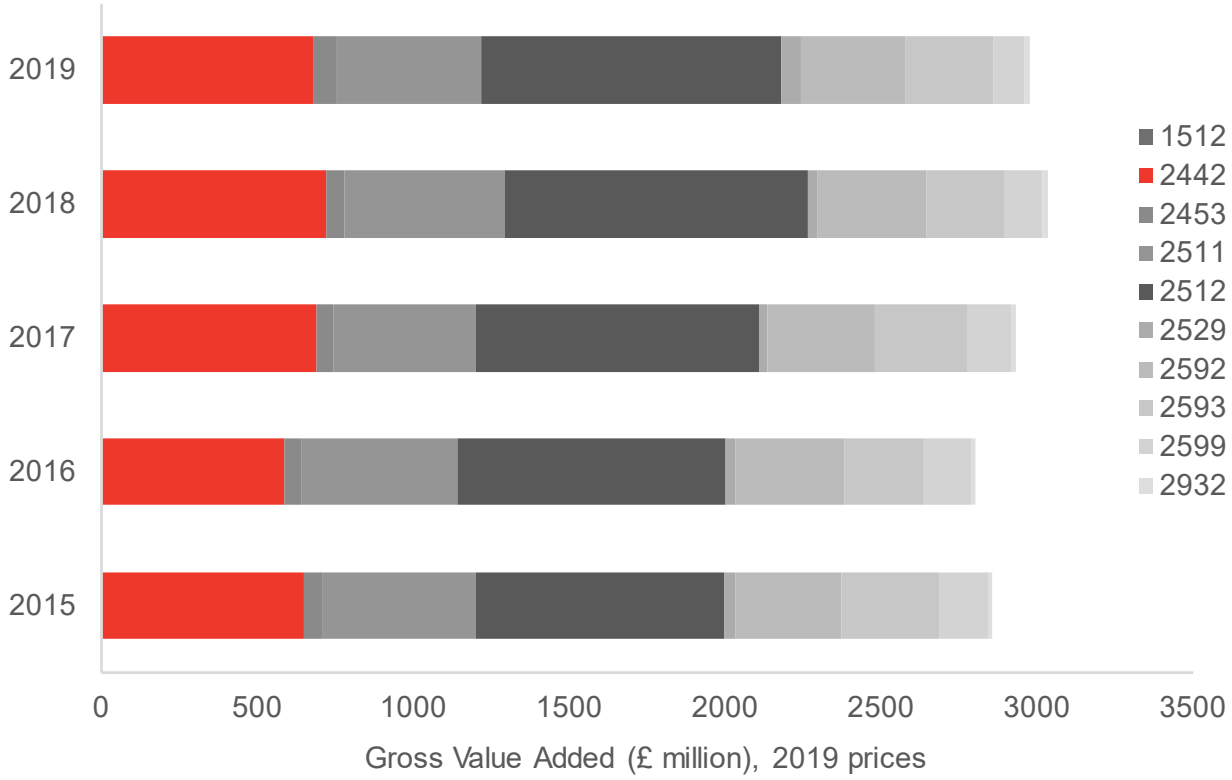


Source: *BRES*

Wider aluminium industry employment experienced a slow growth of around 8% between 2015 and 2018. However, the most recent data from 2019 reveals that employment decreased by 7% between 2018 and 2019. The change wider aluminium industry employment between 2015 and 2019 can be seen below in Chart 4.

Aluminium production (SIC 24.42) alone accounts for approximately 4,000 wider aluminium industry jobs. Employment in aluminium production grew by approximately 14% between 2015 and 2016 and since then has remained stable at around 4000 employees.

Chart 4: Employment in the wider aluminium industry (thousands)



