Department for
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FUTURE CAPACITIES AND CAPABILITIES OF THE UK STEEL INDUSTRY

BEIS Research Paper Number 26

Technical Appendices

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This study was conducted by a Grant Thornton UK LLP-led consortium including Hatch Consulting and the Materials Processing Institute. The consortium received support from a steering board containing representatives from the UK steel sector, including: British Steel, Celsa Steel UK, Liberty Steel, Tata Steel UK and UK Steel (the trade association for the UK steel industry). The views expressed in this report are those of the organisations interviewed as part of this research and the Grant Thornton UK LLP-led consortium; they are not necessarily the views of BEIS.

We would like to thank the UK steel producers and the many people and organisations who contributed to this study. Their invaluable participation and feedback throughout the project helped ensure that this was a comprehensive undertaking and provides a robust assessment of the future capacities and capabilities of the UK steel industry.

Table of Contents

1. Appendix 1: Approach & Methodology

Introduction

Overall introduction

The dynamics of the global steel industry have changed significantly in recent years. From the peak reached in 2011 to the start of 2016, the price of steel has more than halved, with contributing factors including overcapacity at a global level, weaker demand in Europe and expanded supply from China.

The steel industry in the UK is already under significant pressure from these forces – as demonstrated by the closure of SSI UK's Redcar steelworks in 2015.

The UK Steel Council – comprising UK government, devolved administrations, industry, unions and trade associations – aims to consider how industry and government can strengthen the capability and competitiveness of the UK steel sector. A number of 'asks' have already been delivered on energy costs, guidelines on public procurement of steel, environmental regulations and trade measures. The UK Steel Council identified a further ask of government to:

Comprehensively map the current capability of the UK sector, identify the future opportunities for steel products in new and existing sectors and markets, and examine how to overcome potential challenges or barriers preventing industry from diversifying and meeting future demand.

In direct response to this ask, the Department for Business, Energy and Industrial Strategy (BEIS) commissioned a consortium led by Grant Thornton and including Hatch Consulting and the Materials Processing Institute to undertake this research.

The research revolved around three broad questions:

- Question 1 – What is the current capability of the UK steel sector?
- Question 2 – What is the future of UK steel demand by product and consuming sector?
- Question 3 – What are the barriers that prevent the UK steel sector in its current state from having the capability to meet this future demand?

This report provides the detailed findings from the research and analysis undertaken in response to each of these research questions. Given the inter-relationships between the three questions, this report is structured in five main sections. We begin by providing an overview of the methodology we implemented in order to deliver this study in this section. Following this, the report then splits into four broad sections and has been drafted in such a way that each of the sections can be read in isolation, if so desired:

- Appendix 2 – Provides a macro view of the steel industry looking at: the history of ownership, true and apparent demand, per capita steel consumption and a comparison between the steel industry in the UK and Germany.
- Appendix 3 – Looks through the sector lens and examines – by individual sector – historical demand by sector, forecast demand and then provides a synthesised

overview of the views of key stakeholders within the sector around the UK's capability, capacity and associated barriers.

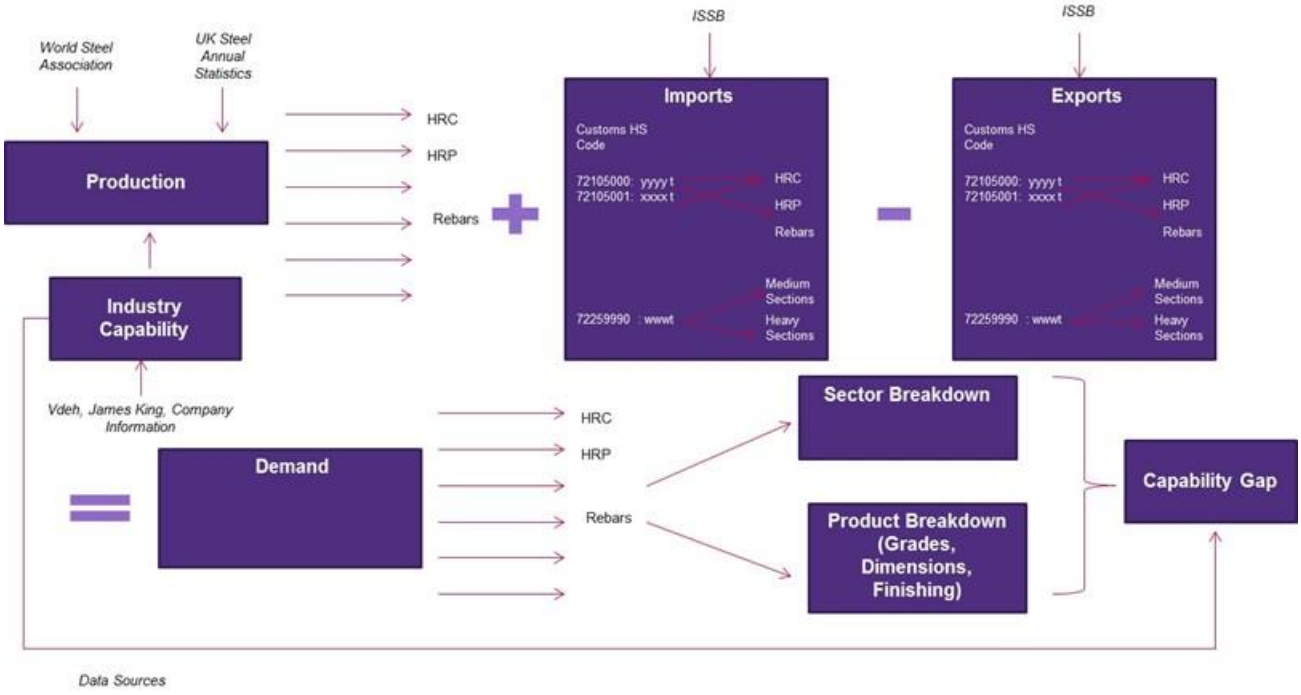
- Appendix 4 – Mirrors section 3, but rather than undertaking the analysis by sector this section looks at it by product.
- Appendix 5 – Provides an overview of the different barriers that are currently preventing the UK steel sector from meeting the future demand identified.
- Appendix 6 – Provides an overview of the interview allocation and supply chain maps used to identify interviewees.
- Appendix 7 – Includes example topic guides used in the stakeholder engagement.
- Appendix 8 – Provides an overview of the capacity and capability analysis.

Q1 Methodology – Historical Demand

Objective

The objective of the question is to provide a current baseline against which to assess the capabilities in UK steel production. This establishes a baseline of sector capabilities, demand by product and sector and supply. It must also examine how and why the steel industry's capability has evolved to produce the products it currently does. This output and findings from the section have been used as a basis to determine a suitable representative mix of sectors and interviews in Q2 and to test and validate the emerging hypothesis and fill in any information or market intelligence gaps.

Exhibit 1: Methodology



The above template describes the approach and methodology adopted in Q1. The demand for each finished steel product was estimated by using the formula:

Demand = Production – Exports + Imports

Long Products	Rebars, Wire Rods, Sections (light [<80mm], medium [80–200mm] & heavy [>200mm]), Merchant Bars, Rails, Engineering Steels
Flat Products	Hot Rolled Coils, Cold Rolled Coils, Coated Sheets, Organically Coated Sheets, Tinplate, Hot Rolled Plates
Others	Open Die Forgings (ODF), Seamless Tubes, Stainless Steel

Each of these products has been further split by different technical criteria determined from asset capability boundaries. An example illustration for plates has been provided below

Exhibit 2: Illustration for plates split by technical criteria

Plates split by Grades
General Structural Grades
HSLA
Pipeline Grades
Wear Resistant Grades
Ultra High Strength
Pressure Vessel Grades
Shipbuilding Grades
Atmospheric Corrosion Resistant Grade

Plates split by Finishing
As rolled
Normalised
Thermo mechanically Rolled
Quench and Tempered

Plates split by Thickness
<10 mm
10-20 mm
20-50 mm
50-100mm
>100mm

Plates split by Width
<2000 mm
2000-3500mm
>3500mm

Steel, as defined in this study, refers to finished steel produced by various UK steel producers. This does not include steel which is fabricated, processed or converted downstream such as welded pipes, fabricated structures, wires. This definition of steel is aligned to the business of the stakeholders of UK Steel who are envisaged to be the main consumers and beneficiaries of this study.

Data Availability and Limitations

There are many data sets available in the public domain, which encompass demand, production, imports and exports of steel. In these data sets, the definitions of steel products and its classification are not perfectly aligned to the requirements of the

methodology in the study. Alongside this, there is no standardisation of data classification. Therefore, the data reported is almost exclusively based on finished steel. Further details or sub-classification of finished steel as per criteria illustrated in previous pages are almost non-existent. This therefore poses some unique challenges for a study of this nature. As a consequence, the available data had to be recast and reallocated to make it 'fit for purpose' for the study. In order to achieve this, informed assumptions had to be made which were drawn from:

- Asset capabilities
- Producer's sector focus
- Product list
- Previous experience of similar studies
- Validation from steel industry experts

In addition, this information was tested and validated during the interview process.

It is possible that the computations of demand, production, imports and exports of steel in this report may differ from those reported in the public domain. The differences can be attributed to differences in definition, reporting data error, double counting or inventory build-up.

Methodology Description

Industry Capability

As a first step, we mapped the asset capabilities in the UK by capacities and capabilities differentiators. Asset capabilities are differentiated on parameters such as grade groups, dimensional range, tensile strengths, finishing conditions and coating. These capabilities determine the boundaries and extent of what a producer could supply to serve a sector or a range of sectors.

Production

The historical steel production numbers were sourced from World Steel Association (WSA) Statistical Yearbooks, Key Statistics for UK Steel compiled by Iron and Steel Statistics Bureau (ISSB). The data was further validated by anecdotal reporting of production numbers from time to time by Metal Bulletin and Platts. The production numbers reported by WSA and ISSB are not aligned to the product definition. Wherever such gaps were noted, we made informed assumptions on the production based on market intelligence, asset capabilities, producer's stated product and sector focus, product brochures and previous experience of similar studies. The assumptions were then sense checked and validated with our steel industry experts.

Imports and Exports

The reported imports and exports were sourced from ISSB. The trade data is reported on a broad high-level classification. For example, trade data reports all sections >80mm depth as heavy sections. However, in our approach we have defined medium sections as those between 80 and 200mm depth and heavy sections of depth >200mm. Aligning the reported trade data involved assumptions on the breakdown of the trade data based on market intelligence and previous experience of similar studies.

After the production and export numbers were compiled, we computed the local deliveries (production less exports) breakdown by capability boundaries. The findings were again sense checked and validated with our steel industry experts.

Demand Breakdown by Sectors

The demand breakdown by sectors was done on a desktop basis. There are no reliable sources which provide demand breakdown by sectors, customised to the requirements of any study. Consequently, we adopted a different approach to estimating the demand breakdown by sectors. As a first step, an approximate sector breakdown was done using a combination of previous experience of similar studies and comparable sector breakdowns from comparable markets such as the EU and North America. In the second step, adjustments on the sector breakdown were made on the basis of specific UK-based indicators, such as construction spend, automotive production, share of local content in automotive production, oil and gas production, pipe production, steel consumption per capita.

After finalising the sector breakdown, the breakdown of product was computed on applicable parameters. This was done using our previous knowledge of steel markets and comparable breakdown from other developed markets. Again, similar to previous steps, these findings were sense checked and validated with steel industry experts in Grant Thornton such as the following:

Name	Experience
Uday Chaturvedi	Uday is a globally recognised specialist in the manufacturing and steel industry, having held senior positions in India, Europe and Asia on behalf of Tata Steel, with significant experience of global leadership, transformation projects and a proven track record in successful value creation. Managing international teams through his highly successful career at Tata Steel, he led the major turnaround and transformation of the Strip Division UK at Tata Steel (4 Mt p.a.) in 2008–2010. He has vast experience in commissioning facilities with specialisation in steel making, casting, rolling and finishing. As the Chief Technical Officer of Tata Steel Europe, Uday had operational responsibility for three integrated steel plants producing up to 12.0 Mt p.a. Uday has been the board member at a number of global manufacturing organisation, including Tata Steel UK and Corus.
Ian Phillips	Ian joined the then British Steel in 1978 and spent 34 years in the steel industry, retiring in 2012 from his role as Director Operations at Tata Steel Port Talbot. His final remit at Tata Steel covered all primary operational activities managing key aspects of the capex, which latterly included overseeing a complete blast furnace rebuild and installation of a vessel cooling system, allowing significant energy benefits to be achieved. Prior to this, he was responsible for all steel making, casting and refractory activities at Llanwern steel works and following the primary end closure was responsible for regeneration, which included sale of assets, environmental remediation, demolition and associated security functions

Robert Bizell	Robert spent 44 years in the steel industry in a number of financial and senior management roles at a variety of locations, including Port Talbot, Llanwern, Ravenscraig, Shotton, Skinningrove and IJmuiden. His last role was as Finance Director – Tata Strip Products UK. He has led a number of strategic reviews for British Steel and its successors

Hatch has done a number of similar studies for clients in the steel industry on conducting similar demand estimation, detailed demand mapping by sectors, grades, dimensions, finishing, coating etc., in different regions of the world – EU, US, Middle East, China, SE Asia, Russia, India, South America and Africa. Hatch is very experienced and familiar with conducting such demand sector breakdowns and is able to compare and contrast the findings with its previous experiences in such studies.

Value

For value computation, we relied on the reported prices of finished steel in Platts and Metal Bulletin. The price data series had limitations and they were available for most products dating back to 2000. For certain products such as heavy sections and rails, price series are not reported. We had to rely on proxy trends from other markets or rely on previous experience of similar studies to compute comparable price series. Additionally, we also factored in suitable extras which producers typically charge for sizes, grades, coating etc. The value was computed as per value = volume x price.

Capability Gap

The breakdowns of demand and net local deliveries were then compared on the basis of criteria identified for each product. From this, we isolated the gaps between the two. We then analysed the reasons for each of these gaps, such as lack of capacity or lack of technical capability, supplier diversification, operating costs.

Q2 Methodology – Sector View

The second question in this study looks to address what the future UK steel demand by product and sector will be. In answering this, there are two separate elements. The first is a quantitative estimate of future UK steel demand and estimates of consumption by UK supply chains. The second element involved a large-scale qualitative research exercise where different organisations were interviewed to gain their views on the current and future capabilities of the steel industry in steel-consuming sectors. This section provides an overview of the approach and methodology employed.

Methodological Considerations

Before providing the detail on the methodology it is important to set out the main methodological issues and challenges that we identified at the outset and have shaped the approach used. These issues are common to many other studies of this kind and the academic literature recognises that there is no 'silver bullet' for addressing them.

Bias

Throughout the project we were keen to avoid two main types of bias. The first type of bias is in relation to non-responses from certain stakeholder groups, or elements within particular stakeholder groups. In order to avoid this, we have taken measures to ensure our sampling takes account of all key stakeholder groups within steel-consuming sectors.

More detail is provided in the sampling section below. The second type of bias relates to the responses to questions given by individual stakeholders. In order to mitigate the negative impact of this, as part of our analysis we have reflected on the variance in and between stakeholder groups. Alongside this, we have tested the level of weight that can be placed on each finding through use of industry experts. These individuals have vast experience working in the steel industry and have played a key role in the project by (i) directly conducting interviews, and (ii) acting as a sounding board for the findings of this. This enabled us to identify any vested interests or viewpoints put forward with a particular agenda in mind. As such, where findings or conclusions are presented without accompanying commentary, it can be assumed that these are unaffected by issues or bias.

Reach and Engagement

Linked to the issue of non-response bias it was important that the evaluation reached the full range of stakeholders and did not just engage with the 'usual suspects'. As such, our approach focused on the breadth of different stakeholder groups and sub-groups at the expense – in part – of the level of depth that would be gained from one particular sub-group. Further information is provided in the sampling section that follows.

Stakeholder Fatigue/Burden

It was essential that the study was mindful of stakeholder fatigue and overburdening those willing to participate. For many of the stakeholder groups, time was given up for the study which was not part of their 'day job'. As such, it was important that time was used most effectively. In order to manage and mitigate stakeholder fatigue and burden, several measures were implemented: (i) ensuring there were no other similar requests for information from other industry groups; (ii) being clear from the outset the amount of time needed to conduct the interviews and the content that would be covered; (iii) use of topic guides during interviews to ensure they were focused and the key topics were covered.

Sampling

It was agreed with the client that there would be 100 interviews conducted in total. This would cover UK-based steel producers, industry bodies and steel-consuming organisations in seven supply chains: Aerospace, Automotive, Construction, Nuclear, Oil & Gas, Rail, and Renewable Energy. These interviews also needed to provide sufficient coverage of the 14 steel products investigated: Rebar, Sections, Wire Rod, Merchant Bar, Engineering Steels, Rails, ODF, Plates, Hot Rolled Coils, Cold Rolled Coils, Coated Products, Tinplate, Seamless Tubes, and Stainless Steel.

To ensure there was sufficient and proportionate coverage of both product and sector, a sampling framework was established. The first step in this process allocated interviews across sectors. 2015 steel production data (both Mt and $ value) was observed for each of the 14 products to calculate the proportion of total UK production they represented and then matched to those sectors where consumption occurs. This provided an initial allocation of the 100 interviews across both producers and the seven observed consuming sectors. Based on Steering Group and Industry Expert insight, these figures were adjusted to take into account anticipated future growth opportunities for steel in the UK. After some minor adjustments based on the views of industry experts, consensus was agreed that this allocation provides a reasonably proportionate distribution.

The second part of this process was to provide an allocation of interviews within each of the sectors. This would ensure views were gained from all relevant groups within each sector and not succumb to non-response bias. It is important that the study reached the full range of stakeholders and did not just engage with the 'usual suspects'. For example, tier 1 and tier 2 organisations in the automotive supply chain may provide different insights to a large original equipment manufacturer (OEM). By engaging with all relevant stakeholder groups, findings would be more reflective of the sector. As such, our approach focused on the breadth of different stakeholder groups and sub-groups at the expense – in part – of the level of depth that would be gained from one particular sub-group. For each sector, a complete supply chain map was constructed to ensure that the complete end-to-end value chain per sector is captured in the study. This enabled the study to successfully engage with the full range of steel producers and consumers as well as trade bodies and labour unions in the UK. An overview of these supply chain maps is presented in appendix 6.

Having constructed a supply chain map for each sector, we then identified those businesses and organisations that we believe should be prioritised in each sector for the stakeholder engagement. This was not a scientific process and given the volume of interviewees, any findings will not be statistically significant and representative of a whole sector. As such, we have focused on breadth rather than depth and have used a range of criteria to identify those businesses and organisations that will provide:

- Representation across the sector supply chain – we allocated interviews in each sector along the supply chain.
- Representation of different-sized businesses – we identified and ranked businesses within each stakeholder group by revenue. The revenue data (obtained from Bureau van Dijk for the most recently available year) allowed us to identify those businesses with the greatest revenue – where steel consumption decisions are likely to have the greatest impact on future demand (assuming revenue is a proxy, albeit an imperfect one, for steel consumption) – as well as some businesses with lower revenues, to gain a range of perspectives around future steel consumption decisions and how expectations compare for both larger and smaller businesses.
- The required inputs for the demand forecast model – we worked closely with Hatch to ensure that interviewees were those that were likely to be able to provide us with the required inputs for the steel demand forecast model, e.g. steel intensities and anticipated production outputs.
- Focus on those with influence – We also incorporated sector-specific knowledge to allocate more/fewer interviews to those stakeholder groups that are likely to have more influence over steel demand decisions in future and therefore more insight in the pre-engagement questionnaire and interview responses. Please see some examples of this narrative below.

This approach enabled a targeted list of contacts to be formed who were then engaged with.

Appendix 6 includes the interview allocation across sectors, actual number of interviews held across sectors, number of interviewees relevant to each product and supply chain maps identifying the key groups within each sector.

Interviews

To ensure the maximum participation of the identified interviewees, we conducted interviews through both face-to-face interviews and telephone interview format. Thirty of the interviews were face-to-face interviews and the remainder were conducted by telephone. Where interviewees were identified as 'key stakeholders', these were led by our consortium industry experts. Using these industry experts helped to extract more information from interviews and added value to what the interviewees were able to tell us. The remaining interviews were conducted by analysts. To reassure interviewees that commercially sensitive evidence was handled in confidence, it was agreed that evidence provided by interviewees would be fully anonymised in report findings, such that it is non-disclosive. This decision was made on the basis of a desire to enable and encourage respondents to speak openly as well as not wanting to limit potential engagement.

Pre-Engagement Questionnaire

The stakeholder engagement process comprised of two parts: (i) a pre-engagement questionnaire (PEQ), and (ii) the interview process. The PEQ was used to gather the quantitative information needed to provide inputs into the demand forecast model. This information was sent to those organisations that had been identified as part of the sampling framework. The individual would then complete the information in the PEQ and return it to the project team. In addition to providing the quantitative inputs for the demand forecast model, it also helped to inform the discussion during the interview.

Topic Guides

It was essential that the evaluation was mindful of stakeholder fatigue and over burdening those willing to participate. To ensure this was the case, a topic guide was formed which included a list of semi-structured questions to guarantee interviews were focused, consistent and ensured time was used effectively. While there was a core set of questions for all interviewees, separate topic guides were created for each of the seven sectors. This allowed minor amendments where required to ensure questions were applicable and relevant for that sector. The producer topic guide differed slightly in that it also included an additional set of questions specific to producers in addition to the core set that were provided to all interviewees. The final set of topic guide questions received scrutiny from our consortium, industry experts and BEIS analysts before being piloted with several interviews. After some minor amendments following the pilot interviews, the topic guide was approved by the steering group.

The core structure of the topic guide consisted of the following themes:

- Background information on respondent organisation
- Current and future levels of steel consumption
- Methods of procurement of steel
- Future steel intensity, technical specifications and materials substitution
- UK steel competitiveness

Topic guides for the construction and automotive sector are provided in Appendix 7.

Analysis

To synthesise the range of different types of evidence emerging from the interviews and written responses, a central matrix was created to identify key findings across sectors and products. This approach provided a clear overview of the evidence and enabled the identification of recurrent themes and patterns in the data. It also enabled us to assess whether we were achieving input from the breadth of sectors and stages of the supply chain necessary for this research and allowed us to increase participation with certain groups in a couple of occasions when needed.

In synthesising the results, we were able to triangulate the findings between stakeholder groups to enable more weight to be placed on the evidence and findings. Alongside the process of triangulation, we have also tried to reflect on the level of variance within particular stakeholder groups and across sectors. Variance is not necessarily a positive or negative but it does need to be acknowledged, either in highlighting strong consensus or helping identifying any outliers.

Where findings have been expressed based on evidence gathered through the qualitative element of the study, we have footnoted these points in the main body and provided further information in an annex at the end of the report. For each footnote, information is provided on the number of interviewees that stated these points, the proportion this represents of the total number of interviewees where that particular steel product or industry sector is relevant, as well as some basic information on the type of organisations that indicated these views (without contravening the anonymisation agreed as part of their participation).

While it is difficult to assess the extent of a particular issue based on interview responses alone, the order that these are presented in for each sector or product broadly represents the order in which they are perceived to be the largest issues in that sector. This is based on the number of interviewees that raised these issues in their response.

The requirement of the study to look through both a sector and product lens has brought certain challenges. With the interview topic guides designed from a sector perspective, it has also been necessary to attribute responses to each of the steel products as well. To ensure credibility and robustness of our findings, we have been careful throughout the analysis to only attribute responses to particular steel products where these points have been raised specifically to them. For a number of reasons, this has not always been possible (even with prompting) and views have been more ‘general’.

To overcome this, we have looked to attribute responses to specific products in two ways. First, sending additional follow-up questions to those organisations we had already interviewed to try to gain further information that will aid this. This approach gained some further information from organisations but on the whole had limited success and even some push back due to the time interviewees had already committed to the study. Second, we have utilised the expertise of the consortium’s steel experts to allocate these responses where possible. This has enabled us to further attribute comments to products and better utilise the evidence gathered.

Given the breadth of the study’s objectives, sectors covered and number of product types looked at, it is inevitable there will be circumstances where only a few interview respondents have stated a particular specific view. Despite some points having more consensus than others – for example, a point is raised by five interviewees whereas another is raised by one – it does not mean the latter should be discounted. Indeed,

depending on the nature of the respondent more weight could be placed on the one response. In addition, and to ensure that key points are identified, we have run all the information through the consortium's steel experts. This process has provided additional validation and insight.

Throughout the interview analysis we have been careful to only include views that were stated about specific products.

Q2 Methodology – Demand Forecast

Objective

This section addresses the forecast demand for finished steel in the UK up to 2030. It does this by illustrating the key drivers for these changes in demand and how these changes manifest themselves through the outlook for different sectors. The forecasts will also address the change levers resulting from changes in regulatory environment and shifts in technical specifications and material substitution. The forecasts allow us to take a longer-term view of the demand outlook and understand where the key opportunities, challenges and barriers are for UK steel.

Exhibit 3: Q2 Forecasting Methodology

Volume Forecasts

- Sector Breakdown
- Changes in sector/ subsector breakdown
- Influence on demand breakdown by grades and dimensions
- Steel usage intensity (where applicable)
- Forecasting to be done at a product level and then aggregated to finished steel

Price Forecasts

- High level price outlook for major raw materials for steelmaking
    - Iron Ore
    - Coking Coal
    - Scrap

In developing the demand forecast, there are two separate elements.

The first is a quantitative estimate of future UK steel demand by volumes. This involved a large-scale qualitative research exercise where different organisations, stakeholders and consumers were interviewed to gain their views on the current and future demand and capabilities of the industry. The interview findings were combined with desktop research to build up a bottom-up forecast of demand.

The second element involved developing price forecasts for finished steel. Specific to price forecasts, we took the approach that the steel industry will continue to remain very competitive in the long run. Therefore, any changes in finished steel prices will reflect the changes in marginal production costs which are mainly prices of steel-making raw materials – iron ore, coking coal and scrap.

A. Volume Forecasts

The forecasting methodology involved the following steps:

- The findings and the output of Q1 were used to shape and guide the questions in the PEQ and Topic Guide.
- The forecast model was built on a bottom-up basis from the demand sector output of Q1. For each of the sectors, the respective drivers which influence demand were identified. Examples are provided below:

Products	Sectors	Drivers
Heavy Sections		Industrial Construction, Private Commercial Buildings, Public Non-Housing Commercial Buildings, Infrastructure
Coated Sheets	Automotive	Automotive Production Forecasts by: Change in local content in auto production EU emissions target 2030 Automotive lightweighting trends and changes in steel intensity per vehicle Shift to higher strength grades Substitution
	Construction Tubes	Industrial Construction, Private Commercial Buildings, Public Non-Housing Commercial Buildings, Infrastructure Downgauging
	White Goods Drums and Tanks Radiators and Cabinets Machinery	White goods production trends and forecast UK Manufacturing Index

The input requirements of the forecasting model were used to shape the PEQs, such as steel intensity per vehicle, steel specifications (width, thickness, grades, strength, coating), yield losses, change in steel intensity in 2020 and 2025, business outlook up to 2020, 2025 or whatever best available.

1. The changes in the drivers were then computed from:

   Responses received in the PEQs and the Topic Guides.

   Forecasts available from public domain on oil & gas production, automotive production forecasts by vehicle category, construction spend forecasts, nuclear decommissioning spend, infrastructure spend, investments in power generation, investments in renewable, aircraft delivery forecasts, industry position papers on future paths for auto lightweighting, developments in increase in power generated per wind tower etc.

2. These changes were then used to build the volume forecasts on sector and product basis which was then aggregated to compute the demand forecasts.
3. Data sources: A wide array of data sources were used to guide the forecasts, which range from Experian's forecasts on construction spend, Oil & Gas UK, IMF, World

Bank, Institute of Fiscal Studies and ONS for forecasts of macroeconomic indicators, Wind Energy Scenarios, ADS for aerospace industry forecasts, SMMT for automotive forecasts etc.

4. In instances where forecasts from public domain and business outlook in the PEQ responses have not been available until 2030, we have relied on historical trends, global trends and these have been triangulated with subjective inputs from industry experts.
5. Alongside the base case, two alternative demand scenarios – low case and high case – were also developed to test the sensitivities of the forecasts to changes in sector drivers.
6. For Forecasted True Demand 2030, it was computed by using ONS population forecast of UK 2030 71.3 million x 250 kg per capita steel consumption equals 18.0 Mt steel.
7. Price Forecasts: Steel prices mirror the price trends of its key raw materials and inputs. As a guiding principle, long products, seamless and stainless steel products will mirror scrap price movements while flat products will mirror iron ore and coking coal price movements. This is because in developed regions of the world, including the UK, production of long products, seamless and stainless dominated by scrap-based EAF route while flat products are dominated by integrated blast furnace route. In forward forecasting the prices for steel, the changes in the applicable raw material prices were used to direct the trajectory of long-term steel price movements. In addition we also reviewed the spreads between finished steel prices and scrap or raw materials basket. (Definition: Spreads is defined as the delta between steel prices and main raw materials basket such as scrap or iron ore + coking coal). In particular the spreads for rebars, wire rods, plates, and hot rolled coil declined sharply in 2015. Hatch's view is that on a long-term basis, such low spreads are not economically sustainable. Hatch's assessment and views are that these spreads are likely to improve compared with 2015 and these improvements have been factored for 2030 prices.
8. Sector-based approach (Example)

   An example of the described approach for the automotive sectors is outlined below for reference.

   - Automotive production forecasts in the UK were sourced from SMMT. We noted that these forecasts have not been updated or factored for EU exit effects
   - The production forecasts from SMMT were provided until 2025. No change in production levels was assumed between 2025 and 2030 forecasts and production assumed to remain constant at 2025 levels.
   - The steel use per vehicle was synthesised from PEQ responses. Wherever the PEQ responses were incomplete, we referred to Automotive subject matter experts to guide us on the steel intensity.
   - Based on PEQ inputs, there are no anticipated changes in steel intensity per vehicle up to 2020. This is consistent with the development cycle of 5–7 years for each model.
   - Any anticipated changes in steel requirements will be effective beyond 2020.
   - The EU emissions targets for 2020, 2025 and 2030 were reviewed. These emission targets were validated by automotive subject-matter experts.

- As a next step, we reviewed future paths for auto mass lightweighting in a position paper released by the Advanced Propulsion Centre. The future paths were compared with previous experience of lightweighting in publications from WorldAutoSteel Vehicle Mass Benchmarking as well as lightweighting targets being pursued in other countries such as the US.
- We reviewed local content in UK automotive production which is currently at 40–45%. We noted that no major investments have been announced for expansion of auto supply-chain capabilities in the UK, although the Automotive Council in the UK has expressed a strategic direction to increase the intensity of the UK auto supply chain.
- Using these above inputs, the demand for steel in automotive sector was computed as:
  ((Steel intensity per vehicle x production forecast per year)/yields) x % local content in UK

  Further to this, we have factored in a lightweighting factor, which was smoothed out as an annual percentage between 2021 and 2030.

9. Value Forecasts

   Value = Price£/t x Volume

   The demand forecasts provided the inputs for the volume numbers.