Source: *BRES*

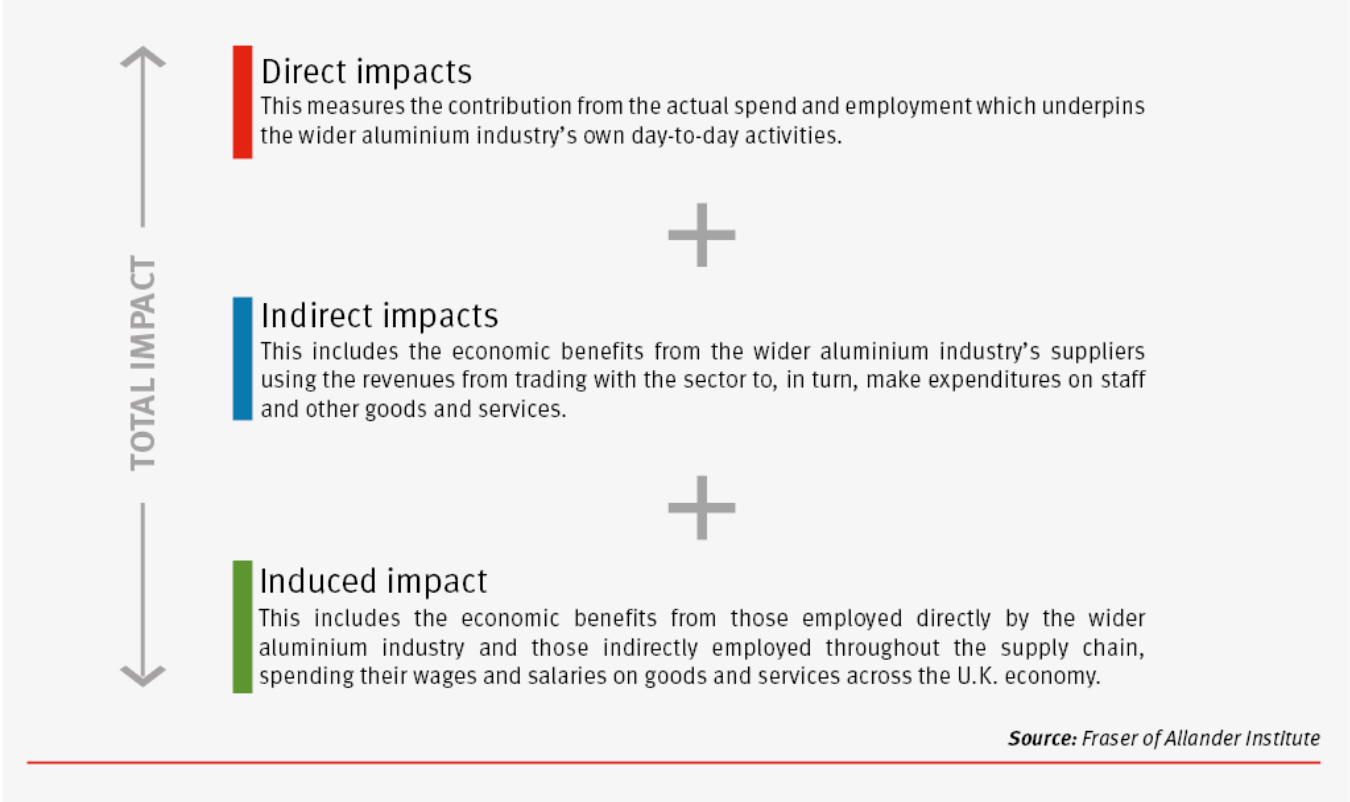
3. The Economic Impact of the UK Aluminium Sector

Using a hypothetical extraction model (HEM), the wider aluminium industry is theoretically removed from the UK economy. By observing and calculating the changes that take place when this happens, we can estimate the impact that the wider aluminium industry has on the UK economy as a whole.

In this section we estimate the importance of the wider aluminium industry to the UK economy.

Our model of the UK describes three different types of impact of the aluminium industry – direct, indirect and induced impacts.

Diagram 2: Direct, Indirect and induced impacts



Source: *Fraser of Allander Institute*

Results

Table 2 shows the economic impact to the UK economy in terms of GVA and employment supported by the wider aluminium industry in 2016. The wider aluminium industry directly contributes approximately £3 billion in GVA to the UK economy. This figure does not capture the indirect or induced impacts of the industry to the rest of the UK economy. When spill-over effects are included, the total contribution of the wider aluminium industry to the UK economy is around £ 6.8 billion.

Table 2: Economic Impact of the wider aluminium industry

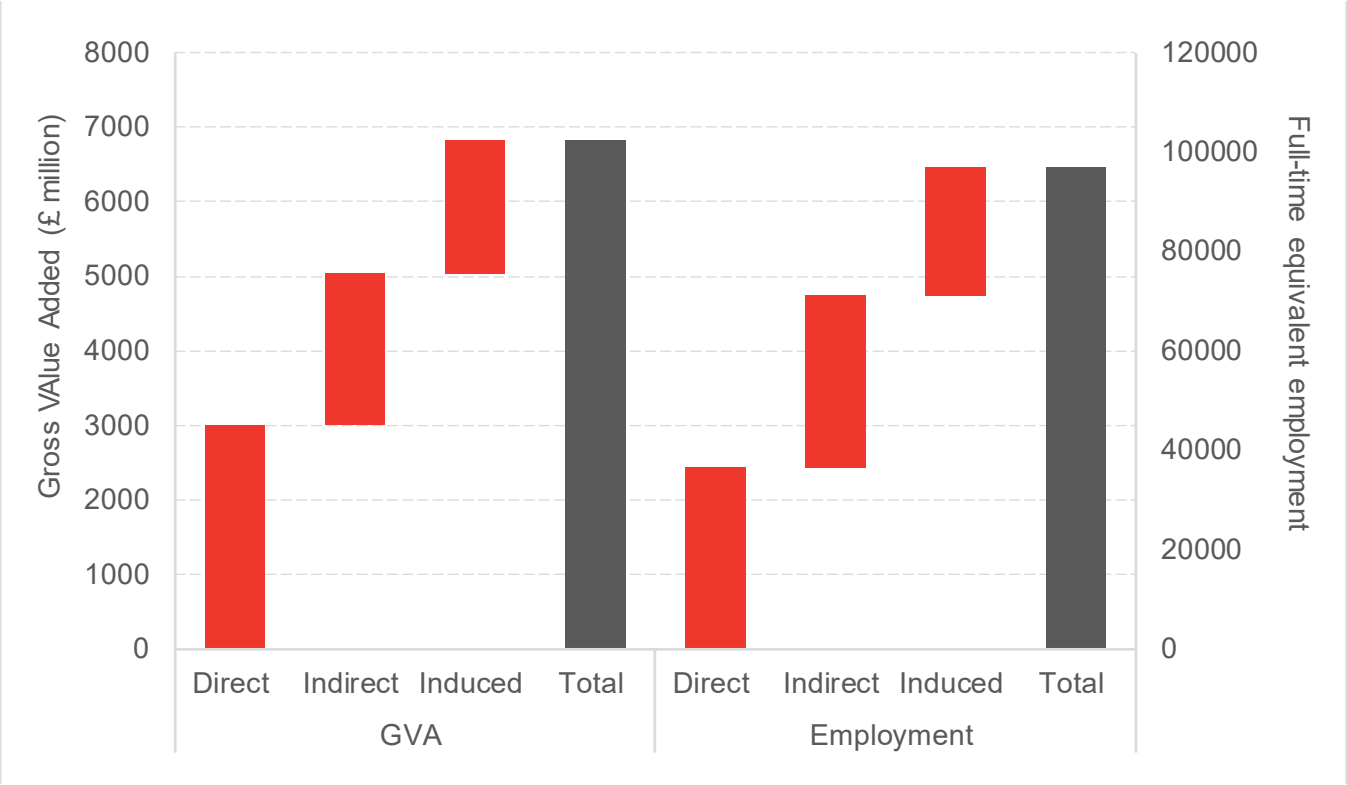
Impact	GVA (£ million)	Employment (FTE)
Direct	3,015	36,594
Indirect	2,029	34,693
Induced	1,791	25,697
Total	6,835	96,984

Source: *FAI Calculations*

When direct indirect and induced impacts are taken into account, we estimate that the wider aluminium industry supports around 97,000 FTE jobs.

Chart 5 illustrates the direct, indirect, induced and total economic impacts of the wider aluminium industry to the UK economy.

Chart 5: Economic impact of the wider aluminium industry



Source: *FAI Calculations*

4. Methodology

To our knowledge there has been no previous attempt to define the aluminium industry in a way that expands upon aluminium production. In consultation with ALFED, it became clear that there was a need to create a wider definition to encompass several domestically manufactured aluminium products that exist outside the narrow definition of aluminium production.

Defining the wider aluminium industry

The process of determining what could be considered as part of the wider aluminium industry had four steps:

- Step 1 SIC codes were used to identify sections of industries which were clearly aluminium. This included what we have already described as the narrow aluminium industry (SIC 24.42).
- Step 2 was to use the ONS UK Manufacturers' Sales by Product survey (Prodcom) to assess how much of a given SIC code could be allocated to the wider aluminium industry.
- Step 3 involved using harmonised system (HS) commodity codes which are used in HMRC overseas trade data. This data was used to estimate the share of a given 8-digit SIC that could be attributed to the wider aluminium industry code when Prodcom could not be used.