Q3 Methodology – Barriers Analysis

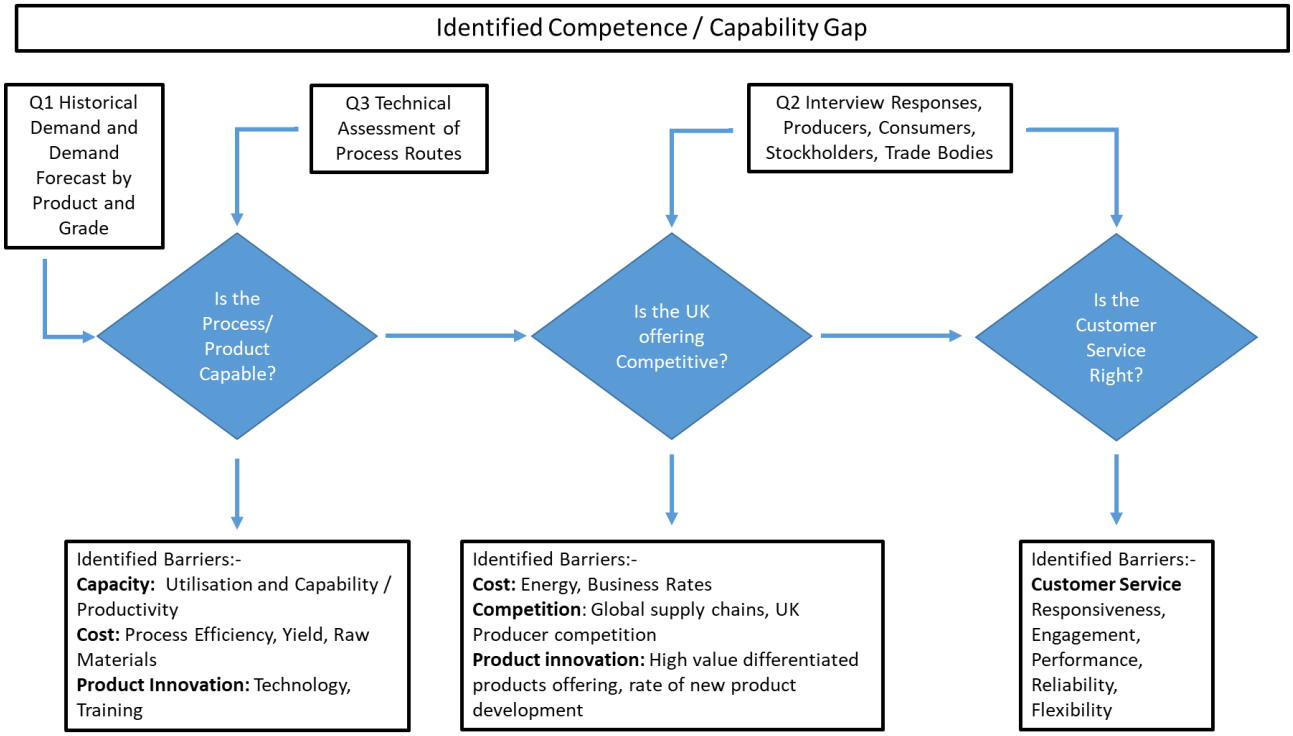
Identification of gaps and limitations of the UK steel sector's offering in its current state that lead to barriers to meeting future demand.

The main objective of the final question in the study was to synthesise the demand data and the interview evidence and identify gaps and limitations within the UK steel industry's current capability. As well as this evidence, a technical assessment of the current UK process routes capabilities to meet each product grade's gauge, strength and quality requirements was required. Key questions that these three data sets answered were:

- In which products/sectors does the UK have significant capability and/or capacity gaps?
- Does the UK steel industry have spare capacity or latent capability?
- In which key high-value product grades does the future product demand overreach the current supply from within the UK?
- Where in the existing process routes is the production of these products within the technical design capability and where is it without?
- The relative extent to which cross-cutting industrial cost-competitiveness issues are affecting the UK supply in products and sectors
- What other factors such as customer service and global supply chains are limiting capability to supply?

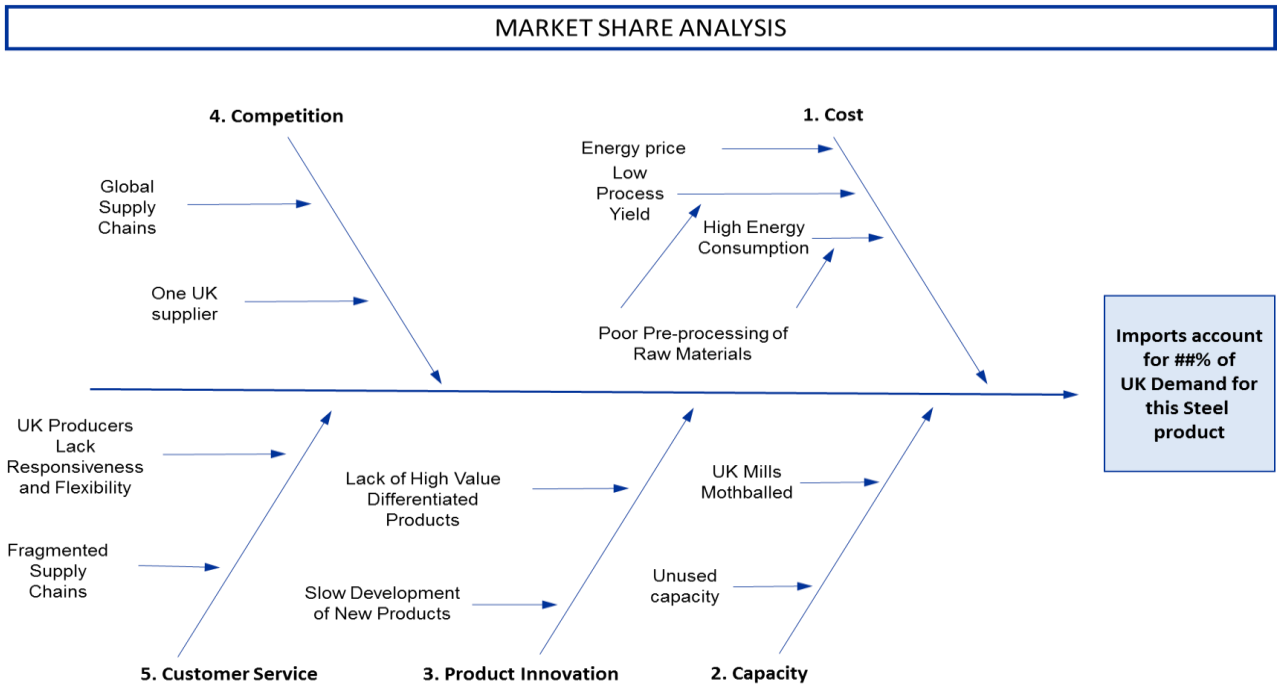
This methodology, and how it draws on the previous two study questions, is summarised in the competence/capability process flow chart contained within the figure below.

Exhibit 4: Identified Competence/Capability Gap



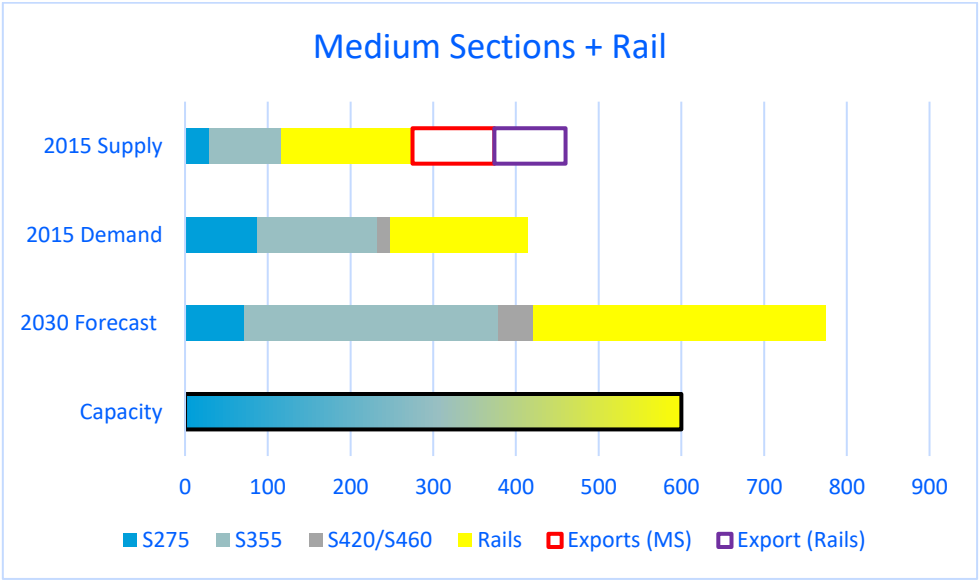
The outcomes of the barrier analysis are shown by use of an Ishikawa diagram contrasting the effect of capacity, competition, cost, customer service and product innovation as shown below.

Exhibit 5: Market Share Analysis



A volume overview for each process route of current supply and current and forecast demand against current capacities was created. These highlight the number of UK producers and the shared cross-product nature of several process routes as well as the volumes of product grades that are not currently supplied from within the UK. An example for the rail/medium sections supply within the UK is given below.

Exhibit 6: UK Rails/Medium Sections Supply



The volume overview shows that the UK can comfortably produce enough of this product to meet the current demand but by 2030 the demand is forecast to outstrip the single producer's current capacity. This increase in demand is due to significant growth in rail and

growth in medium sections coupled with migration to a certain grade (S355). Also, the UK demand for rail is almost wholly supplied from the UK whereas in medium sections, one grade cannot be supplied (S420/S460) and in the other two grades (S355 & S275) the UK has a ~60% and ~35% market share respectively.

Assessment of how the barriers to a UK steel sector with increased capability could be overcome in the future.

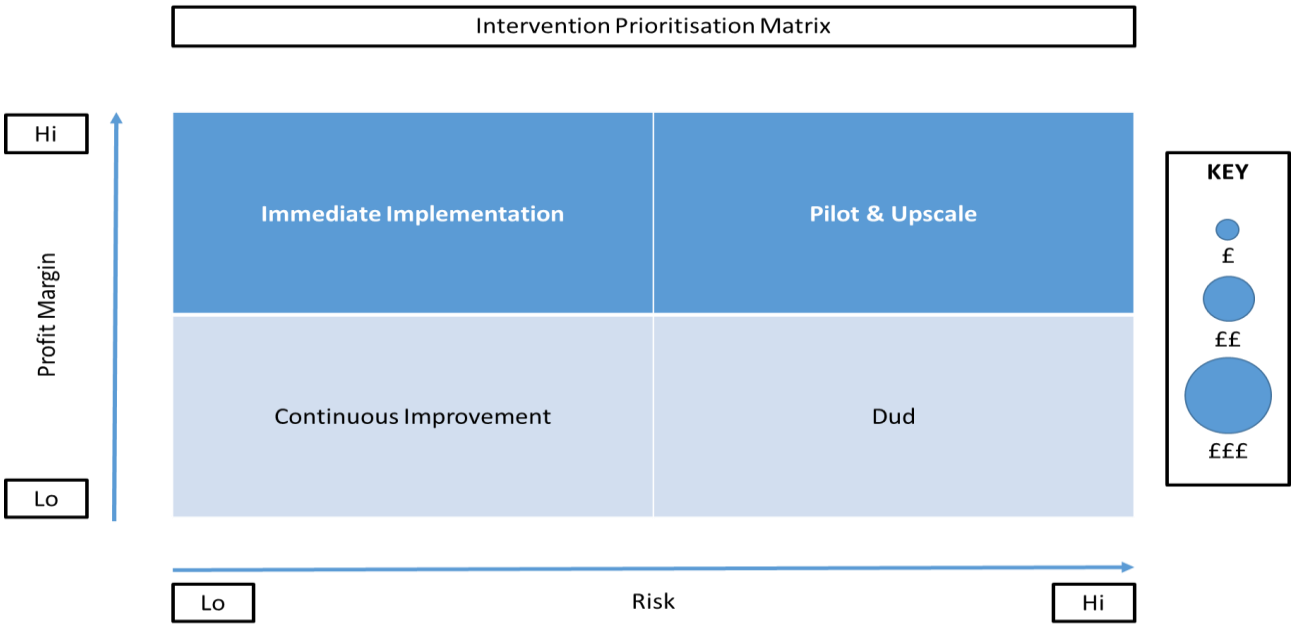
A feasibility assessment including interventions for the most severe limitations (considering where such limitations impact on multiple product lines and where their removal would bring the biggest increase in capability to meet future product demand) for each of the 14 identified product areas was undertaken. This assessment identified the root causes of these limitations, taking into consideration historical capital investment decisions, overall product mix, logistics, work force and machine capability, global competitive influences and barriers to entry (particularly financial).

Strategies for closing the gaps where identified. Such strategies include interventions such as capital equipment replacement and modification, development and installation of new technologies, improvement in process monitoring and control, workforce training, improvement in customer service through for instance delivery performance and a greater understanding of customer need.

The possible interventions identified were compared using intervention prioritisation matrices for each product, as multiple options exist. The relative estimated financial requirement, anticipated return and risk are used as metrics to aid prioritisation.

The intervention matrix has axes of risk and return with order of magnitude costs (1–100s of millions) for the proposed intervention indicated as shown below.

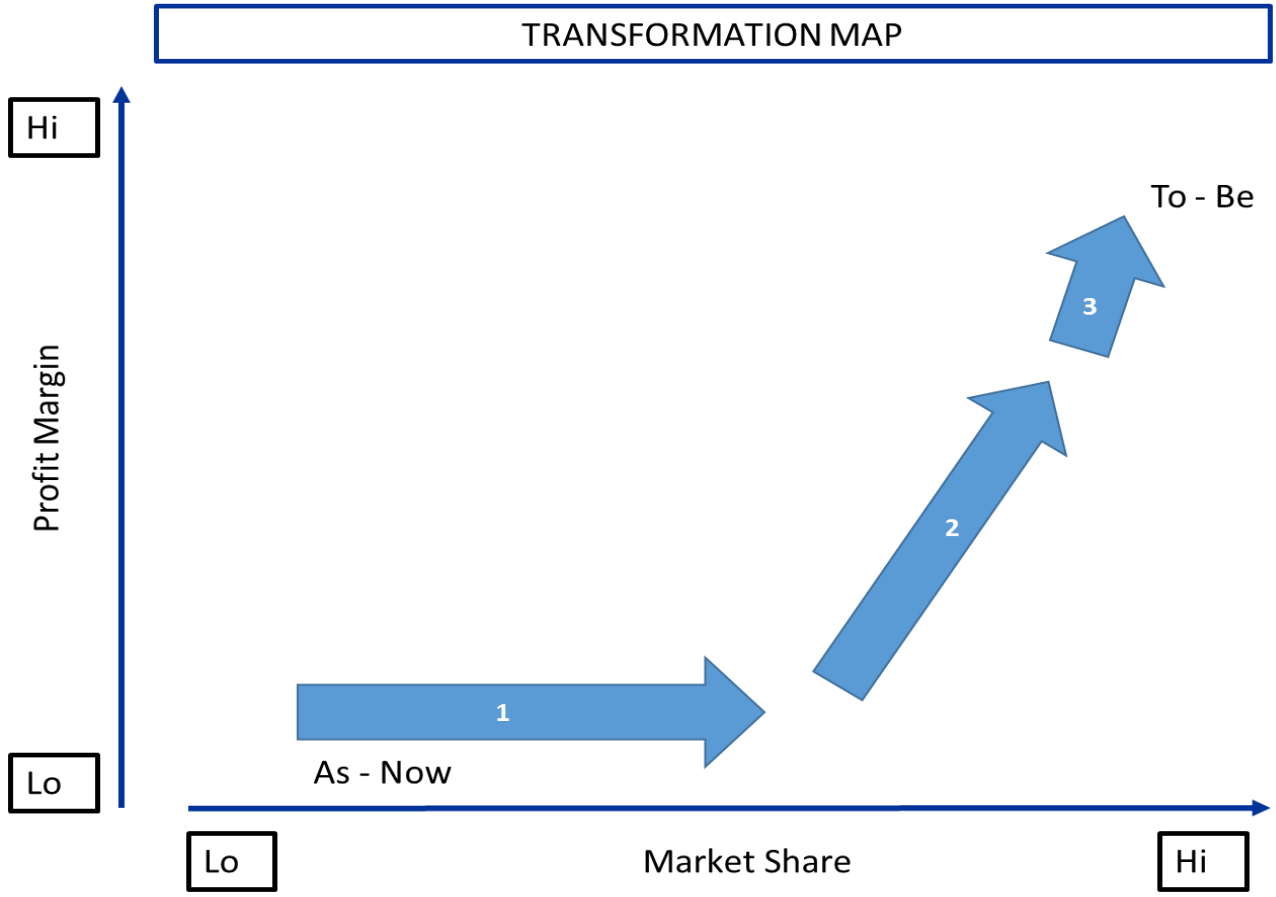
Exhibit 7: Intervention Prioritisation Matrix



The competitive performance improvement (estimate) in each product that could be

expected by implementing the identified high-priority strategies to improve capability are shown in transformation maps based on profit margin and market share, below.

Exhibit 8: Transformation Map

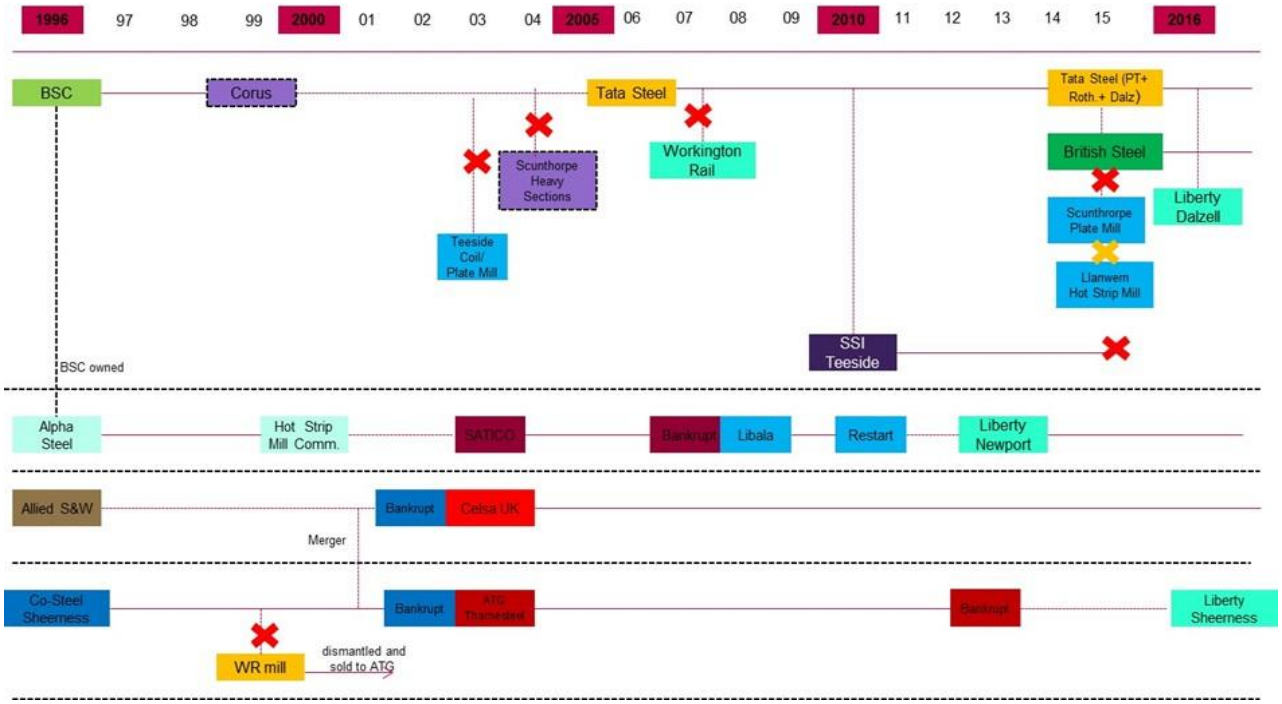


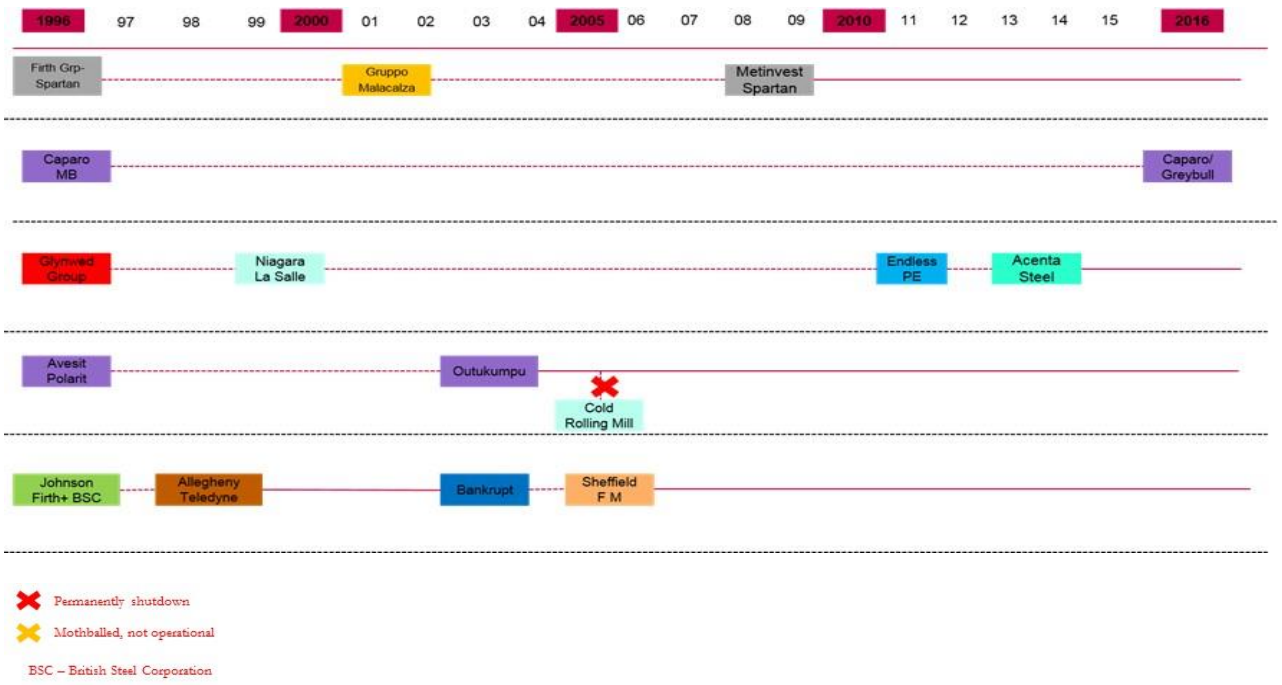
2. Appendix 2: Macro View of the UK Steel Industry

Introduction

This appendix provides a macro view of the UK steel industry through a range of different lenses. This includes a history of ownership of the UK steel assets; and analysis of true and finished steel demand; an exploration of imports and exports; an analysis of per capita steel consumption; and a comparison of the steel industries in the UK and Germany.

Exhibit 9: UK Steel Assets – History of Ownership





Source: VdeH, James King, Company Information

The exhibits above and on the previous pages show the changes in ownership of steel producers and various instances of shutdown and mothballing of assets in the UK since 1996. It tracks how the steel-producing assets in UK have changed ownership, merged, been divested or even dismantled and exported.

The history of ownership change, financial distress and bankruptcy in the UK steel industry is almost unique and unparalleled for an industry with such a rich legacy and history.

Almost every single asset has undergone changes in ownership. The long products assets in Scunthorpe, now known as British Steel, was previously owned by the British Steel Corporation and has seen three ownership changes prior to its current owners, Greybull Capital. Acenta Steel, which came into existence as a result of a management buyout, had seen three previous owners. Caparo Merchant Bars appears to be a rare exception, although it sold a partial stake in the company to Greybull Capital in March 2016.

Much of the change in ownership was a result of bankruptcy or financial distress. The Tata acquisition of Corus was a result of its strategic intent to acquire scale, globalisation and an entry into European markets.

However, we see little evidence of any transformative effects on the steel industry or its ability to arrest the overall decline in production, net imports or capacity utilisation rates. In the past 20 years, crude steel production has declined by 39% and the UK has changed from a net exporter of 2.0 Mt to a net importer of 2.0 Mt. The contraction in crude steel production is a direct consequence of reduction in demand and exports of steel from the UK. The UK steel industry has transformed from a reasonably consolidated one, with Corus and Tata Steel controlling 85% of steel making as recently as 2010, to a largely fragmented industry with some relatively new incumbents.

Exhibit 10: Crude Steel Production in UK (Mt)

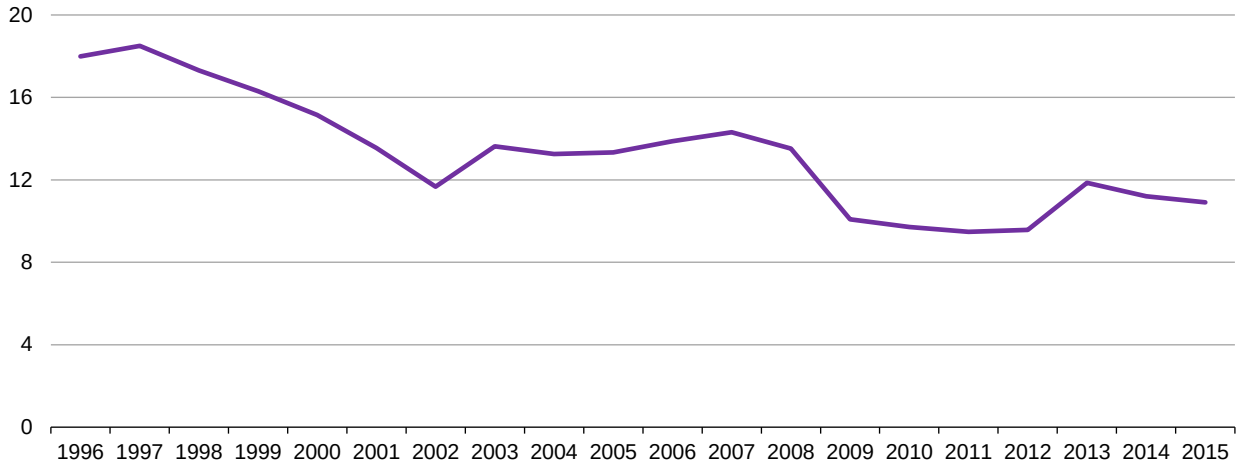
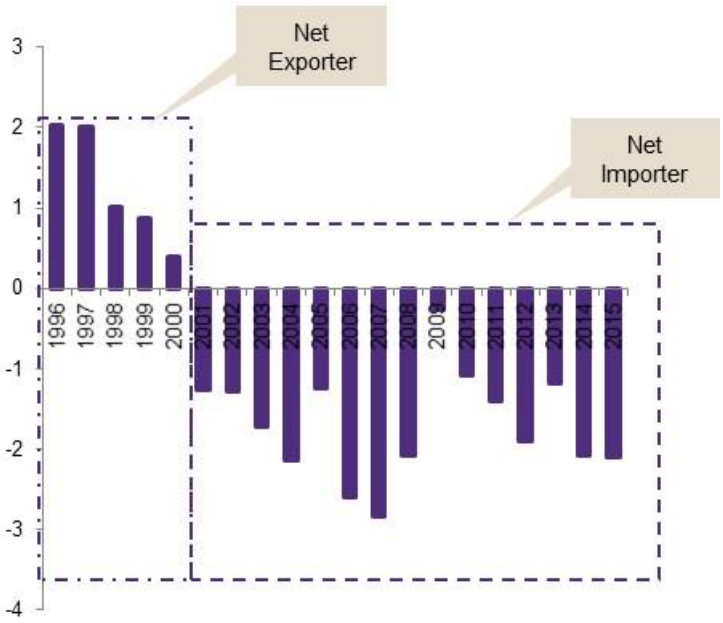


Exhibit 11: Net Trade in Steel in UK (Mt)



Source: WSA, ISSB

True Steel Demand and Finished Steel Demand

Steel is consumed in construction, automotive, machinery, appliances etc. In addition, a country also imports products and equipment manufactured from steel in different forms.

True steel demand aggregates the demand for finished steel which is transformed into manufactured and fabricated products in country and the demand for steel contained products such as appliances, light and commercial vehicles, machinery, ships, rolling stock, process equipment, internal combustion engines. The true steel demand is a better indicator of the total steel consumed in the UK.

Universally, it is not possible for the full extent of true steel demand to be transformed in a country. In a globalised world of free trade underpinned by comparative advantage, steel contained products will always be imported. In the UK context, it is important to study this distinction between apparent and true demand as these display very divergent trends and point to a structural issue which challenges the steel industry.

In the period between 2000 and 2015, finished steel demand has contracted by 34% but true demand has increased by 4.4%. Since the crisis, true demand has grown by 7% p.a. while in comparison finished steel demand has seen growth of 4.7% p.a.

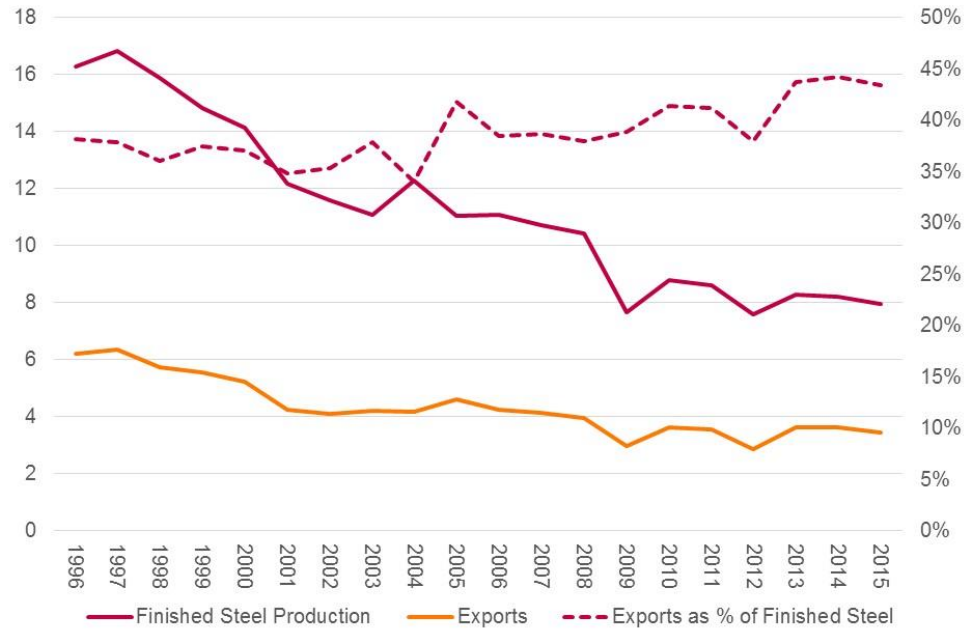
This implies that, although true demand for steel has recovered and is on a growth trajectory, the full benefits of this growth have not accrued to the steel industry in the UK.

Exports of Finished Steel from UK

While an in-depth review of potential export markets was outside the scope of this study, we are able to draw some insights from the analysis conducted.

Exports of finished steel are an important part of the production mix for UK producers. In volume terms, exports have tracked the trends of finished steel production. Both finished steel production and exports have contracted by nearly half between 1996 and 2015.