Three examples of this process are discussed below:

Example 1

SIC 25 - Manufacture of fabricated metal products

SIC 2512 - Manufacture of doors and windows of metal

SIC 25121050 - Aluminium doors, thresholds for doors, windows and their frames

By searching through Prodcom, we found that aluminium doors, thresholds for doors, windows and their frames (SIC 25121050) account for approximately 6% of total UK manufacturer's sales in SIC 25.

We determined that as the sales of this product account for 6% of sales, it was reasonable to assume that we could extract a 6% share of SIC 25's GVA and attribute it to the wider aluminium industry.

Example 2

SIC 29 - Manufacture of Motor Vehicles, Trailers and Semi-trailers

SIC 2932 - Manufacture of other parts and accessories for motor vehicles

SIC 29323040 - Road wheels and parts and accessories thereof

SIC 29323040 (41%)

The sales of road wheels and parts and accessories thereof totalled £96 million in 2019. Within Prodcom, SIC code 29323040 is noted to have the corresponding HS commodity code 870870 for overseas trade.

Due to the nature of overseas trade data and its use for applying trade tariffs, HS commodity codes often offer a higher degree of detail regarding what a product is made of. In this case HS 870870 is broken down into four subcategories, one of which is 87087050 (aluminium road wheels and aluminium parts and accessories thereof).

Using export data from 2019 it was possible to determine proportion road wheels and accessories exported that were aluminium. This figure was then used as a proxy for the share of domestic production that could be assumed to be aluminium.

Using this method, we were able to take a 41% share of the total UK manufacturer's sales for SIC 29323040 and attribute it to the wider aluminium industry.

Example 3

SIC 25 - Manufacture of fabricated metal products

SIC 2592 - Manufacture of light metal packaging

SIC 25921350 - Capsules of lead; capsules of aluminium

We found that sales of capsules of lead and capsules of aluminium (SIC 25921350) totalled £72 million in 2019. Within Prodcom there was no indication of the proportion of capsules that were made of aluminium. Attempts were made to use HS commodity codes in the same way as was described in example 3 above. When HS commodity codes did not offer a higher degree of detail, we concluded that there was insufficient data to determine a fair share of this SIC code that could be considered as aluminium.

Despite a share of this SIC being a good candidate for inclusion, data limitations led to this SIC code to not be included in our wider definition of the aluminium industry.

Estimating the economic indicators

ONS GDP(O) Low Level Aggregates data provide current price estimations of GVA for various SIC codes. GVA figures are often available at the 2-digit and sometimes at the 3-digit level.

The decision was made to take the most granular GVA data available and then to find the corresponding share of that SIC that was considered to belong to the wider aluminium industry.

Although a GVA figure was available for SIC 24, the data also included a figure for 24.4-5. Once we determined the share of 24.4-5 that could be attributed to aluminium, we calculated the GVA contribution of the wider aluminium industry that comes from SIC 2.4-5. An example of this process is shown below in Table 3.

Table 3: Determining GVA from industry shares

Total UK manufacturers sales in SIC 24.4-5	£ 3,163,240,000
Sales of aluminium products in SIC 24.4-5 (£ thousands)	£ 1,448,243,000
Share of total sales that are from aluminium sales	0.46
GVA of SIC 24.4-5 (£ millions)	£ 1,644,000,000
Share of GVA that can be considered as part of wider aluminium industry GVA	0.46
Wider aluminium industry GVA from SIC 2.4-5 (£ millions)	£ 752,681,267

Source: *ONS*

This process was reiterated for the remaining SIC divisions where aluminium products had been found. A total GVA figure for the wider aluminium industry was then calculated by aggregating all of the individual GVA figures.

Modelling the economic impact

Modelling the impact of the wider aluminium industry was carried out using the 2016 FAI UK HEM. This model removes wider aluminium industry from the UK economy and estimates the impact this would have on the surrounding industries in terms of GVA and employment.

GVA

GVA is the value of goods and services produced minus intermediate goods and services consumed in the production process. GVA is similar to GDP however a key difference is that GVA does not take into account taxes and subsidies i.e., GDP at basic prices

Employment

Employment here refers to full-time equivalent (FTE) jobs. One FTE job is equal to a single person working full-time hours or two people each working half the hours of a full-time worker over the same period.

HEM methodology

The 2016 FAI UK HEM is built using the UK government's input output (IO) tables. IO tables are often used to model supply chains and estimate multiplier effects in the economy. The Hypothetical extraction model is effective in estimating the impact to the economy of removing the economic activity of an industry.

A useful feature of the HEM is that it can be used to remove part of an industry and leave the remaining part in place.

This makes the HEM useful for modelling the impact of the wider aluminium industry as it is a composite industry, containing shares of multiple industries e, g., the manufacture of basic metals (SIC 24), manufacture of fabricated metal products (SIC 25), and manufacture of motor vehicles; trailers and semi-trailers (SIC 29). This model allows an examination of the spill-over effects that occur when sales and purchases of the wider aluminium industry are removed. The model compares the before and after states to estimate the importance of the industry to the UK economy.

The model is set up to extract shares of 2-digit SIC codes. For this reason, it was necessary to recalculate some of the 3-digit SIC shares. Table 4 shows the share of each individual 2-digit SIC industry that was taken and extracted by the 2016 FAI UK HEM. The combination of these shares is how we define the wider aluminium industry.

Using the shares of 2-/3-digit SIC codes, it was also possible to find employment statistics for the wider aluminium industry using the Business Register and Employment Survey (BRES). The BRES employment data was added to the FAI 2016 UK HEM to improve the accuracy of the model.

Table 4: 2-digit SIC shares that define the wider aluminium industry

2-digit SIC	Extracted share of 2-digit SIC
13-15	0.003
24	19.44
25	13.84
29	0.09

Source: *ONS*

5. Assumptions, limitations and next steps

Assumption 1

The wider aluminium industry as we have defined it is spread over multiple 2-digit and 3-digit SIC codes.

In order to estimate a GVA figure, a method was required to assess how much of each 2- or 3-digit SIC code's GVA figure should be taken.

This report makes the following initial assumptions about how the GVA share can be calculated:

- The share of 2-/3-digit SIC code that can be attributed to the wider aluminium industry can be found by dividing the total UK manufacturer's sales by the total aluminium product sales in the same 2–3-digit SIC.
- The share of a 2-/3-digit SIC code that can be considered as part of the aluminium industry, is an appropriate share to use when calculating the same SIC code's wider aluminium industry GVA figure.

An example of this process can be found in table 3 in the methodology section above.

Assumption 2

When data limitation made it impossible to take shares of 2-/3-digit SIC codes using only Prodcom, we turned to HS commodity codes from HMRC overseas trade data.

This process involved trying to find HS commodity codes which offered a higher degree of detail regarding what a product was made of. When a useful HS commodity code was found, we were able to calculate the share of exports in that product group that were aluminium products.

This report made the assumption that this share could act as a suitable proxy for the share of domestically produced aluminium products under the same SIC code in Prodcom. An example of this process can be found in example 2 of the methodology section.

Limitations

Limitation 1

We consider the GVA and employment figures given in this report to be the lower bound of likely estimates for the size of the wider aluminium industry. The lack of detailed data on domestically manufactured aluminium products is likely to have resulted in a significant underestimation of GVA and employment statistics.

A large number of products which we believe to be good candidates for inclusion in our definition, are due to data constraints, not included in these report's estimations.

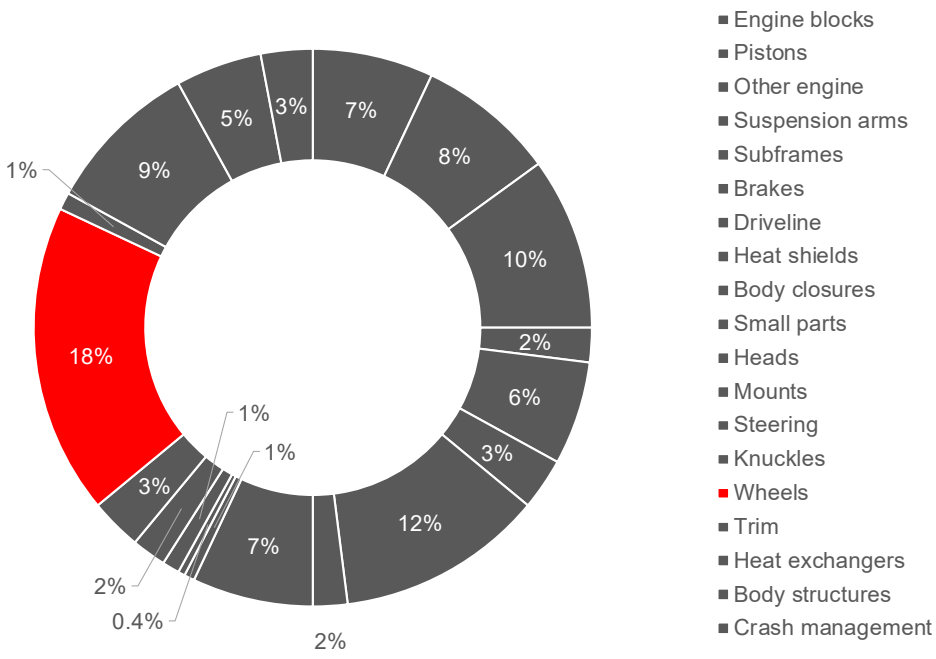
One example worth discussing is the numerous aluminium automotive vehicle components which could not be included. This report was able to quantify the GVA contribution that arises from the production of aluminium vehicle wheels. Due to data limitations, we were not able to account for any other automotive component.