Exhibit 12: Finished Steel Production and Exports in UK (kt)



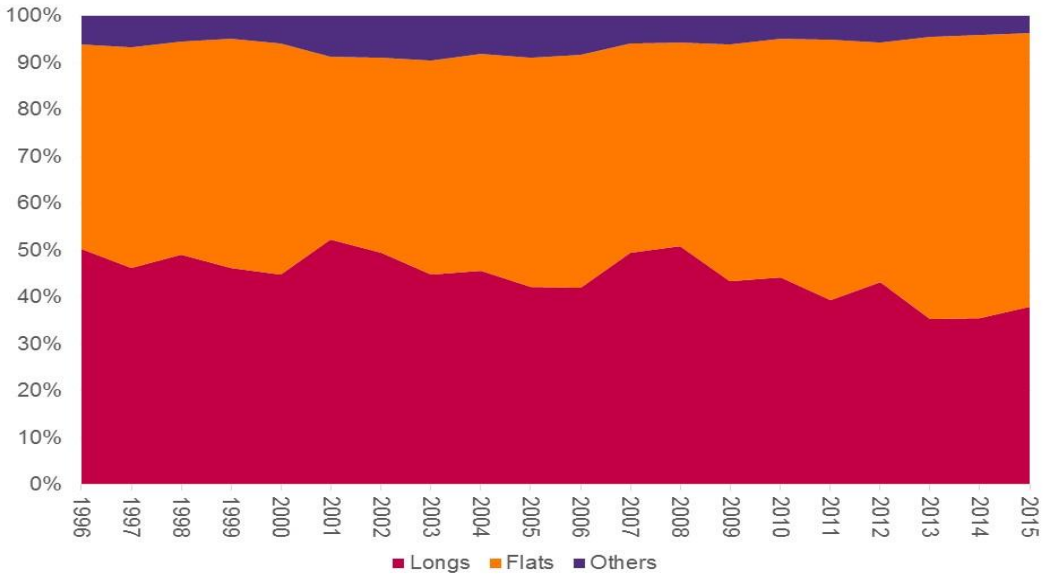
Source: ISSB, Hatch

There are two key trends in exports:

a.) UK currently exports 43% of its production of finished steel. This share has increased in recent years, particularly after the financial crisis in 2008. Prior to 2008, the share was about 35–39%.
b.) The share of flats has increased in total exports from 32% to 44% between 1996 and 2015, while the share of longs has decreased from 50% to 38%. In some finished steel such as wire rods and engineering steels, exports are more important to the production mix and the capabilities are better suited to markets overseas as

compared with the UK. In case of other finished steel, exports are pursued to achieve production volumes and spread the fixed costs.

Exhibit 13: Share of Longs, Flats and Other Finished Steel in Exports



Source: Hatch

Export opportunities are pursued by UK producers for a number of reasons:

- To maintain production volumes to sustain their facilities and help spread the fixed costs
- Alternative markets for production because domestic demand has contracted
- Responding to hollowed-out supply chains and following the migration of customers
- For some limited finished steel, such as wire rods, engineering steels, rail, exports are pursued because they are well accepted by end users as quality products.

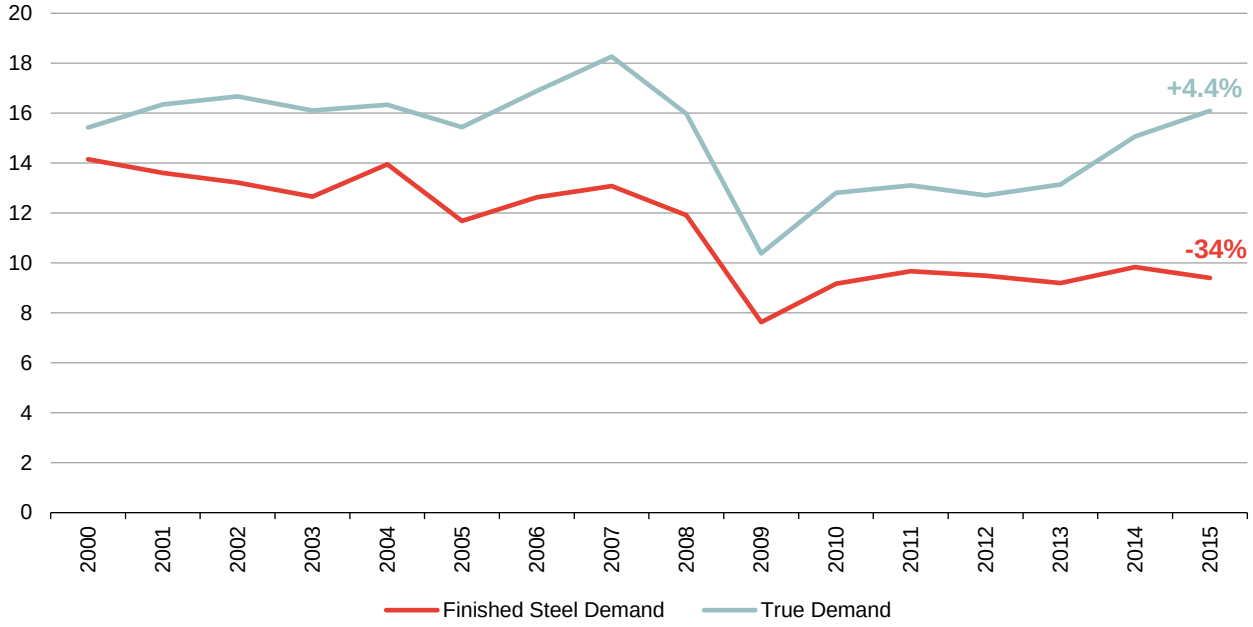
Exhibit 14: Exports as a share of finished steel production

	UK	Germany	Italy	Spain	USA
Exports as % of finished steel production	43%	57%	58%	62%	10%

The above table compares UK's exports share with other large steel producing countries in the EU and USA. Compared with other EU countries, UK exports (43%) are lower than Germany (57%), Italy (58%) and Spain (62%). Although there is likely to be a geographic component to this, there are also disadvantages from lack of cost competitiveness and gaps in capabilities in the industry.

The past trends indicate that exports will in all likelihood continue to play an important part in its production, and producers in the UK will rely on leveraging the linkages with the EU markets and customers to support its business.

Exhibit 15: True Steel Demand and Finished Steel Demand in UK (Mt)



* True Demand =Finished Steel Demand + Indirect Imports of Steel – Indirect Exports of Steel
Source: ISSB, Hatch

Exhibit 16: Steel Equivalent of Imports and Exports of steel contained manufactured goods in UK

Structures, Fasteners, Wire Products, Metal Container, Household Goods, Other Metal Goods, Cutlery (Mt)

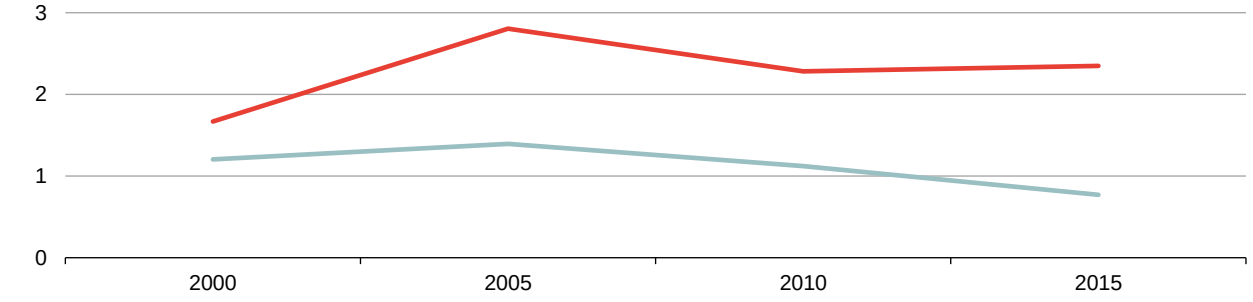


Exhibit 17: Machinery – Agricultural, Tractor, Power Gen, Parts for Machinery, Mechanical Handling Equipment (Mt)

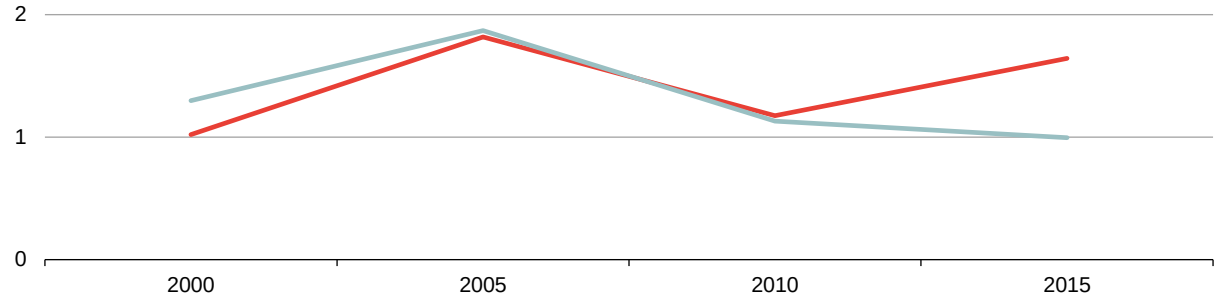


Exhibit 18: Cars, Commercial Vehicle, Vehicle Parts, IC Engines (Mt)

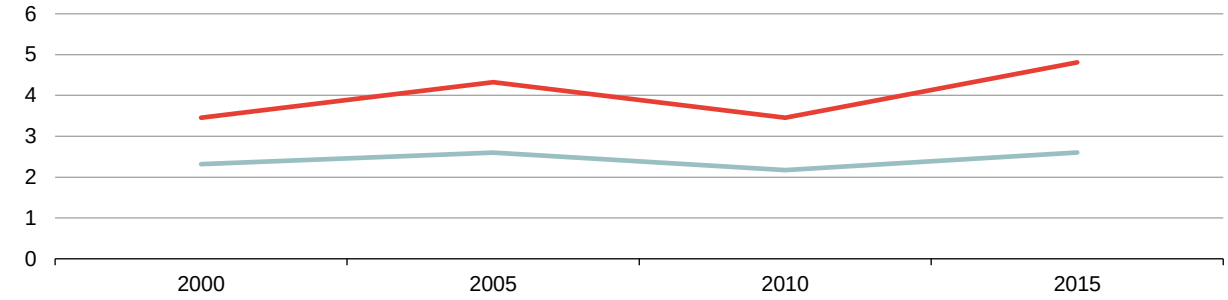


Exhibit 19: Home Appliances (kt)

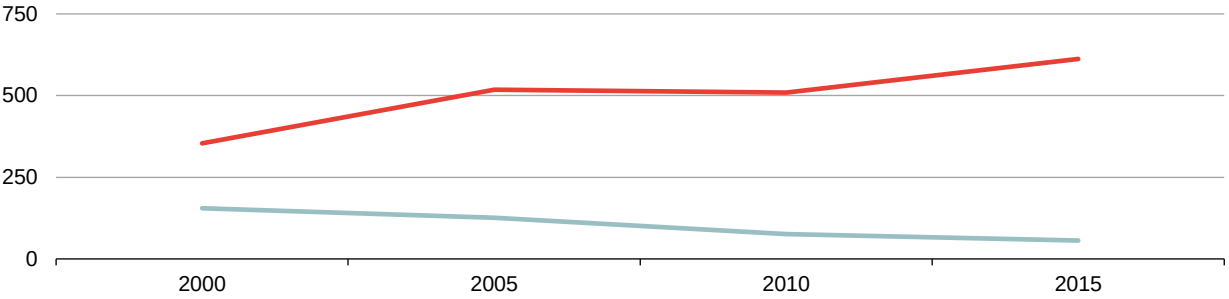


Exhibit 20: Metal Furniture (kt)

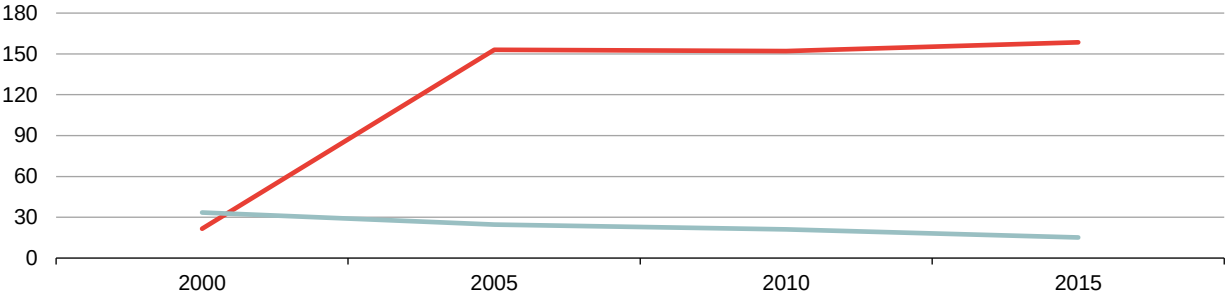


Exhibit 21: Transmission Shafts and Gears (kt)

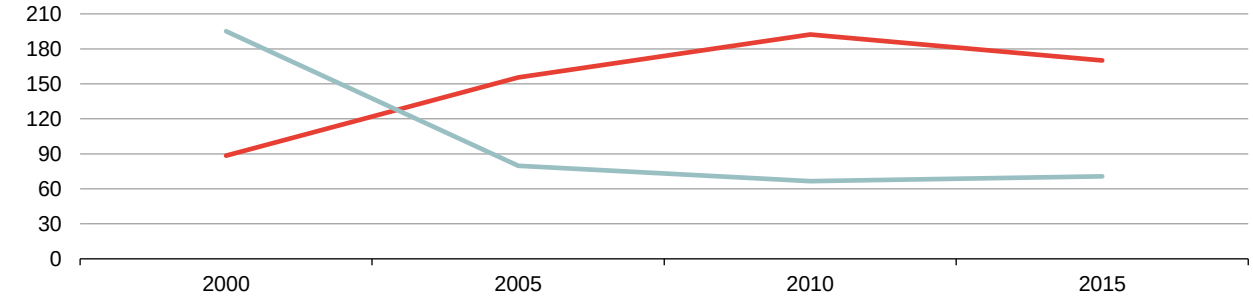


Exhibit 22: Aircrafts, Ships, Railway Rolling Stock (kt)

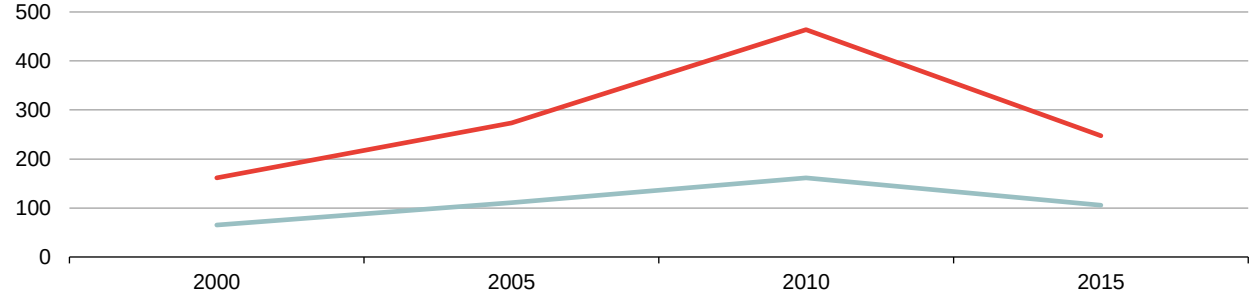
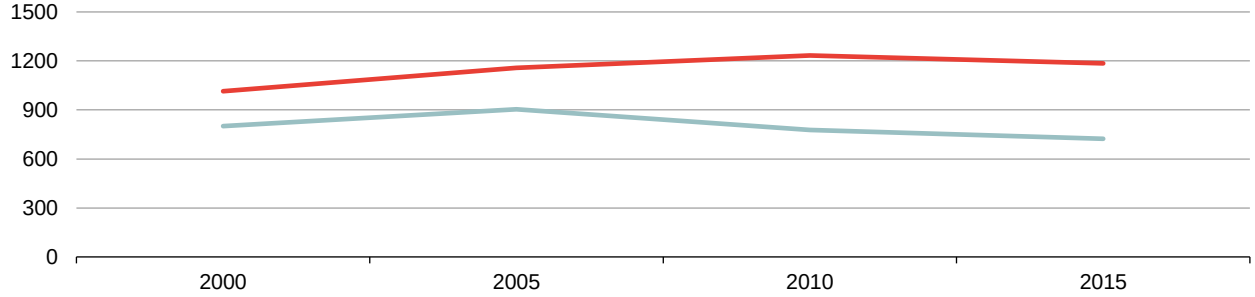


Exhibit 23: Others – Metal Cutting Tools, Office Machinery, Telecom Equipment, Pumps, Valves, Heating Cooling Equipment etc. (kt)



Key: Imports
Exports

Source: ISSB

Note: The underlying data for the above exhibits was sourced from ISSB. ISSB tracks the imports and exports of steel contained goods in the UK. The trade data is converted into equivalent steel numbers through a pre-agreed methodology between ISSB and the UK steel industry.

The above exhibits show the trends and changes in exports and imports of different categories of steel contained manufactured goods in the UK. Over the past 15 years, across most categories of steel contained goods and products, imports have increased while exports have decreased. In Machinery, steel equivalent exports have reduced to 1.0 Mt from 1.3 Mt, while imports have increased to 1.6 Mt from 1.0 Mt during the same period. A similar trajectory was also observed in home appliances. The direct consequences of this for the UK have been two-fold – declining demand and a growing future opportunity

Exhibit 24: Schematic of finished steel flow to true demand in UK – 2015

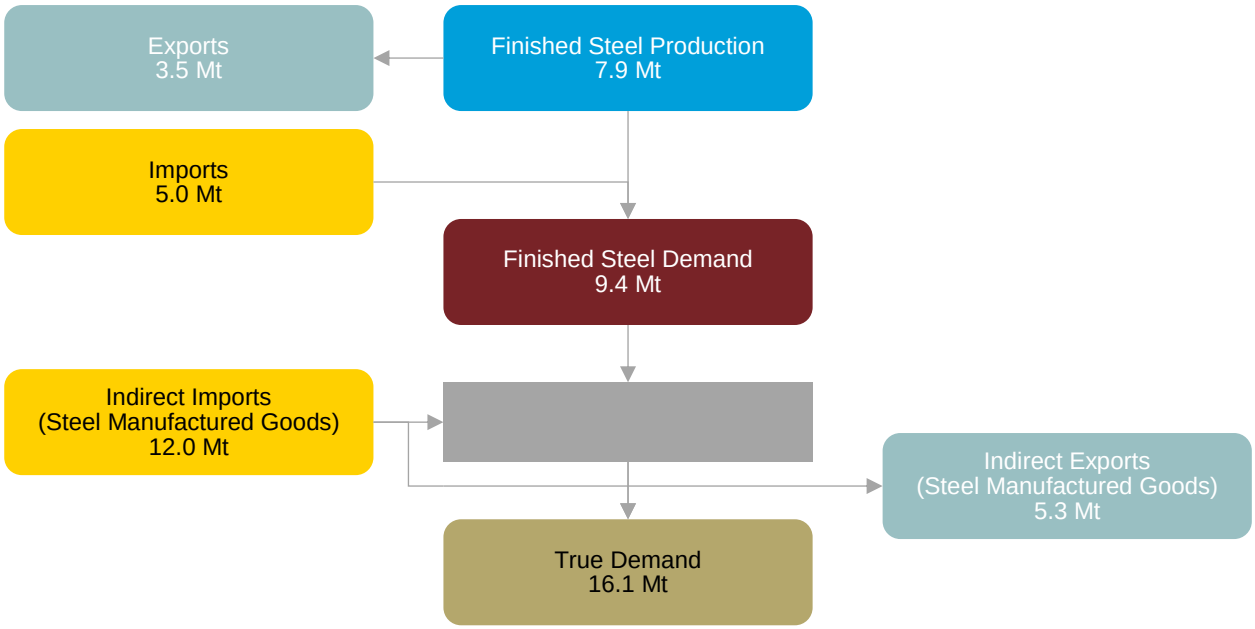
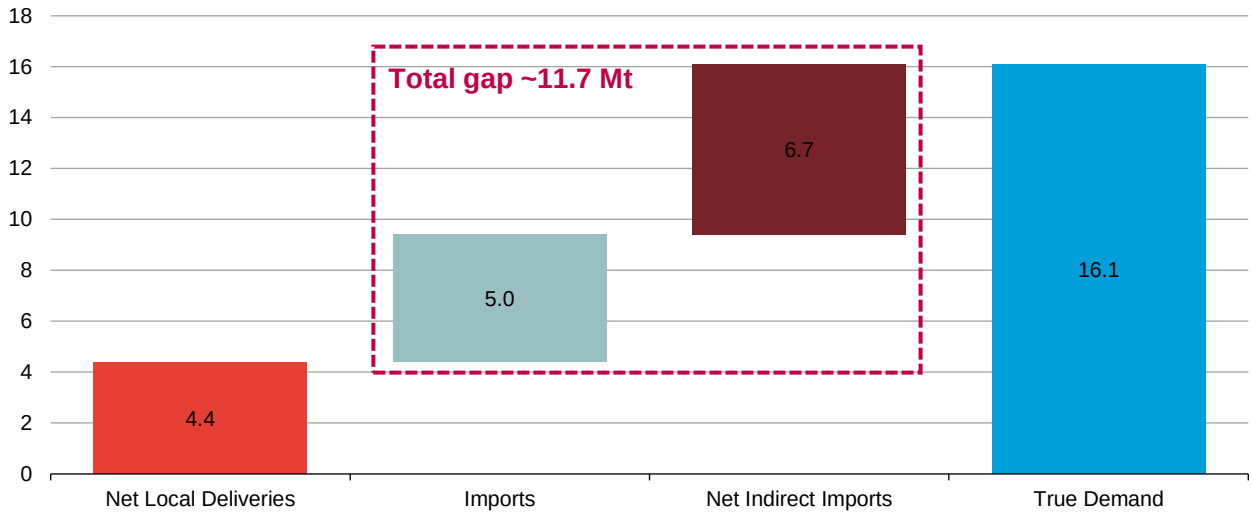


Exhibit 25: Gaps between UK net local deliveries and True Demand (Mt) – 2015



Source: ISSB, Hatch

To understand the distinction between true steel and finished steel and the implication of the future opportunity to the steel industry, a review and analysis for the year 2015 has been provided.

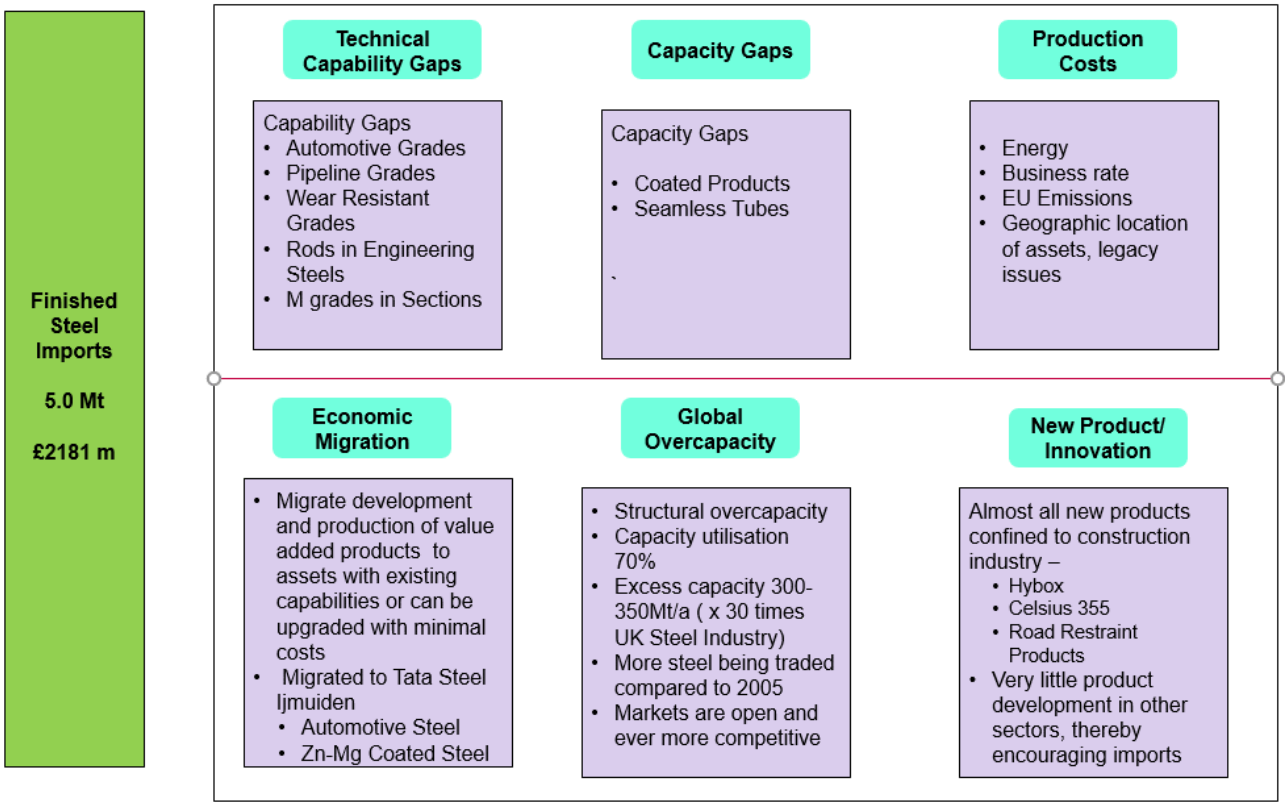
The industry in the UK produced 7.9 Mt of finished steel. Of this, it exported 3.5 Mt. The local deliveries of the industry to meet the demand in the UK was 4.4 Mt. In addition, UK imported 5.0 Mt of finished steel.

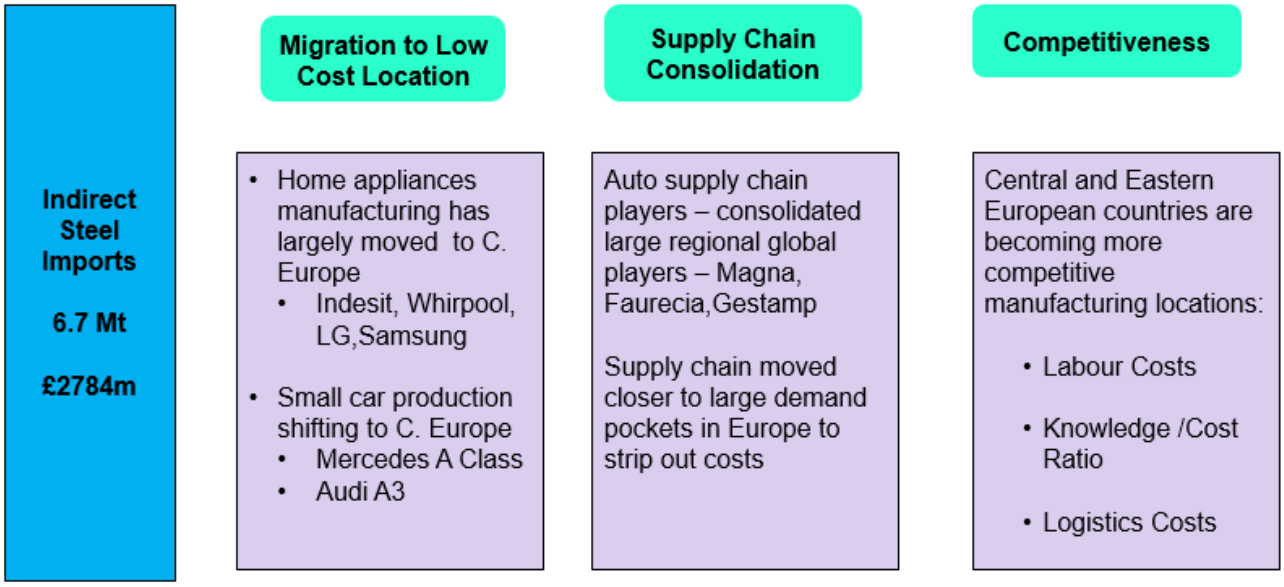
Over and above this, in steel contained manufactured goods, UK imported 12.0 Mt while it exported 5.3 Mt. On a net trade basis, UK was a net importer of 6.7 Mt of steel in contained manufactured goods.

After factoring in finished steel imports and net indirect imports, the gap between true demand and local deliveries is 11.7 Mt. Currently, the UK industry supplies to only 27% of

the true steel demand. The 11.7 Mt of steel represents a large opportunity where UK could increase its share. Improving factors such as cost competitiveness, production capacity, capabilities in advanced steels and customer service can help UK steel producers target this opportunity. It may not be possible for it to bridge this gap completely as customers could still import for a host of different reasons. However, this provides a picture of the extent of the future opportunity for the UK.

Exhibit 26: UK Steel Finished Steel Imports – Reasons





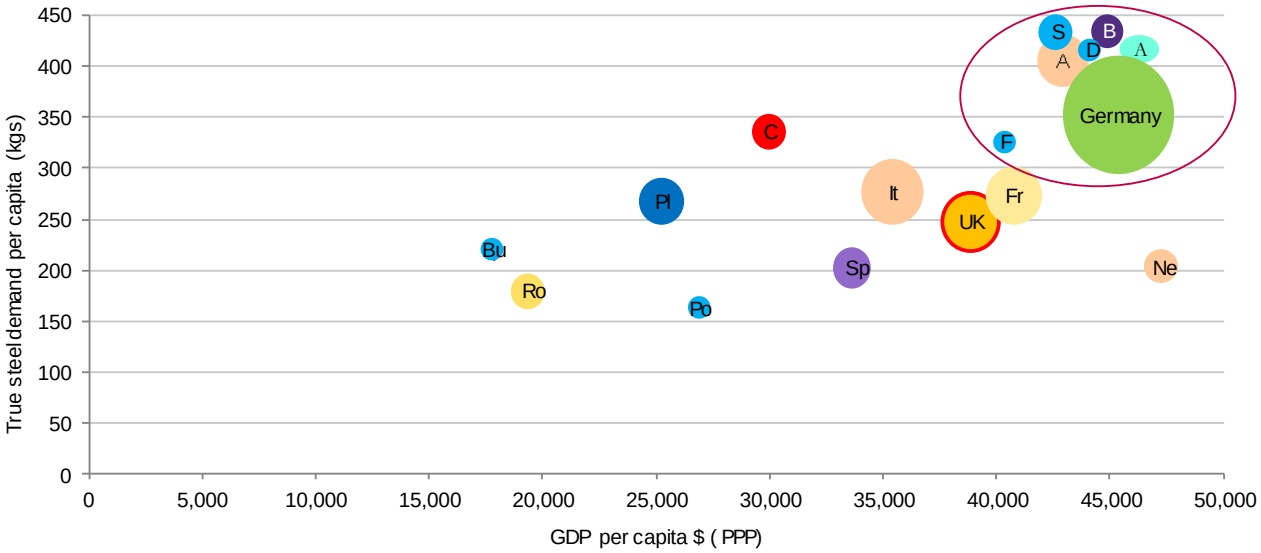
In 2015, the UK lost £2.2 billion in value to imports of finished steel. When this is considered alongside the true demand for the steel the total value of the future opportunity is estimated to be £4.8 billion.

UK has become a net importer for numerous reasons and many of these are a cumulative effect of factors building up over several years. While the demand of steel customers has changed and become more stringent, the UK has failed to keep pace, resulting in technical capability gaps. Higher production costs have constrained margins and consequently surpluses required to invest in product innovation and capability enhancement have also been negatively impacted. This has had a trickle-down economic effect on the volumes required to keep the plants loaded. The industry had had to respond to this by addressing the part of the demand which is more aligned to its capabilities such as in construction. Consequently, its product development is also geared more towards the construction industry. Some of the technical capabilities have migrated out of the UK to other plants which are owned by steel producers outside of the UK for economic reasons. In addition, the global overcapacity situation, in large part driven by China, has contributed to increasing imports, in some cases with predatory pricing, thereby exacerbating the already challenging conditions in the UK.

The indirect steel exports are a direct consequence of long-term migration of manufacturing out of the UK and supply chain consolidation. For example, home appliance manufacturing has largely shifted to Central Europe, as has small car production. In automotive, supply chain consolidation has largely occurred over the last decade or so to strip out costs and move the facilities closer to larger auto production hubs. This implies that the UK automotive industry can be efficiently supplied with components and systems from manufacturing facilities in Europe. Alongside this, countries in Central and Eastern Europe are improving their competitiveness in manufacturing by enhancing knowledge/cost ratios and competitive logistics costs.

Exhibit 27: Per Capita Steel Consumption

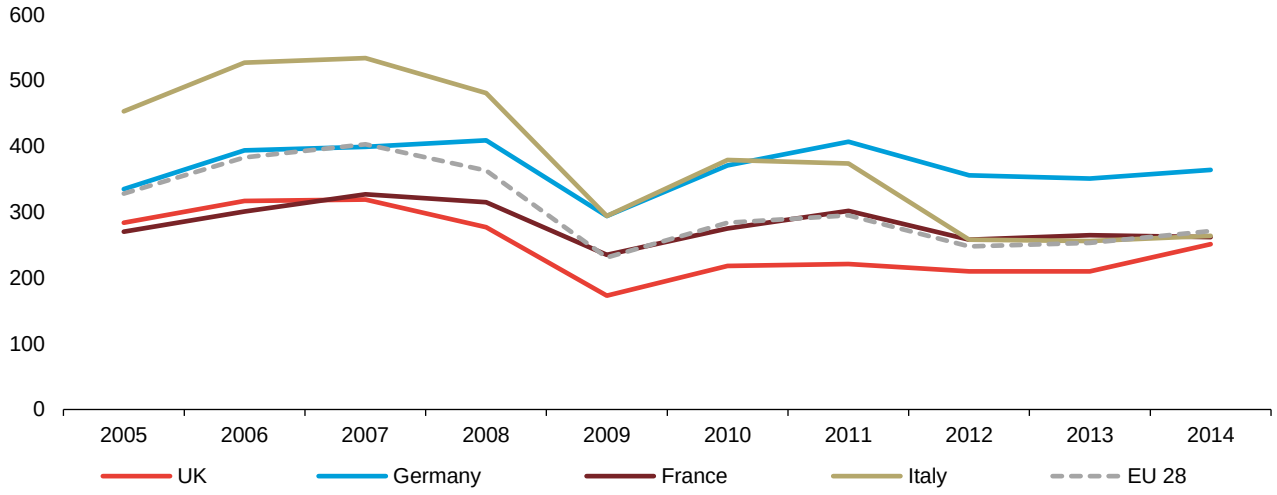
Cross-country Comparison of True Steel Demand per Capita vs. GDP per Capita – 2014



Source: WSA, WEO, Hatch
Notes: Size of bubble represents relative size of true steel demand

Exhibit 28: Changes in True Steel Consumption per Capita (kg)

Germany, France, Italy, UK – EU 28's four largest steel markets



Source: WSA, WEO, Hatch

To gain a better understanding of declining trends in the UK's steel demand, we have done a comparative analysis of steel demand intensity between the UK and other countries in the EU. The analysis compared and contrasted true steel demand per capita versus GDP per capita (PPP basis). This allows us to compare countries with similar incomes (denoted by GDP per capita) and its steel demand intensity after factoring in net import (or exports) of steel in manufactured goods. Typically for similar levels of GDP per capita, true steel demand per capita should be comparable.

The per capita demand of the UK in 2015 of ~250 kg is comparable to France (262 kg), both of which have similar GDP per capita of $40,000. Italy has per capita demand of 250 kg at a lower GDP per capita of $35,000. Germany, Austria, Belgium and the Nordics which have a GDP per capita of $38,000–$45,000 are able to achieve a much higher per capita demand of 380–450 kg, which is 40–60% higher than the UK. This implies that at a structural level, the UK is a much lesser steel-intensive country as compared with many other European countries with comparable GDP per capita.

In the period 2005–2014, UK's per capita steel demand has declined by -12%. In comparison, it declined by -42% in Italy and -17% in EU. On the other hand, in Germany the per capita demand increased by +9%, while in France, the decline was a marginal -3%.

The cross-country comparison of steel demand intensity presents a mixed picture. The UK is less steel intensive compared with other countries in the EU with comparable GDP per capita and the intensity has been on a downward decline. In comparison, Germany's steel demand intensity is not only higher, it has also managed to sustain the increasing trajectory. This implies that there are success stories within the EU that need to be understood, especially as we study the evolution of future capabilities of the UK steel industry.

The key takeaway is that per capita demand (consumption) in the UK after a long period of decline appears to be on a recovery. From a peak of 319 kg, the period between 2010 and 2013 saw the lowest level of 210 kg. In 2014, the per capita demand increased to 251 kg. This signals an arrest of the long-term decline in demand intensity and some return of stability to demand outlook. Appendices 3, 4 and 5 provide further evidence of this.

Exhibit 29: UK and Germany – A Comparison

UK	
Apparent Demand	9.4 Mt
True Demand	16.1Mt
Germany	
Apparent Demand	39.2 Mt
True Demand	29.3Mt

Macroeconomic Indicators	UK	Germany
Population (millions)	65.1	81.3
GDP comparison	1	1.5x
GDP/capita (PPP) $	41,498	46,973
GDP growth (real)		
2005–10	0.83%	1.20%
2011–15	2.00%	1.60%

Investments/GDP %	17.3	19.8
Manufacturing % GDP	19.4	30.8
Trade Surplus/(Deficit) £bn	-34.7	190.6
Construction Spend £bn	145	259
Auto production (millions)	1.71	6.03
Auto production local content	41%	60%
Capital Goods & Auto exports £bn	110	423

Source: Destatis, ONS, German Institute of Economic Research, OICA, IMF WEO Oct 2016, SMMT, Bundesbank, ISSB

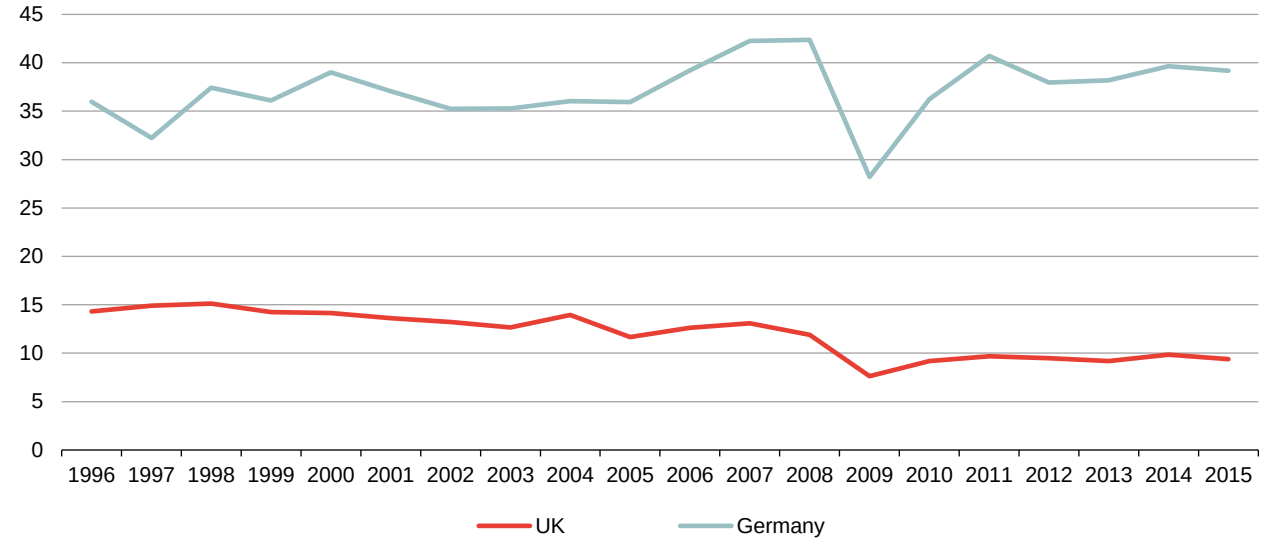
Germany is the largest steel-consuming country in the EU. Its apparent steel demand has been on a completely different trajectory compared with the UK. While the UK's steel demand has declined by 34% since 1996, German demand has increased by 9%.

Steel demand in Germany differs from UK on both absolute demand levels and the intensity of demand (per capita demand).

The structural difference between UK and Germany demand is reflected in the macroeconomic indicators. Germany's GDP is 1.5x UK, its GDP per capita is 13% higher and its economy has also grown at higher rate.

The main factors which shift the balance in favour of Germany are the higher investments as share of GDP, higher construction spend, higher intensity of manufacturing in its economy, and significant exports of auto and capital goods. Germany exports £432 billion of capital goods compared to the UK's exports of £110 billion. Its automotive production is 6.0 million p.a. which is 3.5x UK. Alongside this, its automotive industry has a local content ratio of 60%, which implies a much higher level of steel consumed in country. Taken collectively, these factors therefore support a higher demand and demand intensity in Germany as compared with the UK.

Exhibit 30: Finished steel demand in UK and Germany (Mt)



The German economy and industry are hardwired in a fundamentally different way that supports and encourages manufacturing to remain in the country. Consequently, the benefits of this accrue to its steel industry.

It views steel as a fundamental input to some of its key manufacturing sectors such as automotive and capital goods and a key consumer for services such as logistics. Therefore, in the past, the government policies have been consistently supportive of the steel industry through measures such as favourable energy prices and reduced renewable surcharges.

Some of Germany's flagship enterprises such as automotive OEMs (e.g. VW, BMW) and capital goods (e.g. Siemens) are also large consumers of steel. Additionally, there are many manufacturers which are small to midsized in comparison but are large contributors to Germany's demand for steel. Some of the world's largest tier 1 auto suppliers (Schaeffler, Bentler, Mahle) are all located in Germany to service the OEMs. Likewise, Germany is the EU's centre of construction and earth-moving machinery and it is home to many manufacturers (Liebherr, Wirtgen, Putzmeister) which are smaller than flagship enterprises but are leaders in their segments.

Apart from this, a significant portion of steel demand comes from German small and midsized enterprises – 'Mittelstand' – which are family or privately owned and typically employ 100–300 people. A key part of success of the 'Mittelstand' has been access to financing from local savings banks (Sparkassen). The focus of lending is mainly on benefits in longer-term rather than short-term gains, typically through equity finance. In turn, the savings banks can or may have representatives on the board and have an influence on the strategic direction of the companies.

The dual vocational system of training in Germany involves training an apprentice for 2–3 years in a place of work and vocational institute. This system has thus far ensured that the apprentices secure a good balance of practical and theoretical competence. The manufacturing industry has access to a large pool of technically qualified people with skill sets aligned to its requirements.

The German steel producers are specialised and well-structured to serve different segments of the industry. Examples include:

- Thyssen Krupp: Flats for Automotive, Packaging, Machinery
- Dillinger: Energy (Pipes, Pressure Vessels, Offshore Platforms)
- Salzgitter: Flats for Construction and Automotive, Machinery,
- Peiner Trager (Salzgitter): Heavy and Jumbo Sections

The success of the German steel industry mirrors the success of its manufacturing sector. The success is underpinned by a close collaborative ecosystem of the steel industry, its customers, both large enterprises and Mittelstand, access to long-term, patient financing and a steady supply of qualified labour force.

It is important to note that the government in Germany does not own assets or act as a large shareholder in these enterprises. The government plays the role of a facilitator, enabler and catalyst for the ecosystem and its interdependencies.

3. Appendix 3: Sector Analysis

a.) Introduction

This appendix provides a detailed overview of the analysis of steel consumption across the following sectors: Construction, Nuclear, Rail, Packaging, Automotive, Oil & Gas, Machinery & Engineering, Yellow Goods, Aerospace and Renewable Energy.

The appendix begins with an overview of findings across all of these sectors. This includes a macro view of trends in finished steel demand in the UK and some context of the factors influencing these trends. It then provides a historical view of the high-level steel consumption trends for each of these sectors, before forecasting demand to 2030.

The next section of this appendix looks at each sector individually with a more detailed view of the historical steel demand, forecast steel demand and sector views on current and future steel consumption provided by a range of steel consuming businesses in that particular sector. The quantitative analysis of historical demand and forecast demand is presented for all sectors with the exception of aerospace and renewable energy. These sectors are marginal in terms of steel consumption (in terms of volume and value) relative to the other sectors, at less than 1% of demand, so have not been included because of the small impact their consumption has on the UK steel industry. For these two sectors, however, we have sought sector views, as this provides insight into the extent to which steel consumption is likely to change in the future and whether it will become more significant. The lack of current consumption in these sectors was reinforced during the interview findings. For the nuclear sector, the quantitative analysis of historical demand and forecast demand has been considered as part of the construction sector due to the interconnectedness of the two and consequent difficulties in disaggregation of data. However, the sector views for the nuclear sector gained from the qualitative study have been presented separately. This will enable a clearer view of interviewee views on trends in steel consumption in the nuclear industry.

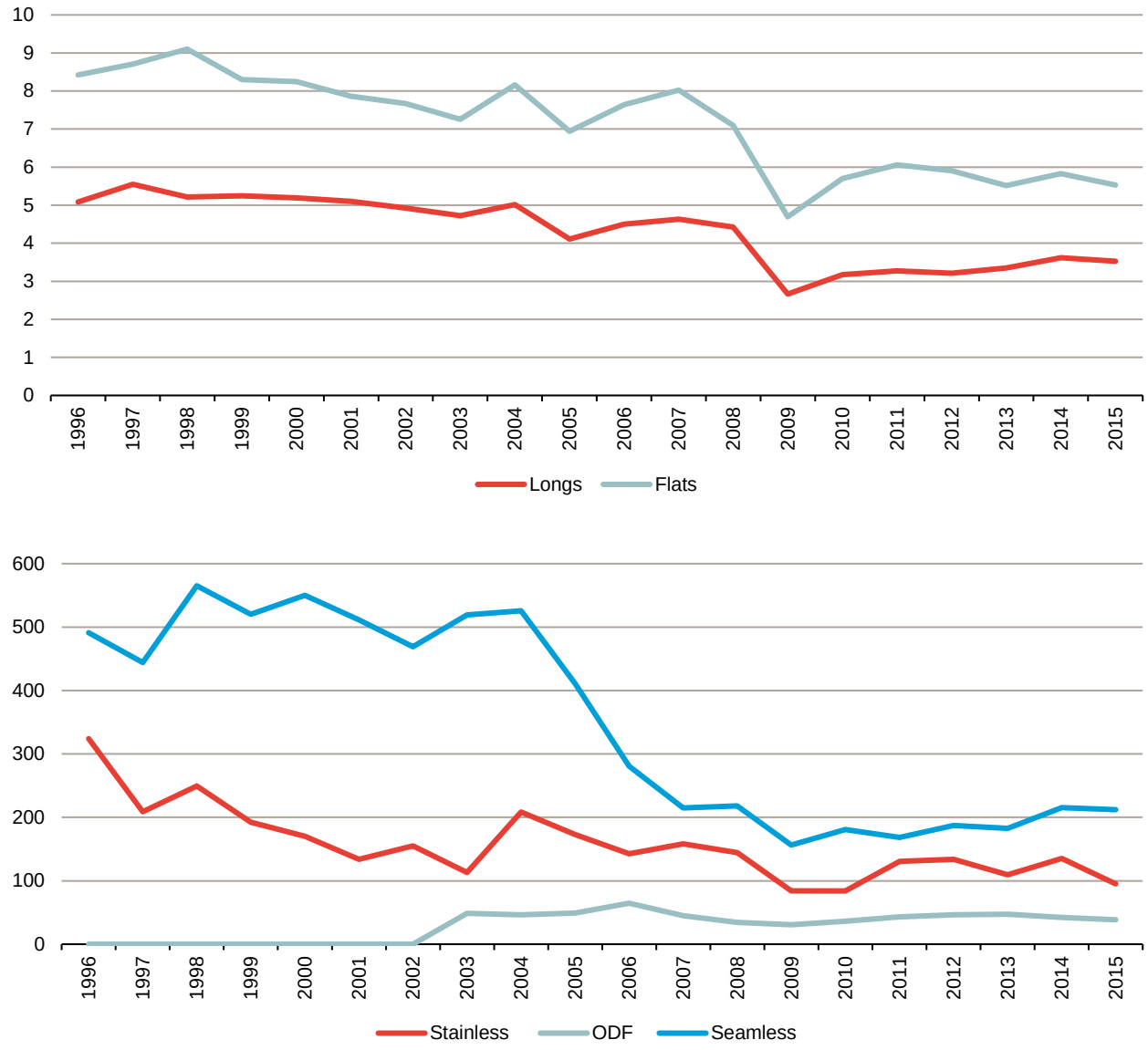
Findings from the interviews for each sector have been structured into four themes: competitiveness, capacity and capability, supply chains and customer service.

While it is difficult to assess the extent of a particular issue based on interview responses alone, the order that these are presented in for each sector broadly represents the order in which they are perceived to be the largest issues in that sector. This is based on the number of interviewees who raised these issues in their response.

b.) Summary

Summary of Finished Steel Demand

Exhibit 31: Trends in Finished Steel Demand in UK (Mt)



Source: WSA, ISSB, Hatch

At a macro level, finished steel demand in the UK presents a picture of structural decline over the past 20 years. Demand for longs and flats has contracted by 31% and 34% respectively. However, for stainless steel and seamless tubes, demand contraction has been more profound, wherein the total contraction has been more than two-thirds. Much of the demand fall was already in progress prior to the financial crisis in 2008, but the crisis exacerbated the situation. Since 2008, demand has been on a slow recovery path but has not managed to reach anywhere near the pre-crisis levels. It must be highlighted that since 2011, demand for all finished steel is showing signs of some stabilisation. Between 2012 and 2015, long products demand has expanded by 9.0%. This signals the arresting of long-term decline in demand for the first time in the past 20 years.

There are numerous reasons for the demand contraction:

- **Fixed Assets Investments (FAI)**: Steel demand is driven by investments in infrastructure, machinery, construction, shipbuilding, automotive etc. FAI as a percentage of GDP in the UK has declined from 20.3% in 1996 to 15% in 2009. Although it has started to recover, it was still 17.3% in 2015, considerably lower than 1996.
- **Manufacturing Migration**: The UK, like many developed countries, has seen large steel-intensive manufacturing sectors decline and migrate out of the UK. Examples are shipbuilding, capital equipment, home appliances, wire drawing. As a consequence, steel demand has been negatively impacted.
- **Supply Chain Consolidation**: In sectors such as automotive, supply chains have become more efficient and regionally consolidated to strip out costs. More components and systems can be produced from the same facilities and can be shipped to the point of demand more efficiently and timely, thereby reducing the need for having manufacturing spread out in the EU and UK. The UK does not appear to be a beneficiary of this consolidation.
- **Downgauging of steel**: In the past two decades, there have been enormous improvements in product developments and the introduction of new grades and types of steel. Higher-strength steel grades result in better strength-to-weight ratio in steel and consequently demand volumes decline. Such trends have been seen in steel usage in home appliances, pipes for oil & gas, offshore platforms, automotive, construction and packaging. These trends have influenced steel demand globally and trends in the UK are a mirror reflection of that.
- **Substitution**: In some applications such as automotive and packaging, alternative materials such as aluminium, paper, glass and plastics have replaced steel. In premium cars, pressures of lightweighting have resulted in aluminium replacing steel in body-in-white parts. In beverage cans, aluminium has largely replaced tinplate cans and as a consequence can weights have reduced by more than half in the past 20 years.

In the environment of such sharp demand decline, the UK steel industry has achieved some success in substitution which needs to be highlighted. A promotional campaign by Corus in the 1990s and early 2000s markedly displaced reinforced concrete as the preferred material in commercial buildings. The promotion involved lobbying government and industry decision makers, education of students, architects, structural engineers in steel design and commercial interaction through the steel fabrication industry, industry bodies such as the British Constructional Steelwork Association (BCSA) and the entire supply chain. As a result of this promotion, share of steel frames in commercial buildings in the UK increased from 40% to 70% and it continues to remain at comparable levels[1].

[1] British Constructional Steelwork Association.

Summary – Historical Demand

Sector-Based Analysis

Steel is consumed in a variety of sectors. After the steel leaves the mills, it undergoes several transformation processes, such as cutting, bending, forming, milling, grinding, drilling, shot blasting, painting, coating, before its final use as manufactured or fabricated product.

Within each consuming sector, there are number of different finished steel products which are consumed. Each product has a disparate production process and asset configuration and there are differences in capital costs, operating costs and minimum economic capacity, downstream processes.

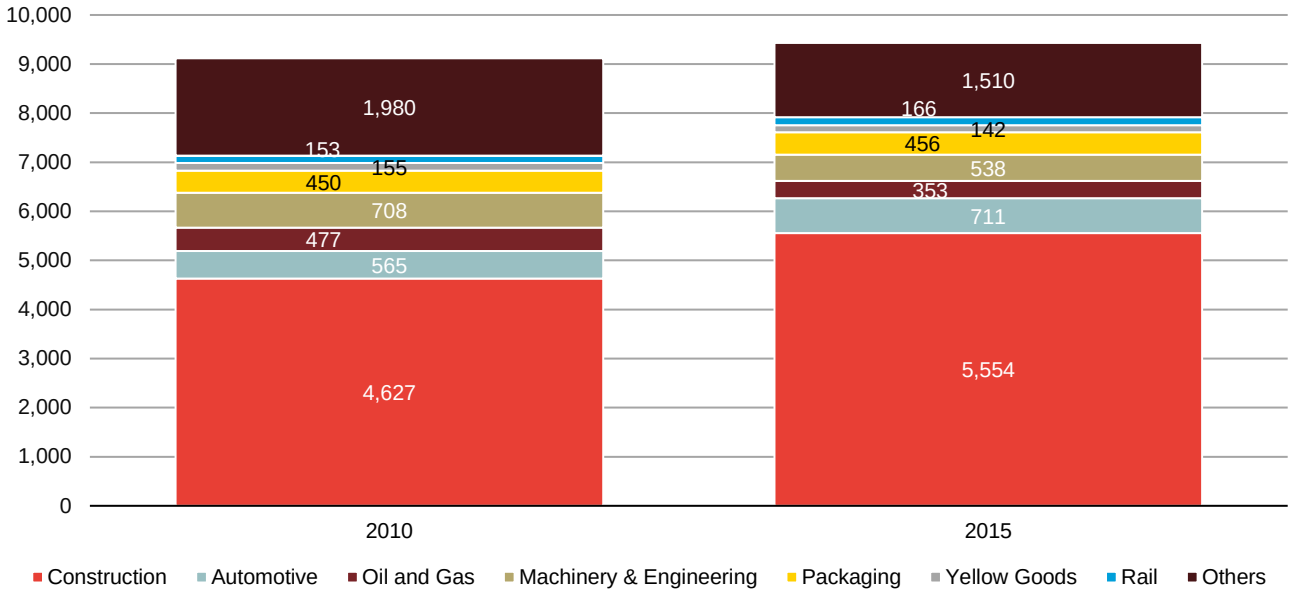
Finished steel in the UK is consumed in the following sectors:

	Products		
Sectors	**Long Products**	**Flat Products**	**Others**
Construction	Rebars, WR (mesh), Merchant bars, Sections (Light, Medium, Heavy)	Plates, HRC, CRC, Coated, OCS	Seamless Tubes, Stainless Steel
Automotive	WR (drawing quality), Engineering Steels	HRC, CRC, Coated	Stainless Steel
Oil & Gas	WR (drawing quality), Engineering Steels	Plates, HRC	Seamless Tubes, ODF
Machinery and Engineering	WR (drawing quality), Engineering Steels Merchant Bars	HRC, CRC, Coated	ODF
Packaging		CRC, Coated, Tinplate	
Yellow Goods	Merchant Bars	Plates, HRC	Seamless Tubes
Rail	Rails		
Others	WR (drawing quality), Engineering Steels	Plates, HRC, CRC, Coated	Seamless Tubes, Stainless Steel

The ‘Others’ sector represents numerous subsectors such as radiators, home appliances, shipbuilding, shelving, cabinets, catering equipment, pressure vessels, metal furniture, boilers, rail cars. Each of these subsectors is individually small but on an aggregate basis they represent a significant portion of steel consumption. At a macro level, they are representative of the manufacturing activity in the UK.

A separate analysis of nuclear, aerospace and renewables demand has not been included as it was found to be very marginal relative to total demand size. This was further evidenced and supported through the interview findings.

Exhibit 32: Finished Steel Demand by Sectors (Mt)

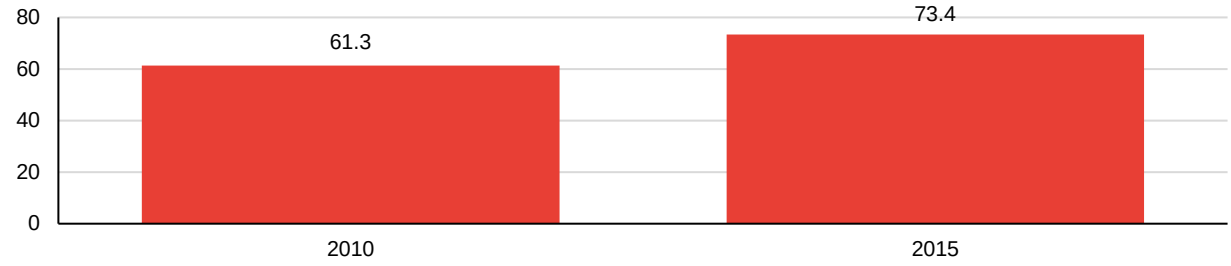


Sectors	% splits 2010	2015	Change
Construction	51%	59%	+8%
Automotive	6%	8%	+2%
Oil & Gas	5%	4%	-1%
Machinery & Engineering	8%	6%	-2%
Packaging	5%	5%	0%
Yellow Goods	2%	2%	0%
Rail	2%	2%	0%
Others	22%	16%	-6%
Total	100%	100%	

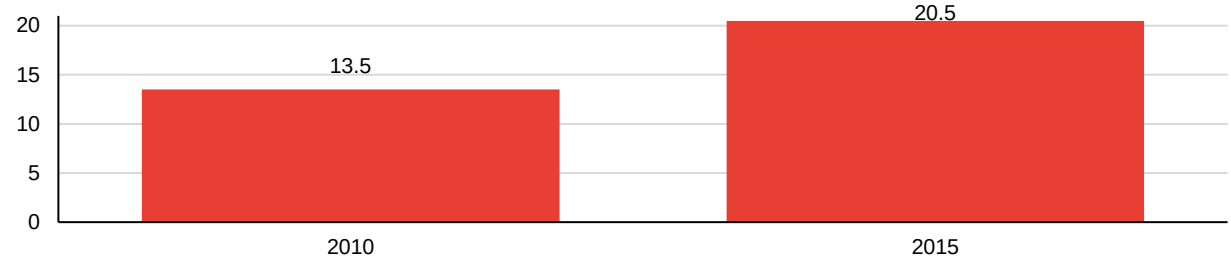
Source: WSA, ISSB, Hatch

Exhibit 33: Key Indicators for Steel Demand (Mt)

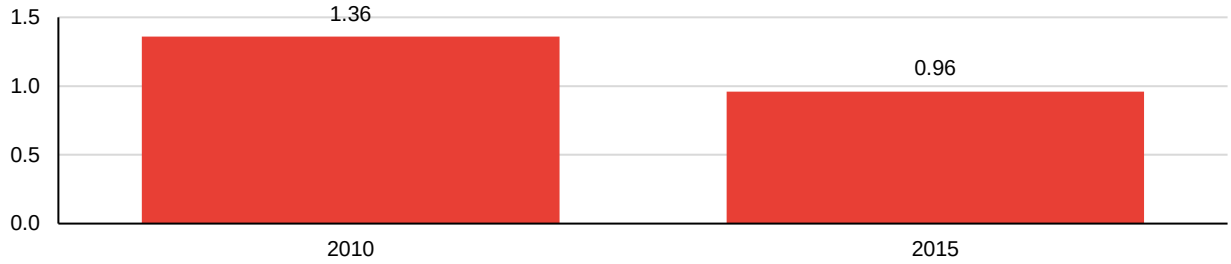
Construction Spend (£bn)



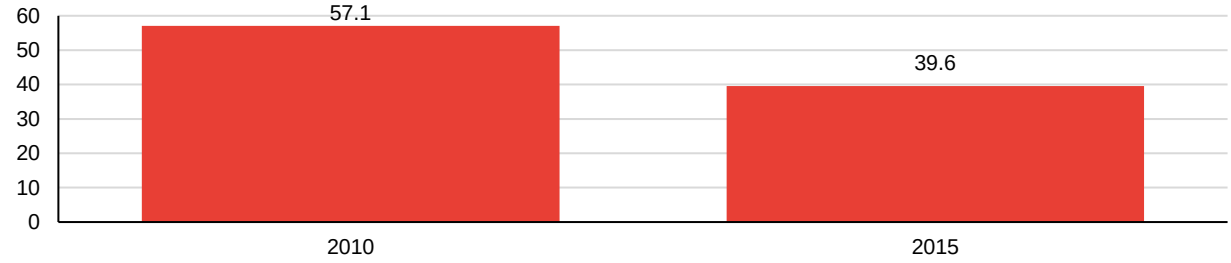
Infrastructure Construction Spend (£bn)



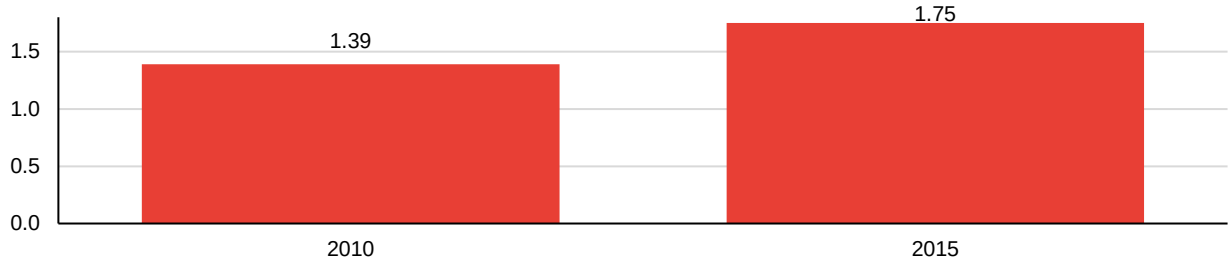
Oil Production (mbpd)



Gas Production (bcm)



Automotive Production (million units)



Source: ONS, SMMT, BP Statistical Review

Together with the decline in steel demand, the UK has become increasingly driven by the construction sector. The share of construction has increased to from 51% in 2010 to 59% in 2015. The other major change has been in the machinery and engineering and 'others' sectors, which have contracted from 30% of the demand to 22% of the demand.