A 2016 Ducker Worldwide report on the aluminium content in European cars estimates that road wheels account for approximately 18% of the aluminium content in an average European vehicle. This

report indicates that a significant proportion of the aluminium content vehicles is located in engines and engine components, suspension systems, body components, brakes, and heat exchangers.

Chart 6 highlights how this report could be greatly improved by including in our definition the remaining 82% of aluminium content in the average European vehicle.

Chart 6: Average aluminium component content per vehicle 2016 (total European car production)



Source: *Ducker Worldwide*

Limitation 2

It is important to discuss the limitations of this report in the context of the available data. There are two methods for classifying aluminium products used in this report:

- The first method involves using Standard Industrial Classification (SIC) codes. SIC codes are the classification system used in Prodcom.
- The second method of classification is the harmonised system (HS) commodity codes used in HMRC overseas trade data.

The two methods of classification are largely used for different end goals.

Prodcom is a survey of UK manufacturer's product sales, as such, it and the classification system it uses are geared towards the use of a given product. Put simply, Prodcom is less concerned about what a product is made from and more concerned about what it is made for.

HS commodity codes are primarily used in HMRC overseas trade data. Within this system products are categorized according to the material they are primarily made of. Aluminium products, for example, are in general located in Chapter 76. This data, however, does not allow us to estimate the size of the wider aluminium industry as it tracks imports and exports and does not include data for domestic production.

There is a considerable lack of harmony between these two sources of data which makes analysis of the wider aluminium industry challenging.

The current data landscape lacks a source of information which classifies products by the material they are comprised of and includes information on the level of domestic production. This is a considerable barrier to overcome when estimating the size of the wider aluminium industry.

Next Steps

As discussed above, our estimation of the size of the wider aluminium industry captures a small share of aluminium products manufactured for the automotive industry.

The first step in developing a better understanding of the importance of the aluminium industry should be to focus on aluminium use in the UK automotive industry. This could include surveying stakeholders in the UK automotive industry in an attempt to quantify the aluminium content of various products within SIC 29. Future research may also consider widening the search for aluminium products to include aerospace and shipbuilding

Additionally, this report has focused on the value aspect of aluminium production and products. A different perspective could be gained by viewing the aluminium industry in terms of tonnage produced. Taking a different perspective may help to overcome some of the data limitations present when taking a value approach to determining economic indicators and the impact of the industry on the UK economy.

6. Conclusion

This report has attempted to go beyond the narrow definition of the aluminium industry and define the wider aluminium industry. This definition takes into account the economic contribution of aluminium products that would be ignored by defining the industry as only aluminium production.

In the UK, the wider aluminium industry directly contributes around £2.97 billion in GVA. Once spill-over effects are taken into account, this amount increases to approximately £6.8 billion in GVA.

The wider aluminium employs across the UK, with a significant concentration of those employed being located around the West Midlands. Approximately 37, 000 people are directly employed by the wider aluminium industry and once spill-over effects are taken into account, we estimate the industry supports a total of 97,000 FTE jobs.

We believe these estimates represent the lower bound of the size of the aluminium industry. Future research which incorporates a larger share of aluminium products manufactured by the UK automotive industry, will allow for a more accurate account of the strategic importance that the wider aluminium industry has to the UK economy.

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