The change in the sector mix for demand in the UK is because of:

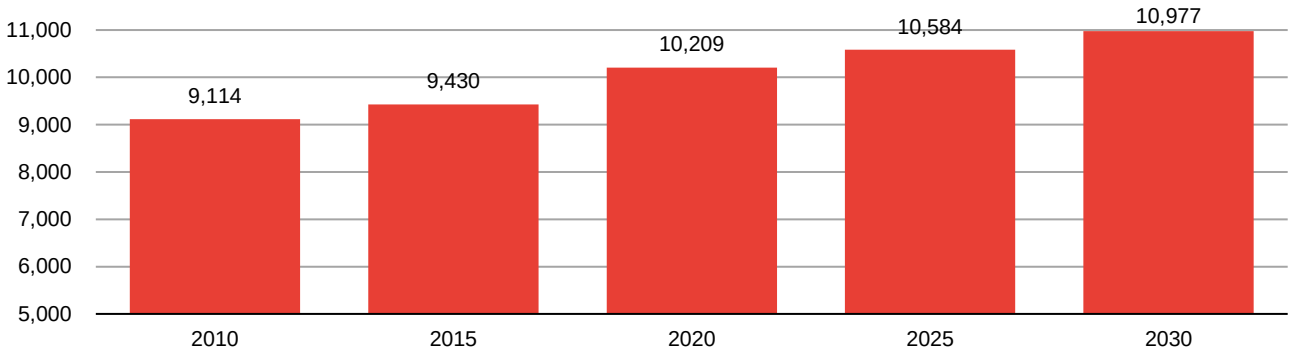
1. Increase in construction spend in the past five years, in particular infrastructure construction by nearly 50%. This is mainly because of the government push to provide stimulus, increase infrastructure spend and provide support to the economy.
2. Increase in automotive production.
3. Decrease in oil & gas production as a consequence of long-term decline in the UKCS.
4. Continued decline in steel-intensive manufacturing in the UK.

These developments are positive from a demand standpoint. Since 2008, demand has been on a slow recovery path but has not managed to reach anywhere near the pre-crisis levels. Since 2011, demand for all finished steel is showing signs of some stabilisation. Between 2012 and 2015, long products demand has expanded by 15%, while flat products demand has been relatively stable.

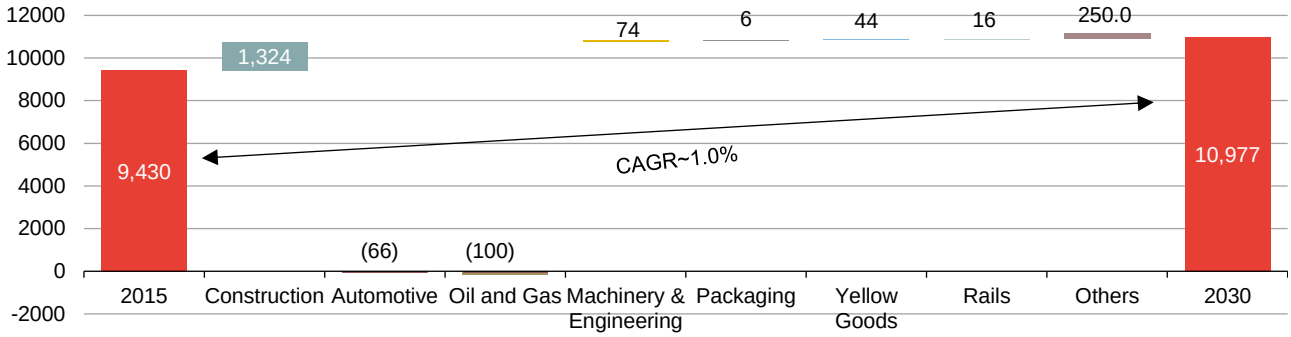
While these developments bode well for the steel industry, there is a broader question of sustainability and volatility. Growth in infrastructure-driven demand is highly unlikely to be sustainable in perpetuity. It also implies that given the nature of investment cycles in infrastructure spend, demand in the UK could become susceptible to cyclicality and volatility. In a developed country such as the UK, manufacturing-driven demand needs to become a larger component of the demand mix than it is currently. Manufacturing-based demand is more predictable, more stable and can help offset some of the cyclicality and volatility of infrastructure-driven demand.

Summary – Demand Forecast

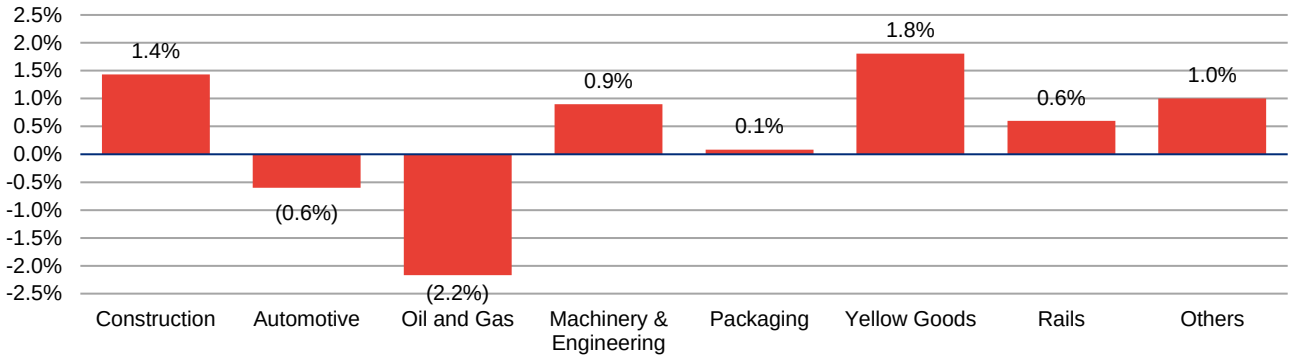
Exhibit 34: Total Finished Steel Demand Forecast (kt)



Total Finished Steel Demand Forecast by sectors (kt)



Changes in demand by sectors (kt)



Source: Hatch

The total finished steel demand is forecast to grow at 1% p.a. to 11.0 Mt in 2030 from 9.4 Mt in 2015. The increase in demand is predominantly from the construction sector. In the automotive sector, while the forecasts indicate a decrease in volumes, this will be offset by a shift to higher value advanced high-strength steel (AHS) and ultra-high-strength steel (UHS) grades. One of the key themes of the demand forecast is that there are no major upward shifts in manufacturing sectors which are steel intensive through the forecast period. Although it is understood that the UK government is broadly supportive of an inclusive industrial strategy, there is no visibility on which specific sectors would benefit. This view is also supported by interview findings across different sectors, wherein interviewees largely assume no changes in manufacturing activities in the UK or deteriorating even further due to a hard landing from the EU exit.

Alternative Demand Forecast Scenarios

In addition to base, two alternative demand scenarios were developed. The key assumptions for the scenarios are presented below:

Scenarios	Assumptions
High Case	• EU exit process, trade agreements uncertainty resolved quicker • Better support for manufacturing in the UK and pick-up in reshoring of supply chains • Improved localisation of automotive production: +10% increase • Positive spillover effects on industrial and commercial construction

	• Funding constraints for Infrastructure Projects less constrained
Low Case	• Hard landing from EU exit • Further hollowing of supply chains • Manufacturing activity remains weak due to tariffs • Auto localisation drops by 10%

	Demand 2030				Volume Growth		
	2015	Base	High	Low	Base	High	Low
Volume (Mt)	9.4	11.0	11.8	10.5	1.0%	1.5%	0.7%
Value (£b)	3.8	6.0	6.4	5.7	3.1%	3.6%	2.8%

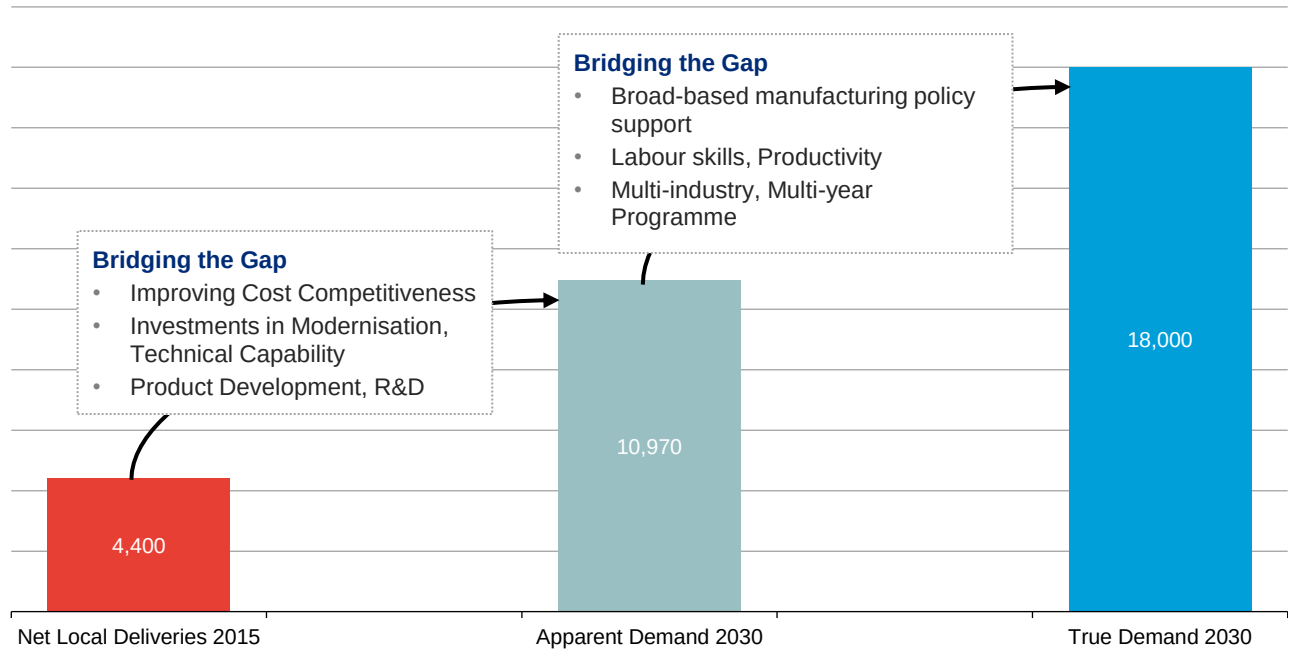
The demand forecast scenarios imply that the upside for demand is quite significant: ~7% of the base demand.[2] The future opportunity is £3.8bn in the base case, but could be as low as £3.6bn or as high as £4.2bn under the different scenarios. The key to fruition of the upside opportunity is to advance the EU exit negotiation process and trade agreements which would help remove the uncertainty surrounding the planned investments in many sectors. Specifically for the automotive sector, steel demand growth could be supported by improved localisation of component manufacturing In addition, if this is combined with a positive, inclusive industrial strategy, it could support further expansion of steel demand in the UK by support of reshoring of supply chains and its positive spillover effects on industrial and commercial construction spend.

On the other hand, the downside on demand could be up to -5%. The main reason driving this scenario is the EU exit process. As a consequence of the hard landing, we expect the effects to manifest itself in:

- Construction sector, primarily in industrial and commercial construction;
- Manufacturing and further hollowing out of supply chain;
- Automotive – a contraction in localisation and more outward migration of supply chains;
- The infrastructure construction spend is likely to be relatively immune to EU exit effects as these are largely committed projects. Beyond 2025, government fiscal pressures may not allow continued investments in infrastructure investments.

[2] The sensitivity analysis uses different scenarios for UK steel demand in tonnes but a single set of forecasts for global steel prices.

Exhibit 35: Apparent Demand, True Demand (2030) and Net Local Deliveries[3]



Source: Hatch

The forecasts also need to be seen in light of the forecasts of current local deliveries and true demand for steel. The evidence and findings suggest that there are huge future opportunities. Currently, the UK delivers only 4.4 Mt of the potential demand of 11.0 Mt, which means that purely on a finished steel basis, the UK has an opportunity of 6.6 Mt. When this is compared with the true steel demand, the UK has the opportunity to address a further 13.6 Mt.

For the UK to achieve these opportunities it will require key areas to be addressed to bridge the gap. It will need to realign its costs of steel making, which is a cross-cutting issue, alongside investments in modernisation and enhancement in its technical capabilities and increased product innovation. There is a larger opportunity between apparent demand and true demand, which represents a larger challenge in terms of growing UK content in supply chains. We acknowledge that the UK may not be able to capture all of the opportunity as shown in the above exhibit because customers will continue to import or imports will happen through global supply chains. There is an opportunity for industry and government to work together to address these challenges.

Opportunities for UK Steel Industry

[3] True demand in 2030 crudely estimated using ONS population projection and estimate for UK steel consumption per capita.

Exhibit 36: Current UK demand, current UK sales, forecast UK demand and future UK opportunity by sector for finished steel

	← Tonnage →				← Value →				
Sector	2015 Current demand (Kt)	2030 Forecast demand (Kt)	2015 Current UK sales (Kt)	2030 Future opportunity (Kt)[1]	2015 Current demand (£m)	2030 Forecast demand (£m)	2015 Value of current UK sales (£m)	2030 Future opportunity (£m)[2] and breakdown (%)	
Construction	5,554	6,879	2,539	4,340	2,003	3,352	880	2,170	57.3
Others	1,510	1,760	756	1,004	654	1,122	232	770	20.4
Automotive	711	645	285	360	348	471	120	293	7.7
Machinery & Engineering	538	611	304	307	226	349	116	194	5.1
Packaging	456	462	259	202	213	314	122	136	3.6
Oil & Gas	353	253	57	196	191	163	27	129	3.4
Yellow Goods	142	186	43	143	58	104	17	80	2.1
Rails	166	182	158	24	84	94	80	12	0.3
Total	9,430	10,977	4,400	6,577	3,775	5,969	1,594	3,785	100

Source: Hatch

[1]2030 forecast demand minus 2015 current UK sales

[2]2030 forecast demand minus 2015 current UK sales, valued using 2030 prices

The growth in demand implies that the opportunity for the UK is likely to increase over the forecast period. By 2030, the total size of the potential opportunity is estimated to be 6.6 Mt, which is nearly 1.5x what the industry is supplying to the UK currently. From a value standpoint, the future opportunity is estimated at £3.8 billion. In construction alone, the opportunity size is about 4.3 Mt.

c.) Construction

Supply Highlights

Finished Steel		Notes
Long Products	Rebars	In the past 20 years, domestic production has declined and its share of demand has been eroded by imports, changing from a 74% share in 1996 to a 48% share in 2015
	Wire Rods (mesh)	The share of local deliveries of wire rods has been consistently high. About 71% of the UK demand is met by local deliveries
	Merchant Bars	About 70% of UK demand is met by local deliveries from the UK. The balance of 30% supplies are imports predominantly from EU
	Light Sections	Local deliveries have increased in recent years to about 75% of demand

	Medium Section	Local deliveries from the UK have steadily declined from about two-thirds to one-third of the demand since 1996. In the past few years, imports have increased their market share of the UK demand
	Heavy Section	
	Engineering Steels	Local deliveries from the UK account for only a third of the demand. Consequently, imports account for nearly two-thirds of UK demand
	Rails	Local deliveries have been supplying up to 95% of demand and this has been a consistent pattern since 1996.
Flat Products	Plates	Predominantly supplied by imports
	HRC	Local deliveries account for about 65–70% of the demand
	CRC	Local deliveries have declined from 65% to 45% of demand in past 20 years
	Coated	Predominantly supplied by imports which are mainly from EU
	OCS	Local deliveries serve c. 60–70% of UK demand
Others	Stainless Steel	Almost entirely supplied by imports
	Seamless Tubes	100% supplied by imports
	ODF	50% of demand services by local deliveries

Capability Summary

Finished Steel	Gaps	Commercial	Technical
Rebars	Unable to meet the full demand requirements. Local suppliers' share of demand has varied between 37% (2015) and 66% (2010)	• UK cost of steel production is high relative to imports from Turkey, China, Spain, Portugal • Lack of sufficient capacity to meet demand • Customer service • Supplier diversification: UK currently has one rebar producer. Customers prefer to diversify supplier base and have alternatives and therefore tend to import the products • Predatory pricing from imports	• No capability gap to meet rebar demand by way of grades or sizes • Celsa is the sole producer for rebars from its bar-rod combi mill. The same mill also produces wire rods. Even after factoring Celsa's current wire rods production, there is some capacity slack to increase production • Overall, there is a lack of rebar mill capacity to meet UK demand, which can be addressed through capacity enhancements or restarting of mothballed capacities

Finished Steel	Gaps	Commercial	Technical
Wire Rods (Mesh)	Unable to meet the full demand requirements		• No capability gap to meet demand by way of grades or sizes • Celsa is the sole producer for WR (mesh) from its bar-rod combi mill. The same mill produces wire rods, so supplies can be constrained in a combi mill • Current gap of 119 kt between demand and local deliveries is not sufficiently large to justify investments in additional capacities
Merchant Bars	Primarily in flat bars >300mm and small volumes of round bars	• Imports used to diversify supplier risk	• Demand volumes for flat bars >300mm not sufficiently large to justify investments to enhance capability
Light Sections	Imports account for about 27% of the demand	• There is sufficient capacity in UK to meet demand • Imports from Spain, Turkey, France have better cost competitiveness compared with UK	
Medium Sections	Low share of local deliveries in demand	• There is sufficient capacity in UK to meet demand • Imports from ArcelorMittal's mills in Spain and France have better cost competitiveness compared with UK • More aggressive price competition from imports • British Steel facility is also used for production of Rails, which offer higher value-add	• There is sufficient capacity in UK to meet demand
	Unable to supply full range of grades		• Both British Steel and Caparo do not have the technical capability to produce M grades

Finished Steel	Gaps	Commercial	Technical
Heavy Sections	Low share of local deliveries in demand	• Imports from ArcelorMittal's mills in Spain and Luxembourg and Celsa in Spain have better cost competitiveness compared with UK • More aggressive price competition from imports • Competitors have responded aggressively to demand decline in the EU and are servicing UK market with more imperial size sections campaign • Cost disadvantage of British Steel on account of asset configuration and production process	• There is sufficient capacity in UK to meet demand
	Unable to supply full range of grades		• British Steel does not have the technical capability to produce M grades
Plates	Width 2000–3500mm		• Metinvest Spartan is limited to 2100mm width plates
HRC	Thinner gauges		• UK is unable to roll thinner-gauge HRC typically below 1.8mm. Many European competitors have acquired this capability for more than a decade
CRC	No capability gaps, but CRC continues to be imported	• Supplier diversification • Better cost competitiveness of competitors	
Coated	Unable to fully meet UK demand		• Capacity gap of up to 1.5 Mt p.a.
OCS	No capability gaps observed		
Seamless Tubes	No capacity in the UK	• Demand size not sufficiently large enough to justify the capital costs of an atypical configuration of EAF/Caster 500 kt p.a., tube mill of 350 kt p.a.	

Finished Steel	Gaps	Commercial	Technical
Stainless Steel	No capacity in UK		• Outukumpu cold rolling facility was shut down in 2005

The UK steel industry has a reasonable breadth of technical capabilities to meet the demands of the construction industry. The gaps in technical capabilities range from some specific size-, grade- or thickness-related issues, which are a smaller part of the demand but are important differentiators in the product offerings of a producer. The capacity-gaps issues are in coated products, seamless tubes and stainless steel. While the capacity gap in coated products is a clear opportunity for the UK, seamless and stainless steel appear to be challenged due to lack of sufficiently large demand to justify investments, or as a result of global overcapacity and restructuring.

There are a number of challenges on the commercial side. Customers import for supplier diversification reasons to mitigate supply risk. In recent years, imports have increased on account of increasing competition from European producers with aggressive commercial offers, Chinese competition often supported by predatory pricing and also due to better cost competitiveness compared with UK producers.

Construction – Demand Forecast

1.0 Demand Outlook

- Steel demand in the construction sector is forecast to increase by 1.4 % p.a. to 6.9 Mt in 2030 from 5.6 Mt in 2015. The total change in demand is expected to be +1.3 Mt (+24%). Within construction, rebars, heavy sections, hot rolled coil and coated products could account for 71% of the growth. The construction sector is likely to dominate the share of total demand across sectors, increasing its share to 63% in 2030 from 59% in 2015. While this presents a positive outlook for demand, it also implies that the steel industry could become even more susceptible and vulnerable to cyclicality and volatility, which may not be beneficial to the long-term health of the industry.

2.0 Sector Outlook

- The following summarises the key trends and developments which could shape the outlook for construction sector:

Industrial Construction Spend

- As per the EEF views, industrial construction spend is increasingly being financed from internally generated funds as opposed to bank finance before the crisis. As a consequence of this, industrial construction spend has remained depressed.
- In the next 3–5 years, industrial investments are likely to be weak because of EU exit uncertainty.
- According to Experian Construction short-term forecasts, industrial construction could decline by 3% up to 2019.

- The government plans to launch a broad inclusive industrial strategy. When this is launched, it is possible that industrial construction spend growth could accelerate. However, benefits may not accrue to the steel industry before 2022.
- Beyond 2019, we could expect growth to 1.5% p.a. mainly between the years 2022 and 2030.

Private Commercial Construction Spend

- The main subsectors are office, leisure and retail.
- Retail construction will continue to be slow because of weak consumer spending and change in consumer shopping behaviour.
- As per Experian Construction short-term forecasts, the office and leisure sectors are expected to grow in years to 2019. For private commercial construction, it forecasts a growth of 2% until 2019.
- Some commercial construction could be spurred when the government's industrial strategy is launched and removes the current uncertainty in the investment environment.
- Between 2019 and 2030, we could expect growth to continue, albeit at much lower rates of 1% p.a.

Public Commercial Construction Spend

The main sectors are schools, universities and health, and the summary of the developments are:

- Spend in schools (the biggest sector) has declined by 33% since 2011. There could be some increase in spending through free school building programme funding allocated by government. The Education & Skills Funding Agency has a significant budget to building 500 new free schools and this in turn could boost public commercial construction spend.
- University spend has increased by 23% since 2011. The University Project Construction has a plant of £5 billion spend between 2017 and 2019, which is an improvement over 2013–2015.
- Health sector spending is expected to remain weak over the next few years on a composite basis. Experian forecasts Public Commercial Construction spend to grow by 1.5% until 2019.
- Between 2019 and 2030, we could expect growth to continue, albeit at much lower and weaker rates of 1% p.a.

Infrastructure Construction Spend

- In the past five years, infrastructure spend has increased by 9% p.a. to £20.5 billion and it has been the single largest growth sector in construction.
- This growth has largely been government driven by way of stimulus to induce more growth in the economy. It is not expected that there will be negative impact derived from the current EU exit uncertainty and growth is expected to be robust.

- The National Infrastructure Pipeline has a planned total spend of £502 billion. Of this, 60% (~£301 billion) to be spent from 2016 to 2020.
- Although securing project funds could be a drag on growth, it appears that the Experian forecasts have already factored this. The forecasts from 2015 to 2019 are expected to be 3.0% p.a.
- Beyond that we expect the growth to continue as many of the large infrastructure projects are long term and multi-year. In addition, there are other large infrastructure projects such as HS2, Hinkley Point C and CR2 to further sustain growth. On that basis, we expect infrastructure construction to grow at 2.6% p.a.

Residential Construction Spend (Private and Public)

- The outlook for public residential construction is largely likely to remain negative and devoid of growth over the forecast period.
- Experian forecasts that private residential construction is likely to post a reasonably strong growth of 4.5% between 2015 and 2019.
- Between 2019 and 2030, we expect growth to slow to 2.0% p.a. due to long-term issues of affordability and possible discontinuation of ‘Help to Buy’.

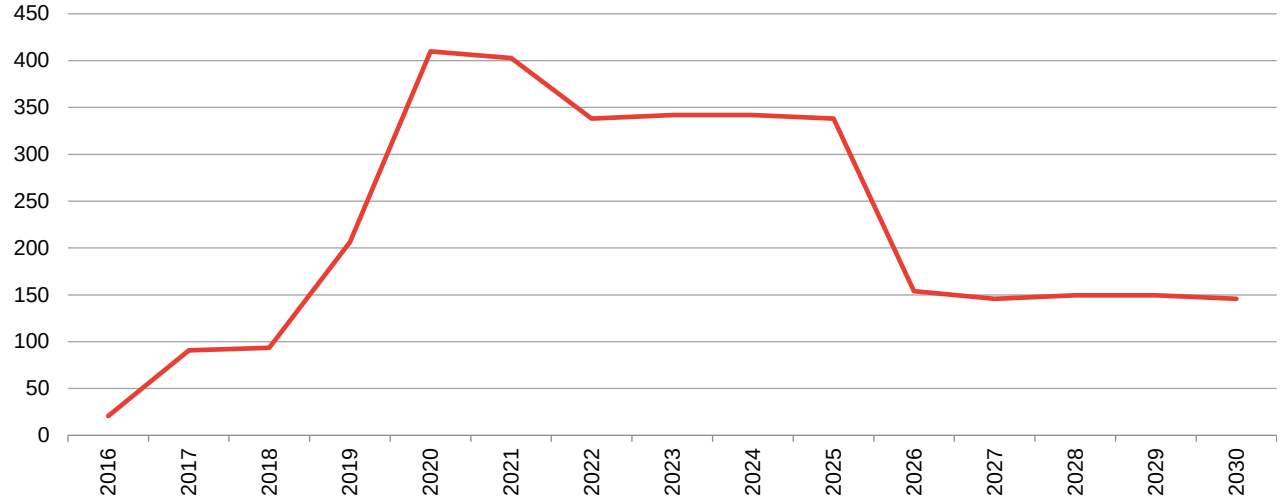
In computing the construction spend forecasts, we have reviewed the estimated steel use in HMG Infrastructure Pipeline. The Infrastructure Pipeline estimates the steel requirements of the major infrastructure projects, such as Nuclear Decommissioning, Network Rail, HS2, Highways England, Defence, Environmental Agencies, Prison, from 2016 to 2030.

The steel demand forecasts from infrastructure construction forecasts (as described in the previous pages) were used to compute a baseline demand forecast. Projects such as HS2, High Speed Rail 2 and Hinkley Point C which start from 2020 are estimated to require large volumes of steel. The demand from these projects has been added over and above baseline demand forecast.

The reason this approach was adopted was that there are specific steel-intensive infrastructure projects that would not be suitably reflected and factored if steel demand growth was linked to top-line infrastructure construction spend growth.

We also had to recognise supply-chain and capability limitation while computing the forecasts. For nuclear decommissioning and Hinkley Point C, stainless steel liners, stainless waste boxes and for coach bodies in HS2, it was assumed that this will be procured globally by supply chains, with no benefits accruing to the UK.

Exhibit 37: Estimated Steel* use in HMG Infrastructure Pipeline (kt)



* All categories of finished steel.
Source: Hatch

3.0 Changes in Specifications

Exhibit 38: Grade Shifts – Heavy Sections

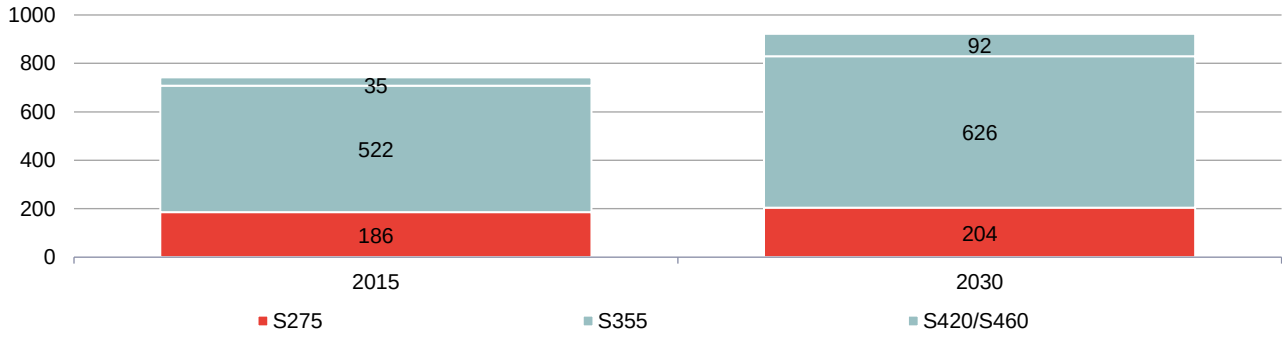
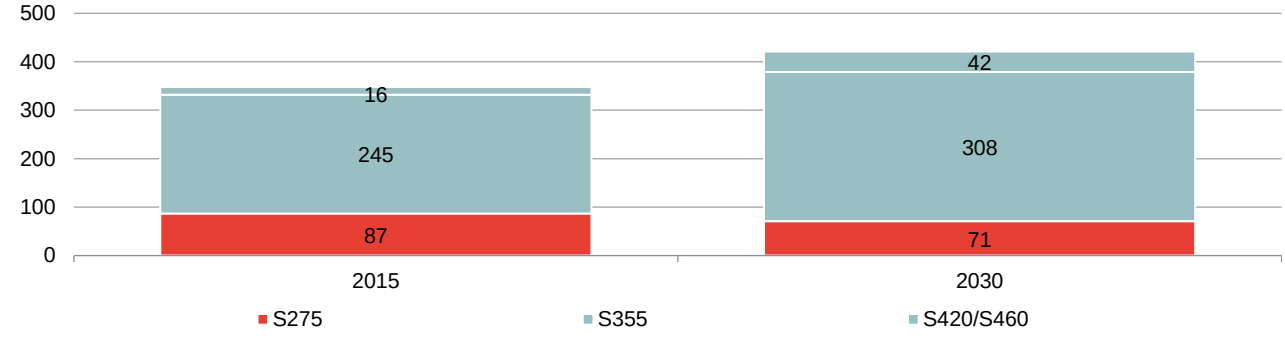


Exhibit 39: Grade Shifts – Medium Sections



The main trend will be shifts to higher strength – S355 and S420/S460 in medium and heavy sections. This builds on the trend seen in the previous years (refer to Appendix 4).

Currently, Eurocode 3 (steel structure design) norms limit the use of strengths up to S460. However, there are changes in Eurocode norms being considered which could allow strengths up to S700 to be used in medium and heavy sections. This implies that the steel industry in the UK, which currently does not produce these grades, may need to plan to enhance its capability to produce these to service the demand. Alongside this, there will be shifts to higher-strength grades in hot rolled coil, coated steel and organically coated steel. But these shifts will either be from commercial-quality grades to high-strength low-alloy grades, or the lower end of mild steel grades to the higher end of mild steel grades. In both cases, these are well within the capabilities of the UK steel industry to adjust to the shifts. As such we do not anticipate that this will pose any challenges to the industry.

4.0 Improving Competitive Positioning

The growth in the construction sector demand is perhaps the most significant opportunity for the UK in past 20 years. The industry must address some of these following areas to position itself more advantageously:

- The industry needs to improve the competitiveness of steel production costs of which energy prices and business rates are the principal contributory factors.
- Specific to cost competitiveness of heavy sections, there are two areas which need attention:
  - improving cost competitiveness by changing the production process of semis to beam blanks;
  - reducing costs of transporting semis from Scunthorpe to Teesside.
- The evidence from the study suggests various opportunities to augment product mix offering to better serve the construction industry:
  - enhancing product mix in merchant bars sizes >300mm;
  - enhancing product mix in medium and heavy to include higher strength grades up to S700 and investing in normalising furnace for thermomechanically rolled grades.
- The growth in demand for construction sectors also necessitates addressing capacity and production enhancement:
  - Coated products: Capacity gap of 1.5 Mt in relation to the potential opportunity size up to 2030;
  - Rebars: There may be opportunities to address this through capacity enhancement and restarting of mothballed rebar mills. This could also address and diversify the supply-risk issues highlighted by some customers.
- Steel Procurement in Public and Infrastructure Projects: the government has introduced steel-specific procurement guidance to take account of social and environmental factors, but that the nature and duration of contracts may take some time for the full effects to be felt.

5.0 Uncertainties and Risks

A key uncertainty in the forecasts is construction schedules for major infrastructure projects. For example, nuclear power plant projects have a history of schedule overruns. If there are schedule overruns, then the future demand could be lower than that forecasted.

The uncertainty surrounding EU exit negotiations and outcomes could worsen the demand outlook for industrial construction, which accounts for the largest share of demand for sections. The longer such negotiations take, the more uncertainty could be induced.

Construction – Sector View

Competitiveness

Within the construction sector there are a number of factors that are seen to be limiting UK steel competitiveness. One of the most significant factors relates to costs.

A number of consumers in the sector noted that the UK's higher energy prices meant that they struggled to be cost competitive.[4] This was a view held by some stockholders, processors and large contractors, although it is not clear how much information they hold on their suppliers' energy costs to make a detailed assessment of this. A reinforcement fabricator stated that energy prices in the UK versus the rest of Europe is a big issue and is a key driver for investment decisions. For example, when deciding whether to put a plant in Germany or the UK, the cost of energy in Germany will be half the price and therefore makes investments there much more attractive. A stockholder said that the UK has to compete at a global market rate. The UK's quality is good, but electricity costs are high. A developer of modular buildings stated that the UK performs poorly in terms of both energy costs and pollution levels. A large contractor stated that the steel industry could compete with Europe if support was provided to reduce rates and energy costs.

Other factors were raised including labour costs, transportation costs and raw material costs. A stockholder stated that the biggest obstacles when making steel are the cost of people and the old equipment being used. They felt that this puts UK steel at a cost disadvantage of about £100 a tonne compared with foreign competitors. Other costs such as energy also bring the costs up. They went on to say that they use their own logistics. By running transport within the UK themselves, it will cost them half the amount compared with third-party logistics providers. An envelope fabricator stated that the price of steel, galvanised in particular, is increasing due to rising raw material prices. Iron ore prices are increasing and this is passed on to end consumers.

The result is that some stockholders and consumers in the sector stated that it was cheaper to import steels.[5] This was noted by several consumers of rebar. An industry body stated that rebar import prices are lower, at around £50 per tonne more than UK producers. The UK has artificially low prices in the supply chain. A large contractor stated that UK-sourced reinforcement bar does come at a premium and our fabricators therefore do import where possible. They do not find that UK steel reinforcement bar is as competitive as material sourced outside the UK. As a result, reinforcement bar is imported

[4] 7 interviewees stated this, representing 19% of the 36 construction sector interviewees. This includes stockholders, processors and large contractors.
[5] 13 interviewees stated this, representing 36% of the 36 construction sector interviewees. This includes stockholders, processors and large contractors.

from elsewhere in Europe and the rest of the world to protect their commercial position. Another rebar supplier stated that they import 70% of their rebar because prices were usually cheaper.

Stockholders also raised this point. One stockholder stated that they have struggled historically to get competitive UK prices from a producer with a UK mill. Instead, they use mills in Spain, France and Germany, although they would prefer to purchase from the UK as they deliver quicker than imports. Another stockholder stated that it is cheaper to bring steel over by water than by road, working out at around £50 a tonne cheaper to import. UK sourcing has not been competitive in terms of pricing, so has invested heavily in a port facility to bring steel in from abroad (Russia, Brazil, Europe).

A property developer stated that a number of fabricators they know buy steel from mainland Europe because they can get better pricing, service delivery and the grade of steel that they are looking for. A fabricator stated that approximately 70% of the steel they use comes from mills and 30% from stockholders. The prices from UK suppliers are competitive, but reducing costs further would allow them to win more work. Dumping was raised by one respondent. There is no control over international protectionism and dumping, and this needs to be addressed internationally. Dumping and protectionism nullifies the impact of any lean operating machine.

Others highlighted that the UK is cost competitive versus imports.[6] An engineering consultancy stated that UK manufacturers are competitive against imports and that the UK is able to compete on the world stage. There is a good choice of suppliers and a good market for them to operate in, so companies are generally well catered for. A bridge fabricator stated that British engineering has a good reputation and there is competitiveness on price. A modular building developer stated that a UK producer they use is 20% cheaper than a Swedish supplier they use. Foreign exchange has had a big impact on prices. They will fix a price with the mill for 12 months.

Several interviewees stated that UK-sourced steel is more expensive but they choose to use it because of quality reasons, or wanting to buy British (see markets section). An envelope fabricator stated that they have looked overseas because of the high prices for colour coat in the UK, but the service is not as good for foreign producers and lead times from overseas are a lot longer and are less reliable. A structural fabricator stated that the UK steel industry is not as competitive as it could be in the world market. The key drivers for the interviewees on procurement are price, delivery times and quality. The felt it must be streamlined and the waste must be cut to remain competitive. They stated that while UK steel might not always be the cheapest, as long as the overall margin can be achieved, then this will always be their preference. Quality is very important to them and it has taken a significant amount of time to build the reputation that they have.

Numerous respondents felt that the UK's inability to compete was down to lack of investment.[7] A reinforcement fabricator stated that the UK industry has not been managed well and have not been investing. As a result, they are competing against others abroad who have. A modular building developer stated that there has been a lack of investment in plants because of uncertainty. UK steel is better quality but less efficient and

[6] 4 interviewees stated this, representing 11% of the 36 construction sector interviewees. This includes an engineering consultancy and two fabricators.
[7] 3 interviewees stated this, representing 8% of the 36 construction sector interviewees. This includes a stockholder and two fabricators.

is 10–15 years behind in automation and equipment. Rather than compete with the major producers in Europe, there is a need to specialise in certain areas. Mass production of steel is done well in Europe and is more efficient. However, a stockholder stated that their steel used to previously be 75% imported but that the improved sustainability of the UK industry has encouraged them to move back to a 50/50 split. Although they were concerned about the long-term future of the UK industry, confidence in the sector has returned and UK steel is the highest quality they can buy.

Quality was not seen to be an issue by a number of respondents.[8] This is picked up in more detail for individual products in Appendix 4 of this report. There were some exceptions and contradictions, with one stockholder saying that UK steel is the highest quality they can buy, whereas another highlighted that they import for operational reasons and because they can reliably get the right specifications from newer mills abroad. Others received high praise, with an envelope fabricator stating that the colour coat supplied by a UK-based mill is the best quality on the market, and a structural fabricator stating that UK quality is as good as it gets. A bridge fabricator stated that UK quality is good and is in the upper quartile.

Respondents were also concerned with the environmental issues with UK steel production versus competitors.[9] A large engineering consultancy stated that UK steel is high carbon compared with foreign competitors. If the UK could become lower carbon there may be greater sourcing from there in future. Energy intensiveness and CO_2 emissions (i.e. reducing the amount of carbon) associated with production could influence material choices in future. Another engineering firm stated that there are currently huge environmental issues with coatings, efficiency and environmentally friendly processes in some of the plants. A developer of modular building stated that the UK performs poorly in terms of energy costs and pollution levels and this could be a driver against use of steel. An office developer stated that there will be an increasing focus on environmental issues in future. There could be an increase in recycling in terms of re-use rather than melting. In buildings, concrete is irreversible once in and is impossible to take the structure apart and rebuild it. A bridge fabricator stated that recycling of steel should be done more efficiently and innovation and technical capabilities should be able to help this.

In terms of customer service, views were mixed. Some respondents felt that the service from UK producers was good.[10] Others highlighted issues including a lack of timeliness, quality issues and an unwillingness to consider smaller orders.[11]

Interviewees praised UK producers for their level of engagement and adaptability in meeting customer needs. An engineering consultancy stated that engagement from producers was good, and they are reasonably responsive. They make quite an effort to make sure that they are producing materials that people want. An industry body for construction equipment stated that producers have got better at meeting customer needs in recent years. Only recently have they begun to engage with the supply chain, with a

[8] 5 interviewees stated this, representing 14% of the 36 construction sector interviewees. This includes stockholders, fabricators and large contractors.
[9] 6 interviewees stated this, representing 17% of the 36 construction sector interviewees. This includes an engineering consultancy, fabricators and large contractors.
[10] 7 interviewees stated this, representing 19% of the 36 construction sector interviewees. This includes large contractors and processors.
[11] 10 interviewees stated this, representing 28% of the 36 construction sector interviewees. This includes large contractors and processors.

better focus on industries rather than products. The felt that they still have to get even closer to the industry and they have to work with technical people in their customers and the industry to develop new products. They felt that there is still a lot to do, with some companies further forward than others in this process. A contractor stated that UK producers adapt to new specifications of material, e.g. lightweight materials and treatment. One structural fabricator stated that they meet with a UK producer every 6–8 weeks at a senior level, and operationally deal with them every day. An industry body for construction equipment stated that producers and consumers are getting closer and this needs to continue. An engineering consultancy also highlighted that they have contact with UK steel producer advisors on what materials to use.

Other interviewees highlighted that there was opportunity for more engagement with producers.[12] In particular, it was felt that this would give producers a better understanding of industry needs. This has implications for innovation, with some respondents stating that the industry is too reactive.

An industry body stated that there is potential for improvement in engagement and the distribution service from steel producers, where this is currently limited.

This was also a clear message from stockholders. One stockholder stated that they have limited contact with suppliers and would ideally like to get closer to UK producers. They felt that it would benefit them financially. Another stockholder stated that very rarely do they meet with suppliers, while another stockholder stated that 65% of the steel distributed in the UK comes from independent stockholders, not mills; 5–10 years ago, this was only 35%. They believe that producers should work more closely with their end users who can provide them with guidance on what UK construction looks like. For example, there should be more work done with design engineers. They highlighted how, as a stockholder, they do lots of work with automotive OEM. The OEM's design team will come to their facility to go through the steel products they require with them, as well as giving them an idea of how the supply chain works. They believed that more can be done up front.

Opportunity for more engagement was also raised by fabricators. A reinforcement fabricator stated that there is opportunity for steel fabricators and the steel industry to get closer. Another fabricator stated that they would like to use more steel sourced from the UK; however, they would need to build stronger, more long-term relationships to ensure the supplier would be more willing to be more accommodating and understanding when making orders. An envelope fabricator stated a particular producer is struggling as a business both internally and with their customer focus. They felt that they are not market focused or customer driven so do not understand how the end-customer market is evolving. They felt they need to understand the values of the market and how it is more about design and speed to market. They believed that producers are too separated and that there needs to be more integration with designers, especially given that this is a key strength of the UK. If they could work with this group, they could try and stimulate export opportunities.

A developer of modular buildings stated that producers are not engaged and there needs to be more collaboration between different parts of the industry. In particular, more

[12] 8 interviewees stated this, representing 22% of the 36 construction sector interviewees. This includes an industry body, stockholders, large contractors and processors.

collaboration between the mill and end-user distribution networks. If the supply chain was working better then it could better meet demand. Instead, they felt mills are producing what they have always produced, not what the client needs. A structural fabricator also stated that producers react slowly to customers' needs. To make profits they need to speak with their markets to get a better understanding of the consumers and their specific requirements. They welcomed the opportunity to engage in innovation. However, this tends to never be that forthcoming and it is the exception rather than the rule.

A contractor stated that the mills make the steel and sell onto the stockholders. That is the only steel they can stock so there is no real choice in the matter for those further down the line. For grades such as 1025 there is plenty of choice, but you cannot always get the options you want and it depends on what the mills wants to sell. They only stock bits of what they could offer; if you want something else, you have to purchase X tonnes of it. An engineering consultancy stated that they do engage with fabricators or producers when required, but only on a formal basis. They also engage with research centres and universities for materials improvements. This is more on a Corporate Social Responsibility level.

Others highlighted that UK producers were better suited for large orders whereas stockholders are better suited for quick turnaround.[13] An industry body for manufacturing equipment stated that mills are used for economies of scale, whereas stockholders are used for speed of supply. A modular building developer stated that they order in bulk and will fix a price with the mill for 12 months. Other fabricators (which do not have as large order sizes) will also group together with them to gain the benefits of this. Mills will not provide these prices to the general market. They have looked at low-cost country sourcing, e.g. Turkey and Russia, but it is not the right thing to do. For example, one stockholder stated that they utilise a European stock shift system, so they are working 24 hours a day and able to deliver steel the next day (which makes up 60% of their orders). They will order from mills 3–4 months in advance and turn stock 6–8 times a year. A reinforcement fabricator stated that this service has decreased a little recently as the mills are trying to keep tighter stocks. A contractor stated that the mill can provide specific sizes, but these are not readily available and made to order. Stockholders have the availability, but only in standard sizes and grades.

Some interviewees raised the potential to fix prices for longer and provide more certainty to the industry.[14] One housing developer raised an issue over the inability of suppliers to be able to fix prices for more than 12 months, arguing that the market needs more certainty. Another housing developer stated that their concern for offsite production is the steel price fluctuations. Steel prices have big spikes. Traditional methods of construction have more options so they can absorb the costs of a price increasing in one area by using different materials. Better forecasting and surety over steel prices would benefit them. An engineering consultancy stated that they do not tend to use stockholders but rather deal directly with mills. One of the reasons for this was that they get more

[13] 5 interviewees stated this, representing 14% of the 36 construction sector interviewees. This includes an industry body, a stockholder, contractor and processor.
[14] 3 interviewees stated this, representing 8% of the 36 construction sector interviewees. This includes two housing developers and a large contractor.

security over price for longer time periods, which is usually fixed or set according to annual indexation.

Several felt that lead times provided by mills could be improved.[15] A contractor stated that mills require long lead times. For example, on a 10-week project, getting the steel from a mill might take up 6–8 weeks which is not viable. Using stockholders increases the cost of getting the product. They also stated that they tend to take the specifications provided by mills and work around them. A structural fabricator stated that they purchase their steel direct from mills and some stockholders. Mills normally operate with 10–12-week lead times, which can be challenging as the architects can make changes to designs at the last minute. In contrast, an envelope fabricator praised the UK producer for their lead times regarding colour-coated steel. They stated that lead times are quick. A UK producer can deliver in 3–4 weeks and they cannot get delivery in the same timeframe from overseas. Another fabricator stated that generally the quality of steel is standard, as is service and delivery. Price is a key factor as they have to work to tight margins.

There were mixed views from respondents regarding innovation. Some interviewees felt that there had been innovation in steel and provided examples of where it is occurring.[16] An industry body stated that the UK is more innovative compared to European competitors, particularly around lightweighting. If there was more collaboration in the supply chain there could be more innovation. An engineering consultancy stated that there has been a lot of innovation over the past 10 years. More steel products have been coming to market such as street furniture (e.g. seats, bins) which were previously plastic or wood. Steel is becoming the more high-end option and the preferred option for architects as it is more durable. A contractor stated that they meet with designers to reduce weight and reduce the amount of steel in structures. Meetings occur three or four times a year off their own back.

An office developer stated that that the industry is very reactive as there is no time on a job to step back and think about the processes and innovation. Nobody actively pursues research and development as they will lose out by directing resources here. They did state that there is a lot of research ongoing, for example, in collaboration with the University of Portsmouth and the University of Reading. The industry is conservative and has continued erecting structures in the same way, regardless of whether it is the most efficient method, simply increasing safety due to increased regulation. The key is how to improve the whole process of erecting a building, not just the best way to make a piece of steel. They also felt that producers are in good shape, but they do not understand the total product. They produce steel sections out of habit and nobody necessarily looks for changes or improvements. There is no innovation and producers are very much reactive. The developer stated that government used to promote and undertake research; however, this is no longer the case. Another interviewee highlighted SPECIFIC as an example of collaboration between industry and academia, funded by government and a steel producer, driving innovation in the industry.

[15] 4 interviewees stated this, representing 11% of the 36 construction sector interviewees. This includes contractors, a fabricator and an engineering consultancy.
[16] 5 interviewees stated this, representing 14% of the 36 construction sector interviewees. This includes an industry body and several contractors.

Others felt that there is limited innovation in the industry.[17] An engineering consultancy stated that there tends to be conflict in the industry with clients typically wanting reliability but also wanting continuous improvement. Clients often do not want to take the risk. Contractors are often in a race to the finish line and anything that works against this is considered to be a distraction. A fabricator stated that they use stockholders as they need steel fast and they cut to size which minimises waste. However, there is not much innovation coming from stockholders. A structural fabricator stated that the UK is not at the forefront of technology changes, and not developing unique grades. A housing developer stated that the supply chain is reactive rather than proactive. It is difficult to plan because of this. A fabricator in the construction sector stated that producers are 10–15 years behind in terms of digital automation and equipment and are unprepared for the next generation of products.

One interviewee felt that there was likely to be little need for innovation in the steel they use. A bridge fabricator stated that there is likely to be little technical innovation in steel itself, rather in the design of infrastructure which will have a knock-on effect on the steel procured, but this is unlikely to cause the need for improved innovation of steel parts. Highways and rail are fairly prescriptive and unlikely to change at all.

Capability & Capacity

Alongside costs another limitation on competitiveness related to the capability of UK producers particularly in terms of the different grade requirements in plates and sections.[18] In particular there was seen to be lack of capability in some sections and plates. A stockholder stated that larger sections have to be sourced from a Japanese provider and continental sections are sourced from Luxembourg. A structural fabricator stated that they procure 75% of their sections from a UK producer and 25% from a mill abroad, and all plate from outside of the UK either directly or from a stockholder. The main reason is lead time and availability. Plates are supplied by non-UK based suppliers as this product is simply not available in the UK and are generally purchased from Ukraine, Russia and other EU countries.

A structural fabricator stated that they get plates from a foreign mill and sections from a UK mill and stockholders. They stated that it is easier to get plates from the mill; however, stockholders tend to have substantial amounts of the same section and can be of benefit when timing is short. More and more, there is a demand for different grades of steel and the supply chain will need to react to this. It is in the industry's best interest to ensure these grades are available directly from the mill. Another structural fabricator highlighted that the UK does not produce 460 grade section. A bridge fabricator stated that they have a strong focus on buying British; however, they do get some steel types from Europe where British companies cannot supply them. There is only a small amount which is not produced by UK customers and therefore procured from European companies.

A couple of respondents highlighted limitations in UK envelope capability. One envelope fabricator stated that they use stockholders for galvanised as they have tried to use a UK-based mill previously but have struggled with the 1.5 grade from one producer. They would rather purchase it from the UK but it comes from China as the UK does not produce the

[17] 5 interviewees stated this, representing 14% of the 36 construction sector interviewees. This includes an engineering consultancy, a contractor and fabricators.
[18] 16 interviewees stated this, representing 44% of the 36 construction sector interviewees. This includes stockholders, processors and large contractors.

necessary grade. A housing developer stated that the UK cannot produce big envelopes, which leads to international contractors getting these projects.

A couple of interviewees also highlighted the lack of UK capability in higher-grade steels. This could have implications for UK producers being able to satisfy demand as the construction industry moves to higher-strength, lighter steels in future. A large developer stated that the sourcing for higher-grade steel takes you overseas to Europe and opens up a whole raft of issues around exchange rates and complicating the design aspects. An industry body for construction equipment stated that a UK-based producer has limited capability on higher-strength steels and they lose out to European made steels.

Capacity was raised less frequently as an issue by construction interviewees,[19] although there were considered to be capacity issues in reinforcement due to the UK having only one rebar producer. Some respondents felt the need to import to ensure security of supply. For example, an industry body stated that there are capacity issues in reinforcement with one supplier unable to supply to everybody. They stated that the current capacity is 1 Mt but there needs to be capacity above 1.2 Mt. When demand spikes, everybody is stretched financially as production struggles to be increased to the necessary levels. This opens the door for Europe, Turkey, Ukraine, Belarus, China – which they felt is the best the market has seen but due to anti-dumping legislation the industry cannot use. They felt an additional UK producer is vital. A stockholder stated that due to the UK having only one rebar supplier, they will always have to have a supply mix that will include an overseas element. They need to have a second source to be confident in the availability of supply.

A stockholder stated that in the past they sourced hollow sections from a UK producer but ran into problems sourcing from them. They now source 100% from Turkey because they do not want to run into similar problems again. The UK price could be as competitive as Turkey but it may not be as reliable. They believed that UK producers – in terms of volume, logistics and management – would not be able to handle the future needs of consumers (e.g. structural steel). If the UK had a 50% increase in demand, they would not be able to handle it. A modular building developer stated that there is a need for reliability of supply and that this is lacking in the UK. They do their own demand forecasting and feed this information back up the supply chain. Indirectly they provide information to the stockists. For three months they will say precisely what they want to buy, and for 3–6 months they will provide an indication of steel consumption but will not be product specific. There is value in helping them to help ourselves.

A structural fabricator stated that UK producers tend to have the capacity to deal with anything that is required domestically and are good at handling specific requests.

Two respondents also raised the issue that UK producers are unwilling to deal with small orders. For example, an industry body stated that there is a lack of willingness of steel producers dealing with smaller orders. If an order is not of a suitable size for the steel producers, it may take up to 18 months to get that order processed. Another interviewee stated that mills do not ask for industry views and instead control what steel they want to

[19] 5 interviewees stated this, representing 14% of the 36 construction sector interviewees. This includes an industry body, a stockholder, a contractor and fabricators.

produce. It is possible to get different products but a minimum order is generally required, which is difficult to achieve.

More generally, there were considered to be capacity issues by some respondents.[20] For example, an engineering consultancy stated that they will procure from abroad when there is no UK capacity or where the price is too high. A structural fabricator stated that there are capacity issues in the UK. However, a bridge fabricator stated that UK quality is good and is in the upper quartile, although where British companies cannot supply, they look to purchase from European companies. If the UK steel industry continues at the current levels of production, its ability to achieve the maximum value of the large future opportunity is limited.

In terms of future steel requirements, one of the strongest trends reflected in the interview findings was the move to higher grades of steel.[21] This echoes the findings in the historical data and reinforces the expectation in the demand forecast that there will be further shifts to higher strength – S355 and S420/S460. However, some respondents did feel that the current cost of these grades makes them prohibitive.

The movement to higher-grade steels was noted by stockholders. For example, one stockholder stated that steel will move to higher-grade and better designed frames. Tonnes will decrease while value and strength may remain unchanged. Another stockholder stated that they expect change in grade and strength requirements going forward, while another stockholder stated that grades are likely to change in future but will require new mills that can do this cost-effectively. The choice of material and requirements needed will be specified by designers.

The movement to higher-grade steels was also raised by structural fabricators. For example, one structural fabricator stated that they might see the increase of material innovation and super-grade steel, although this is currently cost prohibitive and not widely available. Another structural fabricator stated that they expect the introduction of higher-strength grades of steel without the introduction of noise. While another structural fabricator stated that there could be a change in strengths and potentially a move from 355 to 460, although they are not sure if this will work. Technical specifications have not changed much, but there might be some work around this in the next five years.

An envelope fabricator stated that the steels used will get stronger and lighter, with greater strength meaning that the quantity of steel needed is reduced. This is a trend driven by designers and engineers who are looking to reduce the weight and amount of structural steel used, which also helps to reduce cost. This was also identified by an engineering consultancy, who saw it as a clear benefit.

A contractor stated that there may be a change in grades, with buildings designed on strength, but you have to also account for serviceability. They acknowledged that grades have been moving through from 275, 355 and now 460; however, these higher grades create secondary issues in serviceability. In addition to this, only the really big manufacturers can handle the new grades as they have the know-how in-house.

[20] 3 interviewees stated this, representing 8% of the 36 construction sector interviewees. This includes contractors and an engineering consultancy.
[21] 14 interviewees stated this, representing 39% of the 36 construction sector interviewees. This includes stockholders, processors and large contractors.

There were several respondents who contradicted the trend in increasing use of higher-grade steels. A property developer contradicted the view of most respondents by stating that they do not see any big changes. Higher-grade steel is used in certain circumstances where it might give you benefit in smaller section sizes, and therefore reduces the number of column space needed which increases area to let. However, you pay up to 15% more for higher-grade steel so have to see that come back in value.

One fabricator stated that their projects are getting heavier not lighter. They stated that engineers are trying to reduce the weight of structures; however, fire design can be a key reason for increasing weight. They stressed that the only way to increase the fire resistance is to make the structure heavier or potentially make changes in coatings. Otherwise, only a shift in standards would change material choices.

One structural fabricator stated that there is not particularly any significant threat to steel as so much can be done using steel that cannot be done by so-called 'exotic' materials. In addition, an industry body for construction equipment stated that there is unlikely to be movement away from steel.

One area where there is little change expected is in reinforcement.[22] A reinforcement fabricator stated that steel intensity is stable and likely to remain stable. The current trend is to use a core of steel, with foundations of concrete reinforced by steel as well. The industry is focused on process innovation rather than product innovation and the market does not seem to be pulling for innovation, so there is unlikely to be change. As a result, they felt that steel is likely to remain. Another reinforcement fabricator stated that the reinforcement industry is very stable so does not ultimately see any opportunities and threats. An industry body stated that changes in reinforcement grades take a long time and need Eurocode approval, which takes 5–10 years. They stated that higher-strength steel reduces the quantity of steel needed but is not likely. Strength has only increased once in the past 25 years.

Some interviewees highlighted greater opportunity for modular buildings.[23] A property developer stated that there could be more steel used in pre-fabrication if there is an increase in modular construction, given that it requires framing of modules (or elements) and that is typically done in steel or some form of metal. A housing developer saw movement to more modular buildings that use steel box frames. A developer of modular buildings stated that the key driver of demand for them is modular versus traditional building methods. There is a need to change perceptions of what modular means. If this can be done it will enable the market to grow at a whole level. An architect's practice stated that future trends could see more pre-fabricated and modular buildings for hotels.

Others highlighted that more elements are done offsite in construction. An industry body stated that the industry has seen a change in trends where most work is now done in factories rather than on site. Specifications ensure that the steel a builder will get from a stockholder meets certain standards (i.e. specification for stockholders). A reinforcement fabricator stated that trends in the industry have seen most products cast in situ and brought to site. Engineers have had to dumb down and simplify fixings with products now

[22] 3 interviewees stated this, representing 8% of the 36 construction sector interviewees. This includes an industry body and two processors.
[23] 4 interviewees stated this, representing 11% of the 36 construction sector interviewees. This includes a stockholder and contractors.

brought to site. There is potential for robotic manufacture to make this more complex. If it can ensure that it gets to the site more easily and reduce the amount of time, that would be a plus and could reduce the time to site by 40–50%.

Supply Chain

The fragmentation of the supply chain within the sector is making it difficult for producers to engage throughout the supply chain.[24] The need for greater producer engagement has already been highlighted earlier in this section. The biggest implication for the sector of this limited engagement relates to the steel industry's ability to influence the construction sector in terms of helping shape design decision and ensuring that there is a comprehensive understanding of how steel can be used. This will also help to mitigate any risks to UK steel in relation to material substitution and an increased use of substitute materials. One industry body stated that they look for any gaps in the UK supply chain and find UK organisations to fill these. By providing a list of approved organisations they are encouraging use of British companies.

One large structural fabricator stated that the steel supply chain is fragmented and to overcome the complexity they are implementing an enterprise resource planning system (i.e. a business management system). They believed that if they could interact with their steel producers electronically, this would help speed up the process and remove some of the complexity. This was reiterated by another interviewee who stated that to be able to better compete, the UK will need to invest in technology within their supply chain. An envelope fabricator stated that the government must understand that the steel industry is at the core of UK success. The big issue is how the UK government views the steel industry strategically. We need to bring the UK industry and steel groups/sectors/consumers together to understand everybody's needs. The industry is divided and fragmented, there is no single voice or message. Decisions need to be more strategic and chaired by an informed third party.

The supply chain is supported by the large number of consumers consulted who stated a strong desire for 'buying British'.[25] **This preference for buying British was sometimes limited by the UK's capability and capacity, where alternative sources have to be found.** This was stated by several fabricators. For example, one structural fabricator stated that the company has a policy to buy UK steel where possible. However, decisions are dependent on the ready availability of the right size and grades of steel. Another structural contractor stated that wherever possible, steel is procured from Britain, but occasionally some parts which are unavailable to obtain from the UK require procurement from elsewhere. A bridge fabricator stated that they have a strong focus on buying British. The policy of the company is to buy British and support British industry. It is of good quality (upper quartile); however, where British companies cannot supply, they look to purchase from European companies. An envelope fabricator stated that we should be looking after the UK market.

Another fabricator stated that they would like to use more steel sourced from the UK; however, they would need to build stronger, more long-term relationships to ensure that the supplier would be more willing to be more accommodating and understanding when

[24] 14 interviewees stated this, representing 39% of the 36 construction sector interviewees. This includes stockholders, processors and large contractors.
[25] 14 interviewees stated this, representing 39% of the 36 construction sector interviewees. This includes stockholders, processors and large contractors.

making orders. A key part of this is risk management as the fabricators need to be sure the steel they require will be delivered when needed and as expected before any change in sourcing would happen.

A contactor stated they do try to use UK steel where they can, with 90% sourced from the UK and some from Germany. They use two mills for mainly price reasons. The quality and service is better with the UK mill. Health and safety is a given with both. Price ends up being the key variable. With the UK mill currently cheaper, the European competitor is getting closer. Another contractor stated that buying British keeps the supply chain in the UK and helps to keep jobs here. UK companies are easier to deal with and they have long-running relationships and supply chains with producers here.

As noted in the competitiveness section, a number of respondents do import for commercial reasons. Others were less concerned with the origin of their steel. For example, a large contractor stated that they deal with reinforcement bar fabricators who import the raw product as well as using UK-sourced and manufactured reinforcement bar. Unless they are restricted to UK material by client specification, which does happen in certain instances, they do not dictate to our chosen fabricators where the raw material is sourced.

Markets

With major infrastructure projects playing a key role in driving the future demand of UK steel, respondents felt that there is greater opportunity around procurement within the construction sector to support the UK steel industry by focusing on increased transparency on reporting material sourcing as well as ensuring that procurement takes into account wider socio-economic impacts of UK sourcing.[26] The risk at the moment is that currently when foreign companies win contracts, they tend to use their own existing supply chains.

Respondents did not mention the government's introduction of steel-specific procurement guidance to take account of social and environmental factors, which suggests that the nature and duration of contracts may take some time for the full effects to be felt.

A large number of interviewees stated that demand is dependent on government infrastructure spend. HS2 and Hinkley Point C were highlighted as key opportunities.[27] This was a view expressed by a range of respondents. For example, an industry body stated that government spending on infrastructure projects (roads, rail and nuclear) keep the bigger companies busy. There are also regional trends that are also affected by government spending. Projects are packaged in regions, so will often go to the most convenient steel work contractors. Another industry body stated that key drivers of demand are residential, private equity and government infrastructure spend with Thames Tideway, HS2 and Hinkley Point C opportunities.

One large engineering consultancy stated that 90% of their demand comes from government-planned infrastructure spend. Another engineering consultancy stated that they do lots of work for government with the majority of their work publicly procured. The UK is investing more than it was 20 years ago so there has been an increase in need for

[26] 10 interviewees stated this, representing 28% of the 36 construction sector interviewees. This includes an industry body, processors and large contractors.
[27] 14 interviewees stated this, representing 39% of the 36 construction sector interviewees. This includes industry bodies, stockholders, processors and large contractors.

services. Another engineering consultancy stated that a large majority of their projects comes from government spend on infrastructure.

A stockholder stated that a large driver of their demand is the public sector (schools, hospitals), large infrastructure projects, retail developments and warehouses. Another stockholder stated that demand will be driven by residential developments and infrastructure, which is expected to pick up. There are quite a few jobs in distribution centres coming up and this is only likely to continue.

A fabricator stated that their future plans tend to depend heavily on policy decisions and supply and demand factors. Another contractor stated that key to their business is government infrastructure spend. A reinforcement fabricator stated that there could be an increase in the amount of reinforcement needed, with major projects taking place. A developer of modular buildings stated that demand is primarily to the public sector (e.g. education & health), but also to other sectors such as manufacturing, utilities and logistics. A structural fabricator stated that they sell into the UK construction and infrastructure projects, with HS2 and Hinkley Point C being big opportunities. A structural fabricator stated that they are not yet seeing the funding for large infrastructure projects but that this is expected to change in the future.

A contractor stated that they rely heavily on government and local authority spending (although this has been in decline), with private projects making up less than 5% of their turnover. HS2, Lower Thames Crossing, and smart motorways were seen as opportunities going forward. Another contractor stated that their demand comes from publicly financed projects by the government, such as HS2, Network Rail and the Highway Agency.

It was perceived that the government could do more to ensure UK steel is used by taking into account the socio-economic impacts of procurement decisions.[28] The government has introduced steel-specific procurement guidance to take account of social and environmental factors. An industry body stated that government procurement is made solely on cost, with no reward for using UK-based contractors. There is a lack of connection between large infrastructure projects and UK suppliers. If the opportunities are not going to UK contractors then they are not going to UK fabricators. If you use a UK fabricator you are much more likely to get UK-made steel. If you use a foreign fabricator you are much more likely to get foreign-made steel. They felt that a Spanish or Portuguese contractor will tend to get the job over a UK contractor because the primary factor is cost. For example, lots of foreign contractors have been appointed to do the bridges for HS2. As a result, they will tend to stick to design trends and materials used in continental Europe where concrete bridges are more prevalent. They stated that there is a risk to UK bridge companies if the government continues to procure suppliers from abroad. Similarly, they stated that there have been some big tendering opportunities for energy recently and UK suppliers have again lost out because of costs. In contrast, another industry body felt that the government only want UK steel and steel should not have to come to the UK. They stressed that fabricators are sustainable, and the government must listen more to the voice of users not just producers. They felt that there needs to be more education and clarity around procurement rules and more guidance.

[28] 5 interviewees stated this, representing 14% of the 36 construction sector interviewees. This includes industry bodies, processors and large contractors.

A contractor felt that the UK government perceived UK steel to be too expensive when solely focused on cost. However, this does not take into account other factors the UK excels at, for example the high health and safety standards in the country. A reinforcement fabricator stated that there are considered to be grey areas around procurement rules that they see some organisations in the industry exploiting. To overcome this, they would like to see companies reporting their procurement sources at the end of projects. A bridge fabricator stated that British engineering has a good reputation and there is competitiveness on price. However, there is not the same backing by the UK government compared with other countries. There are often offset deals in other countries where finance options are offered on the basis that the investment is kept within the country.

A number of interviewees perceived that there was a threat from foreign contractors.[29] One contractor stated that Chinese steel may become more popular as there has been an increase in Chinese contractors, such as the South Quarry Plaza. An envelope fabricator stated that American development and investment could threaten the single-storey market, with movement to American principles. This has not been realised yet, with just one or two buildings having been built in this way so far, but the market must be aware of the threat. Conversely, a structural fabricator stated that China is a threat to their business. As yet they have refrained from entering the UK market but felt that it was only a matter of time. Another structural fabricator stated that there is an influx of foreign contractors and buyers of foreign steel which UK-based tier 1 contractors are struggling to compete with.

The other big driver for the industry is private developments such as residential and office space.[30] For example, a property developer stated that the key driver for them is private developments. The development programme for office space tends to be lumpy and goes through phases but they are not forecasting a decline. A large office developer stated that cycles run every seven or eight years. Demand for offices also work in cycles as leases end at similar times. As leases end there are lots of projects, but during leases there are not so many. Financial conditions and the government also have a big impact on demand. A structural contractor stated that demand is driven by construction of commercial offices in London, distribution warehouses, and leisure/mixed-use complexes. A fabricator stated that private sector client performance is the key driver; successful clients require expansion in terms of car parks and store refurbishment.

A housing developer stated that their demand is driven by demand for housing. They stated that business is strong with perfect conditions currently as there is a high demand for housing, low supply of housing and low interest rates. Another housing developer stated that demand is driven by private homes, private rented sector and housing association requirements.

[29] 4 interviewees stated this, representing 11% of the 36 construction sector interviewees. This includes a housing developer, fabricators and large contractors.
[30] 6 interviewees stated this, representing 17% of the 36 construction sector interviewees. This includes a property developer, contractor, fabricator and housing developers.

A large number of respondents highlighted opportunities for substitution away from steel with the main opportunities in concrete,[31] timber[32] and glass-reinforced plastic (GRP).[33] Concrete was the most frequently raised alternative, with 11 construction respondents raising this as a substitute for steel. GRP was the next most popular response, stated by eight respondents, followed by timber with six.

Respondents felt that the choice of material is dependent on a range of factors, including engineer or architect's decisions, the suitability of materials to particular design challenges, perceptions of the materials, cost of materials, and the level of marketing by respective industries.

Concrete was generally seen as the main threat of substitution by structural fabricators and contractors. However, it is worth highlighting that steel is still required when reinforcing concrete. Respondents raised various uses for concrete relative to steel. For example, a property developer stated that they are predominantly looking at concrete for residential or retail and residential combinations. They felt that concrete tends to lend itself to doing residential or hotel work because you need mass to deal with vibrations between individual apartments or hotel rooms. Conversely, an engineering consultancy stated that they are looking to use concrete for retaining walls for car parks. This decision is driven by the fact that concrete is cheaper, but they admitted that if steel was cheaper it definitely has other advantages that may lead to greater use. An engineering consultancy also stated that crash barriers are moving from steel to concrete. They felt that government regulations and standards have played a part in this change, but concrete also provides increased safety, reduced maintenance and longer whole life cost.

Some respondents felt the threat of concrete to steel has receded in the past few years due to a number of limitations. For example, a structural fabricator and engineering consultancy stated that current design trends, specifications and shapes mean that steel is usually favoured over concrete. The engineering consultancy stated that this is particularly the case with bridges in the UK. Another stated that they are more comfortable using steel compared to concrete, so tend to drive customers towards this where possible. A contractor stated that they could use concrete, but this requires a lot of people on-site which is not favoured by contractors because do not tend to like this. Despite the threat, respondents highlighted that use of steel versus concrete in the UK is the highest in the world.

With plastics, a contractor felt that there are question marks over how to modify the material on-site and it could be too brittle to use.

Timber was seen as an emerging threat by the construction respondents, but again, it does have limitations. For example, a property developer highlighted that timber is good from a sustainable point of view; however, you are limited to steel and concrete for high-rise building structures as timber will only satisfy to a certain level. An office developer

[31] 11 interviewees stated this, representing 31% of the 36 construction sector interviewees. This includes an industry body, processors and large contractors.
[32] 6 interviewees stated this, representing 17% of the 36 construction sector interviewees. This includes an industry body, large contractors and processors.
[33] 8 interviewees stated this, representing 22% of the 36 construction sector interviewees. This includes an industry body, engineering consultancies, large contractors and processors.

stated that timber is taking over composite metal decking but this is only a small part of developments, so it should not be a big issue for steel.

One housing developer did state that timber frame and masonry are the biggest competitors for steel for housing. They stated that timber currently has the biggest share of the market, but this could be reversed if steel prices are more stable. At present, there is around a 10% premium on steel. In contrast, a contractor felt that timber is unlikely to be used much going forward as construction is an old-fashioned industry and trust in new materials happens slowly.

Respondents raised a number of opportunities for substitution to GRP from steel. They felt that this is being driven by a number of benefits GRP has relative to steel, including the fact it is lighter, easier to transport, cheaper, better at dealing with corrosion and does not need to be painted. For example, an engineering consultancy highlighted potential movement to GRP in signage and lighting columns. In addition to the benefits listed above, GRP holds a lower scrap value compared with steel, which means it is less likely to be stolen. Another engineering consultancy stated that large bridges can also be made of plastics instead of steel, particularly those used in rail projects. They felt they have the same functionality and are much lighter so could be more efficient to install. An envelope fabricator also stated that plastic could substitute steel in future with some in the industry moving to plastic designs which are 16–18% lighter. A structural fabricator stated that substitution is already occurring and some contracts are now being lost to GRP, which is cheaper and avoids corrosion.

The opportunity to move to fibre reinforcement was highlighted by several interviewees. A large contractor stated that 95% of the steel they use is rebar. The construction process on an increasing amount of our work is now changing and they are promoting and completing more post-tensioning construction. This process replaces a fair proportion of reinforcing bar with strand reinforcement and if this continues their requirements for rebar may actually reduce even if the workload is maintained. An industry body stated that fibre reinforcement has also been used in Thames Tideway segments, which is surprising. They went on to state that there is no steel fibre capability in the UK, with it all imported. A modular building developer stated that steel makes up one-third of their total cost so price fluctuations have a big impact. If prices increase, there could be substitution to engineered timber structures or GRP for roof materials. Stability in the timber prices could threaten substitution (due to green issues). UK steel performs poorly in terms of energy costs and pollution levels. This could be a driver against use of steel.

In contrast, a reinforcement fabricator stated that substitution from steel has not been seen in the market. Ten years ago, there was lots of talk around substitution to fibres but this does not seem to have emerged. Fibres are not at the same level of standards to steel so have not seen a growing market share. Steel is stable, fit for purpose and we do not see any major drivers for this to change. There is always going to be competition between steel and concrete, and to a lesser extent timber. They felt that a producer has done a lot of good marketing for steel and so have the trade bodies. Another reinforcement fabricator stated that they do not see much change in the industry. They felt that stainless struggles in the industry and fibres have not seen much traction.

Respondents also raised opportunities for steel to substitute other materials. Several highlighted the opportunity to take further market share from concrete.[34] For example, a structural fabricator stated that steel competes closely with concrete, and should definitely look to replace this. One housing developer stated that they are looking to move from concrete to steel modules. A housing developer stated they are building two prototypes with steel frames, which has taken around 18 months of R&D to produce. This is cold-rolled light-gauge steel. The steel content in their buildings would rise 10-fold compared with what is currently used if they are successful. This suggests more steel use instead of timber and steel used for other things such as steel floor cassettes. An engineering consultancy stated that if you can create lower carbon value steel, then concrete market share is likely to suffer.

A stockholder stated that steel is likely to be the first choice for construction but people are still putting up concrete buildings. Given the density of the population in London, concrete developments are less of an option. All developments have to be built on top of something, e.g. have to keep the façade and use steel internally. There will be more steel buildings given the import price of concrete. The waiting time for blocks can be up to three months, whereas cladding is quicker to install. For example, you do not see as many concrete car parks nowadays. A fabricator stated that client needs are also key, and the differentiator is usually cost or the look. For example, in London, clients generally want steel structures for the look and feel they provide. Retail clients tend to prefer mixed-use (mixture of steel and concrete) or pure concrete. Furthermore, how the engineers/architects design the structures impacts material choices; there seems to be a movement to steel.

An envelope contractor stated that the UK must hold onto its market share in terms of steel structures and envelopes. There is an opportunity in non-office occupied buildings with more than six storeys. They felt that the government needs to look at global methods to push a shift to steel from concrete. They could take the low-hanging fruit initially, such as mid-rise and mixed-use builds.

There appears to be an opportunity for the UK steel industry to engage more deeply with the construction sector, particularly around encouraging the greater use of steel, in residential construction, and driving a higher degree of standardisation in design – with Sweden provided as an example to emulate.[35] For example, a stockholder stated that in Sweden or Denmark the design process is standardised and there are best practices. The UK has many more constraints around planning as well as designers from all around the world who bring different ideas and styles. This creates a much more diverse design process with different professional inputs and material choices. A contractor stated that UK steel is expensive versus other countries such as Sweden, where they have modular construction and no land restrictions. Here, everything is bespoke and nothing is standardised, with the exception of fast food outlets.

Respondents stated that they are anticipating further standardisation of designs in future.[36] One stockholder stated that designs are becoming more economic and there will start to be more use of standardised components in construction. Whereas a fabricator

[34] 7 interviewees stated this, representing 19% of the 36 construction sector interviewees. This includes an engineering consultancy, stockholders, large contractors and processors.
[35] 2 interviewees stated this, representing 6% of the 36 construction sector interviewees. This includes a stockholder and a contractor.
[36] 5 interviewees stated this, representing 14% of the 36 construction sector interviewees. This includes a stockholder, contractor, fabricators and a developer.

stated that they are looking into standardising their car-park offering as this would allow them to place orders further in advance and possibly buy directly from mills. A structural fabricator stated that they do not see a huge technological revolution coming on the horizon, but there could be rationalisation of products made to reduce variables for designs of the output. A modular building developer stated that there may be more simplification of their products, and standardisation of steel products needed could align to this. They currently buy a variety of types of steel for the different types of products they produce. Non-standardisation of products makes this more difficult, and lead times from producers do not help. A structural fabricator stated that standardisation of design could see increases in demand for steel. If designs were standardised, then it would allow the steel producers and industry to be better aligned.

d.) Automotive

Automotive – Historical Demand

Capability Summary

Finished Steel	Gaps	Commercial	Technical
WR (Drawing Quality)	No capability gaps observed		
Engineering Steels	High share of imports despite good range of technical capabilities	• Lack of suitable supply chain presence • Customer service – timely deliveries and distribution facilities	• Gaps in technical capabilities to produce rods
HRC, CRC, Coated Products	High-strength grades		• Tata Steel Port Talbot does not have any capabilities for these grades. These grades are imported from Tata IJmuiden and from ArcelorMittal plants in Europe • There have been trial production runs for HS grades but these have not been stabilised and commercialised
Coated Products	Gaps for Z600 and above		• It needs some modifications in the existing coating lines. Only ArcelorMittal and Wupperman have high coating capabilities

Finished Steel	Gaps	Commercial	Technical
	Galvanneal (GA)		• GA used to be produced in Llanwern but it migrated to Tata Belgium. No GA is produced in Shotton currently
	Zn-Mg		• Produced by Tata in IJmuiden. ArcelorMittal, Thyssen, SSAB. Used mainly for automotive and some construction applications to increase service life
Stainless Steel	Lack of capacity in UK	• Demand size not sufficiently large enough to justify the capital costs of an atypical configuration of EAF/Caster 500 kt p.a., tube mill of 350 kt p.a.	

The automotive sector demand has increased in the past five years due to increasing vehicle production in the UK. It is only 8% of the demand currently but it is a hugely under-penetrated sector for the UK steel industry. With its capability, the local deliveries are minority suppliers to the industry and its share does not exceed 35%. Most of the steel to the automotive sector is supplied by imports or imported in the form of manufactured systems or components, which are then assembled in the UK. This has been acknowledged as a key strategic issue by the Automotive Council UK. From an opportunity standpoint, it implies that there is considerable room for the industry to improve from its current position.

The key developments in the automotive sector are:

- Increasing share of AHS and UHS steels as vehicles increase lightweighting in response to emissions targets. UK does not produce any of these value-added grades, which are consumed in the automotive sector, and this is a very significant lack of capability.
- There is demand for coatings >Z600, galvanneal (used in automotive body in white [BIW] applications) and zinc-magnesium coated sheets. Increasingly, these are becoming important differentiators and value-added components in a producer's product mix

The success of wire rods (drawing quality) which has capabilities to supply to the automotive sector implies that if the capabilities are developed then a producer is not necessarily bound only to the UK market and it can address opportunities in the EU and also globally.

Automotive – Demand Forecast

1.0 Demand Outlook

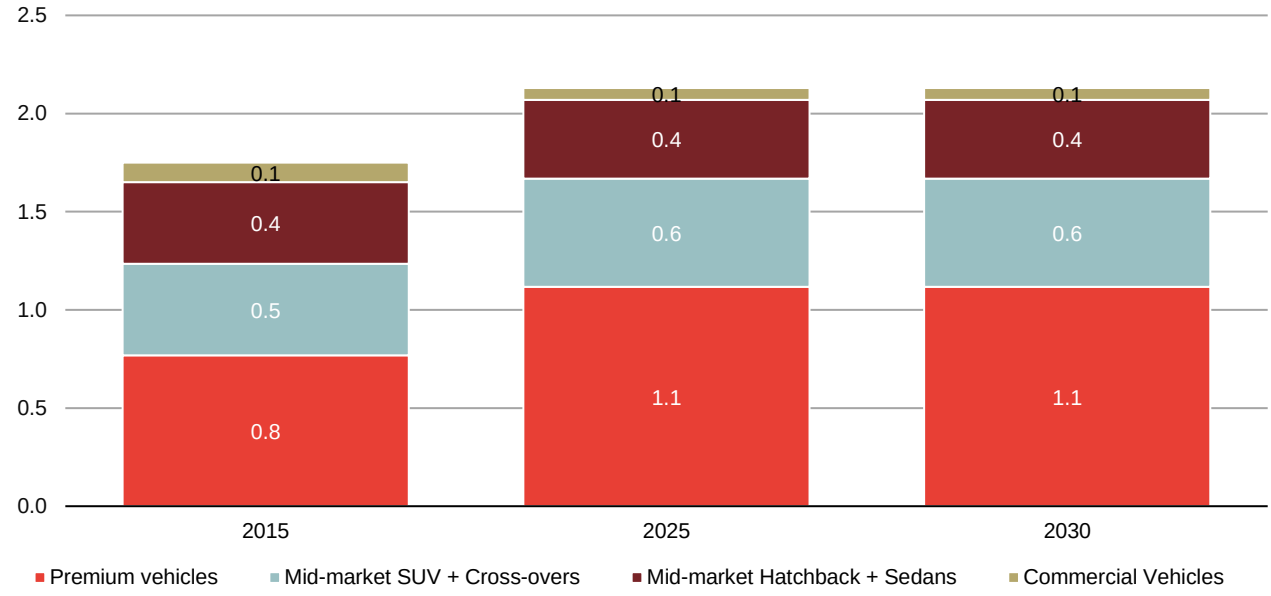
The total demand for finished steel from the automotive sector is forecast to change to 645 kt in 2030 from 711 kt in 2015. At a high level, this is a reduction in demand volume. But it must be highlighted that demand is shifting from volumes to value because of higher use of more value-added AHS and UHS. The forecast is based on current local content of 35% in UK production. Therefore, there is significant potential to improve this if the local content could be increased by reshoring automotive supply chains.

2.0 Sector Outlook

2.1 Vehicle Production

According to SMMT, vehicle production in the UK is forecast to grow to 2.13 million units by 2030 from 1.75 million in 2015.[37] This represents a 21% growth in vehicle production during this period. Almost all of the growth is forecast to be in the premium vehicle category (Jaguar, Land Rover, Mini, Bentley, Rolls Royce). The current uncertainty with regards to EU exit and its knock-down effect on investments has not been factored into the forecasts as there was no visibility on the timeline of the negotiations. The forecasts were accepted as a useful guide to the trajectory of the future of the automotive industry. It must be highlighted that the premium category vehicles have predominantly shifted away from steel to aluminium. The bulk of the steel consumption will be in the other categories of vehicles, such as mid-market hatchbacks, sedans, SUVs, cross-overs and commercial vehicles.

Exhibit 39: Automotive Production Forecasts (million)



Source: SMMT

2.2 CO_2 Emissions Target

The EU has set a binding target to reduce greenhouse gas emissions by 40% from its 1990 levels by the year 2030. Continuing in that direction, the average emissions per new

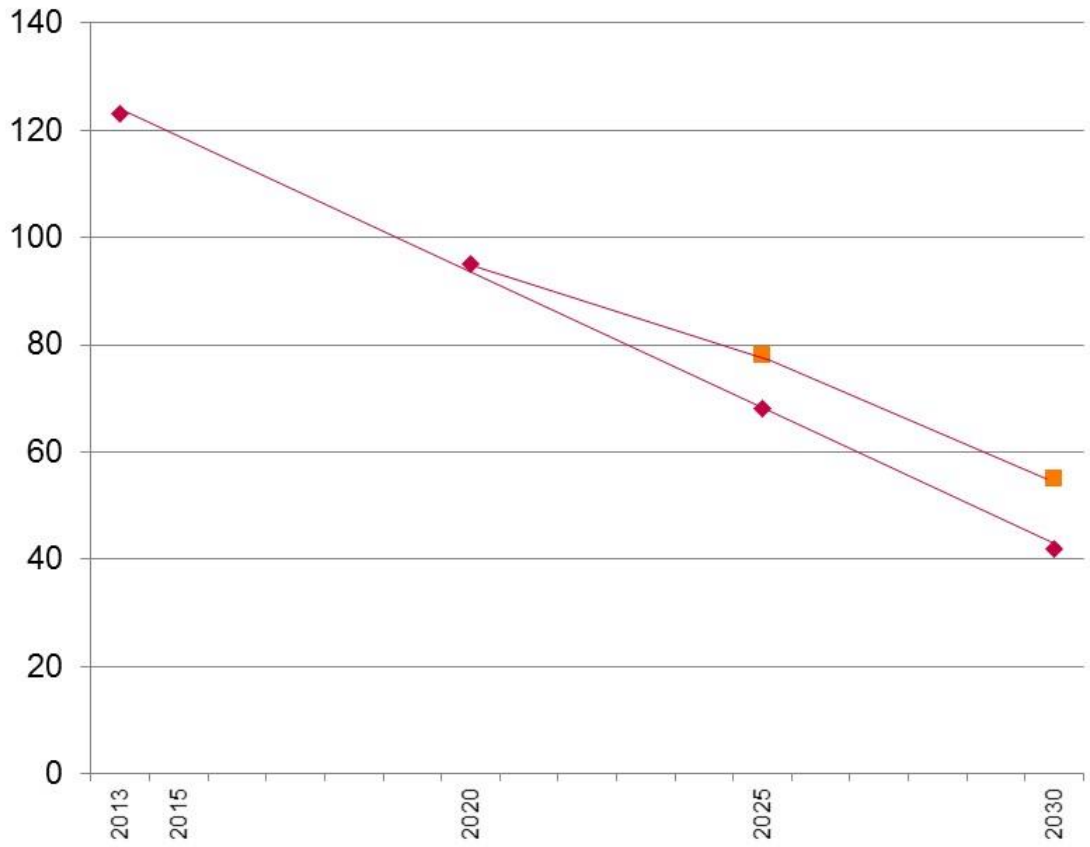
[37] Inclusive of vehicle exports.

car in 2016 were 119.6g/km, 8% below the 2015 targets. Clearly the success of this will encourage the EU to aggressively push for more stringent targets. The EU has not finalised the CO_2 emissions target for passenger vehicles and commercial vehicles; however, the indications of the range of emissions targets under discussion suggest that it is likely to tend towards 42–55 CO_2 g/km. Compared with the current levels of 119.6g/km in 2015, this represents a very steep reduction of 55–65%.

The automotive industry is at a stage where, if electric car production and usage accelerates, it could even relieve some of the pressures of meeting emissions targets on conventional internal combustion engine cars. This implies that pressures of lightweighting of cars could also be relieved and pushed back.

The proposed emissions targets were discussed with our automotive subject matter experts. In the discussions, we were advised that indicative emissions targets for 2030 are a reasonable target to consider from a long-term planning perspective. Alongside emissions targets, we also discussed the effect of growing electric vehicle production. Our subject matter experts advised us that although electric vehicle production will inevitably increase exponentially, the increase will be from a small base. Vehicles with internal combustion engines are likely to form a significantly large share of future production and therefore the emissions targets under consideration by the EU are not likely to change very substantially.

Exhibit 40: New Car Average CO_2 Emissions in EU 2014–2030



Source: ICCT Briefing November 2016

3.0 Vehicle Lightweighting

This CO_2 emission target implies that vehicle mass reduction is a critical component to achieve the emissions target alongside other options such as increasing power train efficiency and rolling resistance. Based on the interview responses, there are no major changes anticipated in steel intensity per vehicle up to 2020, as some of the changes to vehicle mass are already being addressed by OEMs. This is also consistent with the development cycle of 5–7 years for each model.

The key anticipated changes in steel requirements from a demand forecasting standpoint will be effective beyond 2020. The interview responses received from different players in the automotive supply chain and stakeholders did not provide any clear response to the direction of the travel for vehicle lightweighting. In our view, the reasons for this could be commercial confidentiality, lack of authorisation to share such information (especially for listed companies) or lack of visibility. We therefore had to rely on information available in the public domain.

A review of position papers by UK Advanced Propulsion Centre and WorldAutoSteel suggests that vehicle masses may need to be reduced by a further 15% by 2030 to align it with targeted CO_2 emissions.

Indexed vehicle masses	2012	2020	2030
Premium Vehicles	1.0	0.89	0.74
Mid-market SUV	1.0	0.89	0.74
Mid-market Hatchback	1.0	0.88	0.73
Commercial Vehicles	1.0	n/a	n/a

Source: Advanced Propulsion Centre

This implies a shift to higher-strength grades, particularly to HS and AHS grade, reduction in demand volumes but a shift to higher values. In addition, the local content in vehicle production is not expected to increase significantly from the current 40%, as there is little evidence to support a big change in supply chains reshoring back to UK.[38]

Further to this, we reviewed the vehicle mass reduction achieved in the past as well as some potential paths that are being considered for meeting emissions targets.

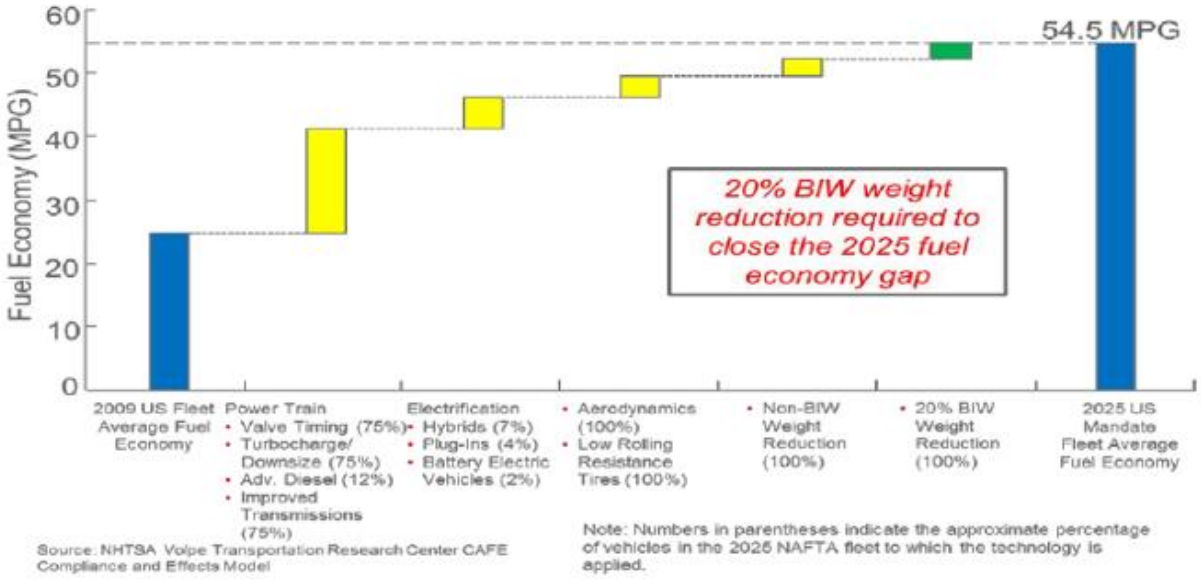
A review of vehicle masses in the past 10 years done by WorldAutoSteel reveals that steel has successfully enabled mass reduction of up to 25% in the past decade. The below exhibit provides various examples of such reduction for vehicle models in the US.

[38] In the demand forecast we have made the conservative assumption that local content remains around the 40% mark out to 2030, as some of the sector will have aspirations to increase local content over time.

Exhibit 41: Steel-Enabled Vehicle Mass Reduction

Source: WorldAutoSteel

Exhibit 42: Illustration of Measures to Achieve Higher Fuel Efficiency and Lower CO_2 Emissions for a Typical Sedan (US)



Source: WorldAutoSteel

The above exhibit provides an example from ArcelorMittal on how automotive grade steel could enable better fuel efficiency, which also implies lower CO_2 emissions. The illustration shows that steel could help achieve 20% reduction in BIW weights.

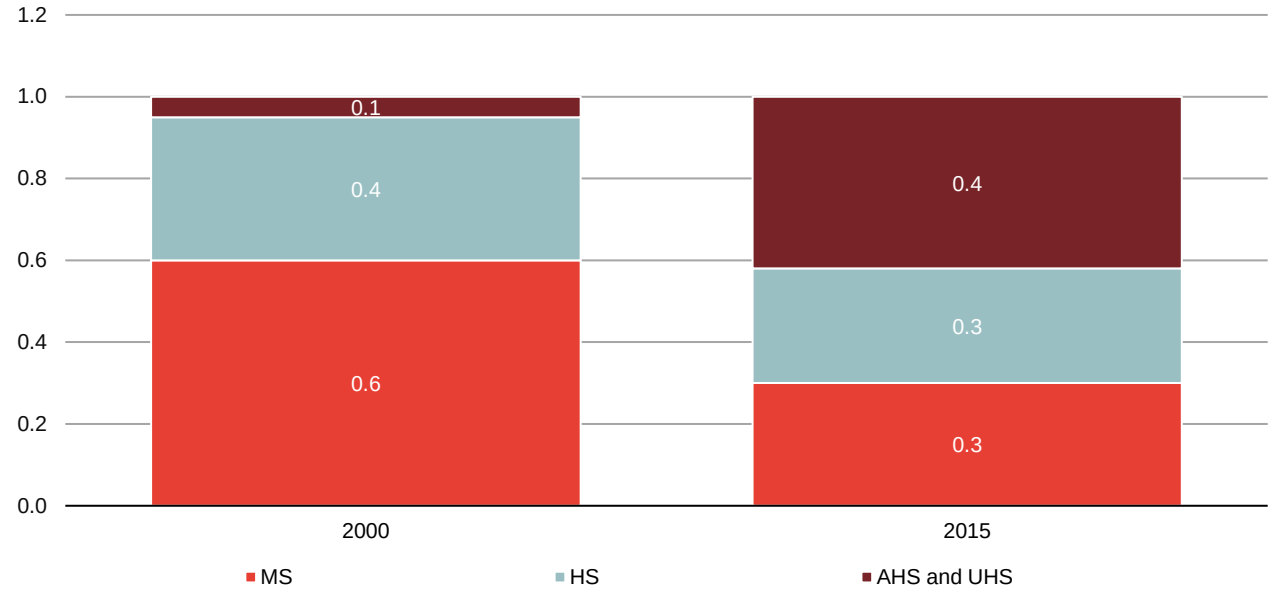
Synthesising these examples and historical evidence shows that the steel industry has adapted well and rapidly to increasing requirements from the automotive industry. On that basis we conclude that at 17% weight reduction of the vehicle mass up to 2030 enabled by steel can be achieved by the steel industry.

4.0 Changes in Specifications

The anticipated lightweighting will have a direct influence on the grades to be used in automotive. Steel grades for automotive applications have evolved enormously over the past two decades. There has been an increasing demand for high-strength steels and as noted above, the historical trends show that globally the steel industry has adapted well

and rapidly to increasing requirements from the automotive industry. However, the UK steel industry has not been as effective.

Exhibit 43: Changes in Steel Grades by Strength

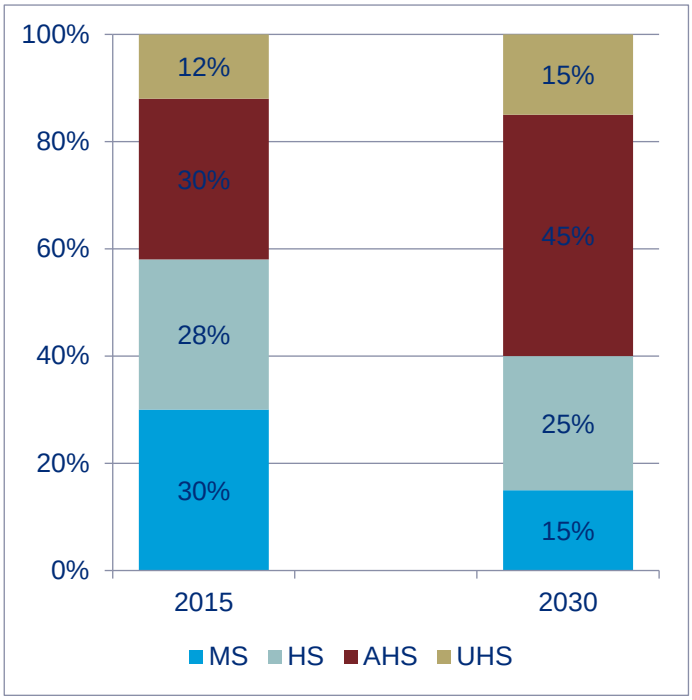


Source: WorldAutoSteel, ArcelorMittal, Tata Steel, Hatch Estimates

A comparison of steel grades used between 2000 and 2015 for vehicles and Western Europe and North America is illustrative of how much grades have evolved in 15 years. AHS and UHS was 5% of the total consumption in 2000 and by 2015 their share had increased to 42%.

The requirements of lightweighting are such that a perceptible, sharp increase in AHS and UHS will be required to meet the 2030 emissions target. The share of AHS and UHS could increase to 60% of total steel in automotive sector from the current 42% share in 2015.

Exhibit 44: Estimates of Grades Shifts by Strength



Source: Hatch Estimates

4.0 Improving Competitive Positioning

Automotive steel is a huge strategic area in which the UK has marginal presence. It has not made the investments in aligning its capabilities with the demand of the industry. The roots of these issues can in part be traced back to the industry struggling to make margins and invest the surpluses to develop the capabilities. Some capabilities have migrated out of the UK as an economic response.

Steel will continue to be the dominant material of choice for automotive production in the non-premium vehicle category. If electric vehicle production takes off, steel can still be considered as the main material despite substitution threats from alternative materials like aluminium or composites.

AHS is likely to be the main bulwark of steel grades. When comparing the future grade requirements, the UK's capabilities are not in lockstep with the automotive industry. For the UK to become a dedicated supplier to the automotive industry, it will need to address the following:

- Investments in modifications and capability enhancements will be required which cascade from steel making, secondary metallurgy, hot rolling, cold rolling and coating. These need commitment of resources over a longer time period, even through the down cycles which the steel industry goes through frequently.
- Investments in product development and innovation and development of linkages with automotive supply chain. The interview responses from the automotive industry suggest that the steel industry trails behind the aluminium industry and it needs to vastly improve this aspect to be a serious supplier.

- Augmenting coatings mix for zinc-magnesium, galvanneal and Z600 and above.
- Addressing capacity gap in coated products.
- Specific to engineering steels, it would need to address the gaps in downstream supply chain processes such as forging.
- The interview responses indicate that procurement of OEMS or tier 1 suppliers to automotive industry are not tied to being located in the UK, so the UK needs to build its commercial relations with the automotive industry on a pan-European basis.

5.0 Uncertainties and Risks

A key uncertainty in the automotive sector is on the production forecasts timeline due to EU exit negotiations. However, this will risk a smaller share of the demand. The main steel-consuming vehicle categories are expected to maintain similar production levels for the foreseeable future.

Automotive – Sector View

Supply Chain

UK-based OEMs operate sophisticated globally integrated supply chains. Given foreign ownership, many sourcing decisions are made outside the UK.[39] This context has a number of significant implications for UK producers. Principally, it means that UK automotive supply chains will often source their steel content from overseas, as this can be more commercially advantageous.[40] This then has a knock-on effect in relation to investments as the parent company will often choose to invest in plants that are capable of producing higher-value grades. It also means that while there are large volumes of domestic steel supplied to the UK auto sector, the OEMs consulted felt that there is little to no dependence on the UK steel sector within the automotive industry.

For example, a large OEM stated that steel is procured on a European basis where they will have contracts with the producers who will then supply out of their most appropriate facility. They stated they are a global company so they are not bound to any particular country or supply chain and if the UK steel industry ceased tomorrow then they would source from elsewhere. An OEM reiterated this stating that they are a global entity and therefore purchase from global suppliers while another stated that they procure directly from the producer who will make a decision around which mill they supply from. At present, this is not in the UK. In addition, an industry body stated that OEM purchasing and engineering teams are often based abroad.

It also poses a challenge to the producers in how they engage with the supply chain below the OEM. The view of the producers was that while relationships are generally strong with the OEM, there is much less interaction with organisations lower down the supply chain.[41] This is a challenge for the producers as these supply chains are

[39] 7 interviewees stated this, representing 47% of the 15 automotive sector interviewees. This includes an industry body and four large OEMs.
[40] 4 interviewees stated this, representing 27% of the 15 automotive sector interviewees. This includes a producer and two large OEMs.
[41] 4 interviewees stated this, representing 27% of the 15 automotive sector interviewees. This includes an OEM and two tier 1 suppliers to OEM.

invariably made up of a large number of smaller suppliers. As noted by one producer, given the amount of money tied up in the complex supply chain and the high levels of wastage, there is an opportunity for the automotive and steel industries to innovate and facilitate a clearer, simpler supply-chain solution. The lack of engagement further down the supply chain was highlighted by several tier 1 interviewees,[42] with one stating that it is preventing innovation.

Respondents did highlight that OEMs often specify strict specification requirements and often sources that suppliers have to adhere to.[43] For example, a tier 1 supplier stated that customers have strict expectations and very specific needs, whereas a supplier they are rarely given freedom. Another tier 1 stated that the customer will dictate the route and the supplier. They dictate the mill, fix the costs and set the quantity to be supplied. As a result, they cannot negotiate directly. The tier 1 supplier will support the customer in terms of asks. Another tier 1 supplier stated that the decision on which mill to procure from is driven by their customers, who dictate the mills. The customer negotiates the types of steels and the prices that will be paid. A large OEM corroborated this, saying that they give specifications to suppliers, with sources and prices defined for them. Another tier 1 BIW supplier stated that they do have some say at the beginning of relationships with OEM. The tier 1 supplier tends to lock into relationships with the OEM. While the tier 1 suppliers have flexibility at the start of these agreements to choose where they buy from, they cannot move away from these sources for the duration of these contracts. In contrast, one OEM of sports and luxury vehicles stated that they let their suppliers deal with the sourcing of steel, of which they stated that 50% are based abroad due to the nature of the specialist products they are sourcing.

An industry body highlighted research by the Automotive Council that identifies 60–70 components that are not produced in the UK. The best example is alloy wheels, with large-scale manufacturing abroad. There needs to be a critical number of OEMs based in the UK to keep the supply chain here.

Capability & Capacity

The UK's capability was highlighted as an issue, with a number of consumers noting that there are certain specifications, particularly high-strength steel, UK producers cannot make.[44] An industry body stated that UK steel producers provide one-third of UK automotive steel demand. They felt that UK content has got better but is still improving. One large OEM stated that they have specifications that are not provided by the UK so come in from Belgium or Holland. Another large OEM stated that historically the specifications and quality required have been difficult for UK producers to meet. A previous UK-based supplier to the OEM could not keep up with the changing demands. Another OEM stated that they have a preference for galvannealed steel, which is no longer easily sourced from the UK. One particular producer in the UK has underinvested so they therefore cannot give them orders, as they have a lack of confidence they would be able to produce the quality required.

[42] 3 interviewees stated this, representing 20% of the 15 automotive sector interviewees. This includes three tier 1 suppliers.
[43] 5 interviewees stated this, representing 33% of the 15 automotive sector interviewees. This includes an OEM and four tier 1 suppliers.
[44] 8 interviewees stated this, representing 53% of the 15 automotive sector interviewees. This includes 1 industry body and four large OEMs.

A tier 1 supplier stated that historically they used to go to a UK mill directly, but their stock and price were not particularly good. They now use a stockholder because of the availability of specifications they provide for a certain OEM and because the stockholder works on a just-in-time basis. Another tier 1 supplier stated that they were not sure whether the products they require could be produced in the UK. They stated that there is a perception that UK steel mills would not be able to produce the requirements they have. A processor also stated that there are certain circumstances where procurement cannot happen from the UK because of both availability and capability so they will look elsewhere. For example, galvanised-product capability reduced in one UK producer 18 months ago which left them exposed and they had to import material because of that.

Capacity was raised as an issue by two OEMs. One OEM stated that they have had capacity issues with one producer of coated products where they have wanted to increase demand but were told that this would not be possible. As a result of this they stated that they may look to change their sourcing decisions in future away from this producer. One tier 1 BIW supplier stated that capacity in the UK is a weakness due to one mill which is trying to do everything. A lack of investment in these facilities means that they are not going to be prepared for the next generation of products. Lack of investment was also seen as a reason for the quality of product being better in the continent. In contrast, an OEM stated that capacity-wise they were not aware of any issues with UK producers.

Competitiveness

There were mixed views about the competitiveness of the UK steel sector. Some noted that they were competitive in the UK market.[45] An OEM stated that the UK steel industry is competitive supplying from the UK to UK-based factories but not competitive enough to supply into Europe, once transport is taken into account. Another OEM stated that while the UK is cost competitive with European competitors, there is a growing threat coming from a South Korean mill. As a result, they may be moving more of their consumption there in future, while others noted that they were not cost competitive with Europe.[46] For example, one tier 1 supplier stated that it is difficult to source from the UK at the right price. A processor stated that there is nothing to separate out the UK from the rest of Europe, even with the foreign exchange rate, because a lot of the raw materials are bought in dollars. Any advantages thought to have been had have been absorbed into the pricing. An OEM of sports and luxury vehicles stated that the UK steel industry is not cost competitive compared with Europe and limited by productions costs.

Energy costs were seen as the key differentiator by one respondent. A tier 1 BIW automotive company suggested that UK mills are at a disadvantage against their European competitors in terms of energy costs and would like to see more assistance from government.

In the European context, the UK's competitiveness was also seen to be limited by additional logistics costs, particularly in relation to transporting product around the UK.[47]

[45] 4 interviewees stated this, representing 31% of the 15 automotive sector interviewees. This includes two large OEMs and a tier 1 supplier.
[46] 5 interviewees stated this, representing 33% of the 15 automotive sector interviewees. This includes one large OEM and two tier 1 suppliers.
[47] 2 large OEMs stated this.

One large OEM stated that logistics costs are a major challenge, with transport by road no longer a viable option because of its prohibitive cost.

Consumers also highlighted issues with quality and customer services with examples given of producers not being adaptable to smaller volumes.[48] One tier 1 supplier stated that steel producers are not interested if there is not lots of demand. They cherry-pick products to maximise profit and are too focused on capacity and cost restraints. They must listen to customers more. Another tier 1 supplier stated that when they have used UK sources previously, the service centres were considered poor. They also stated that orders of their size are not of enough value to steel mills so there is no opportunity to negotiate price. Producers will tend to only deal directly with larger organisations and stockholders. A large OEM stated that UK steel mills were more focused on customer needs in the past when they were more adaptable to small orders. Now, producers require aggregated volumes and are order-book driven. This may be down to individual producer's commercial decisions where small orders might not make economic sense.

Lead times were seen to be increasing by a couple of interviewees.[49] A tier 1 supplier stated that they have seen lead times lengthen over the past few years. Meanwhile, another tier 1 supplier stated that delivery by one producer was rendered on time when it was four weeks late (something it was noted that was not the case in Europe).

In order to remain competitive, consumers identified the need for greater market intelligence and innovation as this would enable the producers to adapt better to the changing needs of the automotive sector.[50] The example was given of aluminium producers effectively engaging with the automotive sector around both customer service and innovation. For example, one tier 1 supplier felt that mills need to look at the next generation. At present, there is no market intelligence in the UK mills so they do not know what is out there. They are very insular and not reactive to what the market wants. They could instead work with OEMs to meet the needs of their consumers rather than receiving complaints. There is nothing from steel suppliers in terms of improving their processes and becoming more efficient. They felt there is a need for greater presence from the automotive industry.

Several interviewees raised lack of innovation as an issue with UK steel producers. A large OEM stated that there has not been much innovation in steel. The steel industry is an old, well-established industry and it continues to do what it has always done. We see steel increase, we see it reduce and the market falling, but we do not see a huge amount of innovation.

They continue to provide from the sites they have and it is not one of the most progressive industries out there. A processor stated that UK producers are not as progressive as they were 10–15 years ago with new materials, product types, different coatings and alloy steels. New offers are low, but in terms of servicing current order book and customer expectations, there is fairly good coverage domestically. They felt that there is nothing to

[48] 1 large OEM stated this.
[49] 2 tier 1 suppliers stated this.
[50] 6 interviewees stated this, representing 40% of the 15 automotive sector interviewees. This includes three large OEMs.

separate the UK from European competitors. A tier 1 supplier stated that UK producers have not been able to develop grades quick enough and will therefore struggle to compete with other European producers who have.

Cost, quality and delivery were seen to be key factors in their sourcing decisions.[51] For example, one large OEM stated that they will look for the best provider they can in terms of quality, service provided, technology, high-grade steel etc. and total landing cost of that product. Another large OEM stated that every procurement decision comes down to quality, cost and delivery. Another large OEM stated that they buy direct from mills as it gives the company control over logistics, forecasting, quality and price. Control over these factors also gives them a failsafe, ensuring quality is maintained at aggregated volumes. Another processor stated that quality, reliability and pricing are key drivers in the procurement decision.

Markets

In terms of the future of steel within the automotive sector there were two big factors that are seen to be influencing steel usage in the automotive sector. The first was around vehicle electrification.[52] **The second was around the emissions agenda and a desire to reduce vehicle weights which will impact on the intensity of steel used, as OEMs look for efficiency with an increasing move towards the use of lightweight steels, aluminium, composites and plastics.**[53] **Respondents are approaching these developments in differing ways: some will continue to use the same quantity and grades of steel, some will substitute to other materials, some will advance to higher grades.** Given that future OEM production is determined by 5–6-year product cycles, there is a need for the UK steel industry to ensure that they are engaging around the key decision points of their major clients and influencing design decisions.

An industry body stated that work goes into power trains, connectivity, lightweighting and electrifying. Despite this, they do not see fundamental change in the type of steel, but rather the scale. A large OEM stated that there is a threat to power trains driven by the increasing requirements around energy efficiency and the demonisation of diesel at the moment. Likewise, this drives opportunities to evolve into alternate power trains technology. The general industry feeling is that the technology closest to delivery is electric. Another large OEM stated that the corporate average fuel economy is a key driver for weight reduction. They have the ambition to make a larger percentage of their vehicles electrified by 2030. A tier 1 supplier stated that electric vehicles could be an opportunity and a threat, with this ultimately dependent on where they are being built. An OEM stated that the introduction of electrification may reduce the requirement for lightweighting and use of aluminium going forward. Another OEM stated that there will be moves to electrification but the steel content in the vehicles will not change.

Numerous interviewees highlighted examples of where the industry is moving away from steel in order to decrease weight. One industry body stated that CO_2 emissions are a challenge. This leads to lightweight vehicles and decreased size of power trains, as

[51] 7 interviewees stated this, representing 47% of the 15 automotive sector interviewees. This includes three large OEMs and other consumers.
[52] 5 interviewees stated this, representing 33% of the 15 automotive sector interviewees. This includes an industry body and two large OEMs.
[53] 12 interviewees stated this, representing 80% of the 15 automotive sector interviewees. This includes an industry body and four large OEMs.

well as seeing a switch to other materials, e.g. aluminium, alloys, plastics. Another industry body highlighted several examples where steel has already been substituted in component parts, such as fuel tanks moving to plastic.

A large OEM stated that the emissions agenda is the primary driver of change. The continuous need to reduce CO_2 from an automotive perspective drives the need for efficiency in the power train, but also to reduce weight with the vehicle. There is a need to balance the weight reduction in vehicles and the use of materials with the price the market will pay for mainstream products. They did then state that there are no plans with mainstream vehicles for further changes in steel in BIW. Another OEM stated that some parts are now moving to plastics such as filler pipes. They have also looked into using titanium; however, material costs are currently too high. An OEM highlighted the extent of the movement away from steel by stating that an old conventional vehicle used 770 kg of steel, whereas a new vehicle uses around 60 kg less. They stated that lightweighting is being pushed very close to the edge and steel still has benefits in many areas. While this is the view of the OEM, it should be noted that some of this reduction will have resulted from changes in the production process. An OEM of sports and luxury cars stated that they have already largely moved away from steel to aluminium with only 5% of the metals used now being steel.

A BIW tier 1 supplier stated that emissions are a key issue for the industry with lighter cars producing less in emissions. They primarily consume aluminium, which is three times lighter than steel but also six times more expensive so has its limitations. The steel industry has to compete with aluminium and needs to think about how it will compete next. Another tier 1 supplier stated that BIW is now being made in aluminium and they now supply 5000 tonnes of aluminium product as well. Composite materials are not anticipated to be a threat for them given the types of products they produce. A small car-accessories supplier stated that the products they provide have changed over time with more switching to aluminium and composites. They expect more movement to aluminium in the next 10 years as it is lighter and stronger.

While steel use, going forward, is likely to become increasingly higher strength. One OEM stated that changes in steel usage will depend largely on requirements for weight reductions in their vehicles. Usage of higher-strength steel is likely to increase and they are likely to stick with steel as their primary material if possible as all their production structures are set up for steel specifically. Another OEM of sports and luxury vehicles stated that of the little steel they do use, this will be moving to lighter and more durable steel. A tier 1 supplier stated that it is widely anticipated that there will be movement to more high-strength steels. Another tier 1 supplier stated that, going forward steel is going to become more high strength but the thickness will decrease to get weights down.

However, three large OEMs did state that they do not see further changes in the specifications of steel that they use. For example, one stated that there are no plans with mainstream vehicles for further changes in steel in BIW. They highlighted that they will continually push the envelope to improve specifications, which will then be developed in vehicles manufacture, as long as they are at the right price. A lot of the high spec materials are not feasible at this stage. They stated that they are not aware of anything that will result in more steel use.

e.) Oil & Gas

Oil & Gas – Historical Demand

Capability Summary

Finished Steel	Gaps	Commercial	Technical
WR (Drawing Quality)	No capability gaps observed		
Engineering Steels	High share of imports despite good range of technical capabilities	• Lack of suitable supply-chain presence • Customer service – long delivery windows and inadequate distribution facilities	• Gaps in technical capabilities to produce rods
Plates	No capabilities in pipeline grades		• In the past, pipeline grades (X52, X60, X65, X70) have been challenging for Tata Steel • Hartlepool pipe mill has in the past imported plates from Europe because of lack of capabilities
HRC	Insufficient range in pipeline grades		• Pipeline grades up to X65 can be produced at Port Talbot. However, grades X70 and all grades for applications in low-temperature environments (e.g. North Sea) have been challenging for Tata Steel in the past
Seamless Tubes	No capacity in the UK	• Demand size not sufficiently large enough to justify the capital costs of an atypical configuration of EAF/Caster 500 kt p.a., tube mill of 350kt p.a.	
ODF	High share of imports despite good range of technical capabilities	• Imports are part of global supply chain for OEMs, which makes it challenging to penetrate these supply chains	

Steel in this sector is used mainly in the form of pipes for drilling, casing, gathering, transportation of oil & gas and offshore platforms. The oil & gas sector also provides a wide range of export opportunities for UK steel producers in specialist steels.

Demand from this sector has been in decline mainly because of contracting oil & gas production from the mature fields in the UK Continental Shelf (UKCS). Over and the above this, the UKCS is challenged by the oversupply in the global markets and low oil prices, which renders at least a third of production economically unviable.

The key areas from a capability gap standpoint are in plates, hot rolled coil and seamless tubes.

- There are no pipeline grade capabilities in plates after the shutdown of Scunthorpe plate mill in 2015.
- In hot rolled coil, Tata Steel has struggled to produce X70 and above grades and low-temperature application grades. A vast majority of competitors globally have these capabilities and a lack of these capabilities can be a deterrent to being considered as a competent supplier in the sector. Developing these capabilities requires continuous and long-term commitment of resources. There has been underinvestment in capability development largely due to economic conditions in which the UK steel industry has been operating in the past few years.
- In seamless tubes, it is unlikely that current lack of capability will be reversed anytime soon unless there is a massive upturn in demand which could then make the investment case attractive.
- In open die forgings, the challenges are mainly to do with competition from imports that are part of the larger global supply chain for OEMs, which have global reach. As a consequence of this, forgings are procured locally or regionally where the OEMs manufacture the equipment and then supply to the UK. Despite having the capabilities, therefore, the UK open die forgings industry finds it challenging to meet the demand from the oil & gas sector.

It should be noted that a study, commissioned by the onshore oil and gas industry, is currently underway to examine whether electric welded pipe, produced in the UK, could perform the same role as that of seamless tube in future shale gas applications. Should substitution be found to be safe, practicable and economic, this will naturally impact on the assumed capability of the UK sector to supply products into this market.

Oil & Gas – Demand Forecast

1.0 Demand Outlook

The demand outlook from the oil & gas sector is very different from construction and automotive sectors. Demand is forecast to decline at 2.2% p.a. to 253 kt in 2030 from 353 kt in 2015. The total decline in demand during this period is about -100 kt (-28%). The decline in demand is likely to be seen across all finished steel, e.g. plates, hot rolled coil, open die forgings, seamless tubes, wire rods and engineering steels.

2.0 Sector Outlook

Production from the mature UKCS basin has been on the decline for several years. There was a small increase in oil & gas production in 2015, but there is no evidence that this marks a turnaround in the outlook for the industry.

According to Oil & Gas UK, production of oil & gas in the UK is forecast to decline by a further 14% and 25% respectively by 2021. Low oil & gas prices discourage producers

from investing in maintaining or increasing production. A third of the UK's oil & gas fields operate at costs above prevailing prices (Source: Economic Report 2016, Oil and Gas UK). For balance production, there is very little cash generated which is available for re-investments. Consequently, CAPEX (for upstream and midstream – pipes) in oil & gas is forecast to contract by 80% by 2020.

Given the current uncertainty around shale gas development in the UK, the sector outlook presented here has not factored this in, to account for any potential steel demand from a UK shale sector.

Exhibit 45: Forecast Oil Production UK (mbpd)

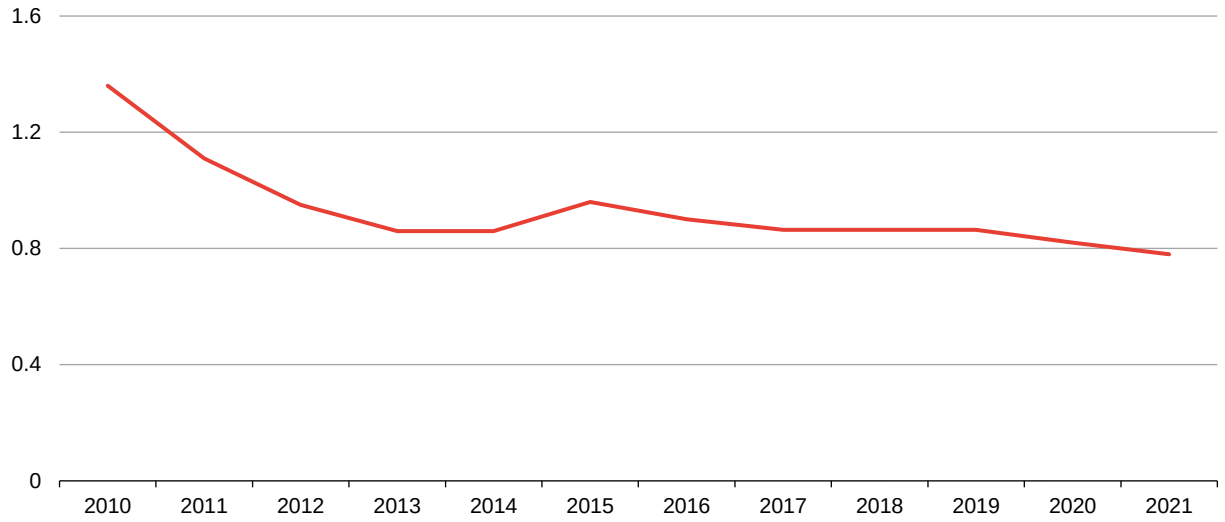
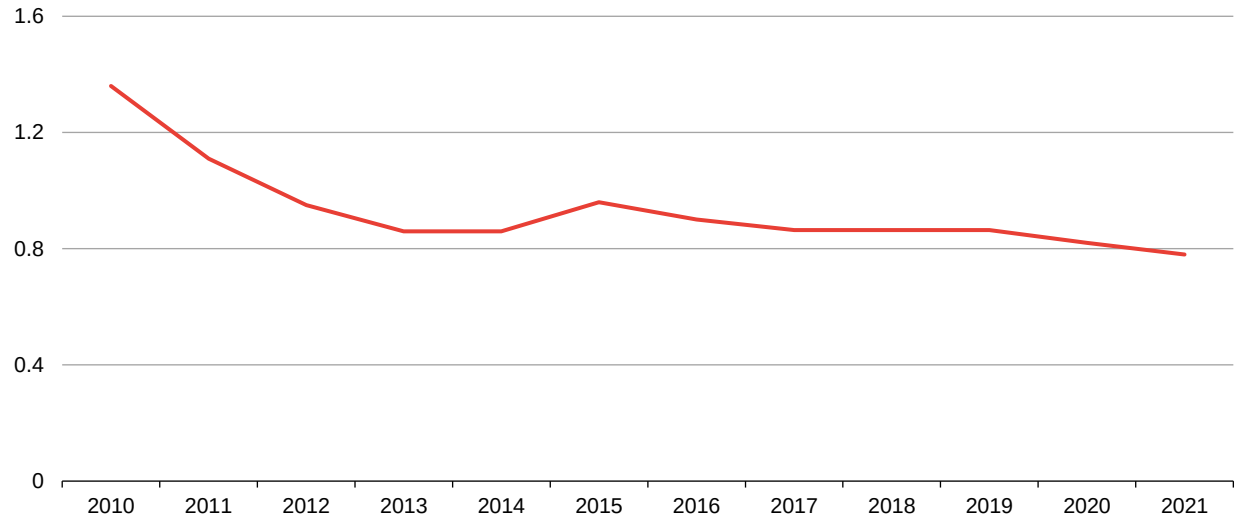
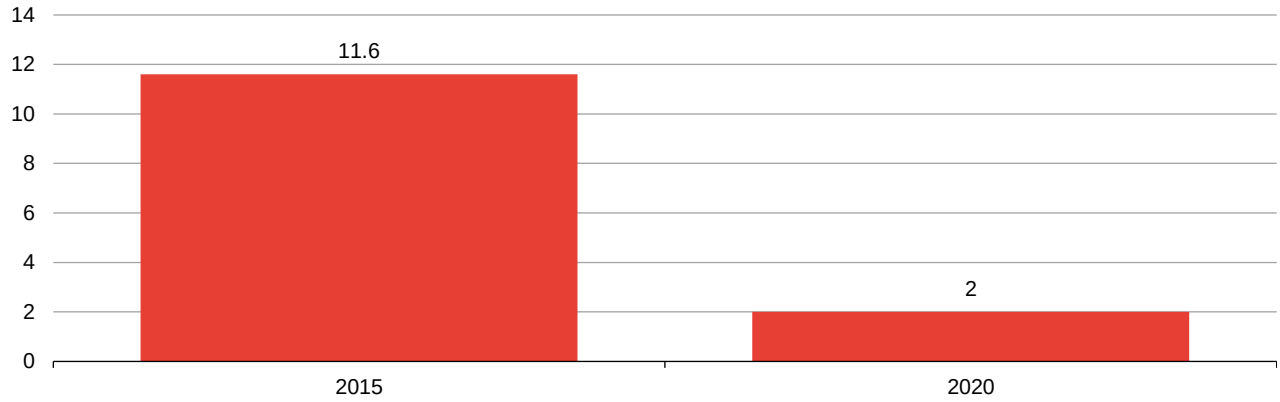


Exhibit 46: Forecast Gas Production UK (bcm)



Source: BP Statistical Review, Oil & Gas UK

Exhibit 47: CAPEX in Oil & Gas Industry UK ($ billion)



Source: Oil & Gas UK

3.0 Changes in Specifications

Thus far main grades have been X52–X70 grades in hot rolled coil and plates. In the next 15 years, use of X80 is likely to become an increasing part of the grade mix. This is also supported by interview responses by two large oil & gas companies. Plate producers, which have good capabilities for the oil & gas industry – Dillinger, Voest Alpine, ArcelorMittal Industeel, and most of the new plate mills in China, India, Russia have X80 capabilities. Therefore, this must be considered as part of the capability mix while planning for the future.

4.0 Improving Competitive Positioning

The current outlook for the UK oil & gas industry makes it very challenging for the steel industry to consider investing in improving its capabilities. The main areas of focus from a standpoint of improving competitive positioning are in plate and hot rolled coil.

Finished Steel	Focus Areas
Plates	With the closure of Scunthorpe plate mill, there is no pipeline grade capacity, which is required to serve the oil & gas industry. Most of the modern plate mills built in the past 10 years or so have these capabilities. These capabilities extend from upstream to steel making and casting to plate mill rolling and heat treatment. The steel making is an important part because many of the specifications demanded require clean, low-sulphur steel, including casting of very thick slabs in vertical casters. Addressing these challenges will require control of steel making through captive or offsite sources. In addition, the steel industry needs to plan for X80 grades with a view for the future changes.
HRC	The capability range needs to be extended to X70, X80 and low-temperature grades.
ODF	Realigning its cost competitiveness as compared with suppliers in China, Poland and Romania. Modernising the facility and investing in automation and CAD for increasing product quality.

5.0 Uncertainties and Risks

The low oil & gas prices cast uncertainties on how far the incumbent producers will continue to produce from the UKCS and even consider further scaling down production to reduce losses. This implies that steel demand in the oil & gas sector could be more negatively impacted.

Oil & Gas – Sector View

Markets

The demand for steel within this sector – indeed the overall buoyancy of the sector – is very much dependent on world energy prices.[54] The current trend has been a weakening of growth in demand for oil and an imbalance with supply (growth of US shale and OPEC chasing market share). This has resulted in a low oil price, which has reduced the amount of drilling and in turn the demand for new platforms and ultimately significantly reduced the demand for steel. This global trend has been compounded by the fact that the UKCS is a very mature basin and exploration was already tailing off prior to the oil price crash which started in mid-2014. It is also very much a global industry with the UK only accounting for 1% of the world oil supply. An industry body stated that oil is being sourced worldwide, with the UK's influence falling over the past 10 years.

An industry body stated that demand depends on world energy demand. Oil demand has been falling which has led to a drop in oil prices. This reduction in demand has reduced the amount of drilling and in turn the demand for new platforms. This has led to problems for fabricators as there is no demand for their steel. Until oil prices increase to around $60/65 per barrel the industry will remain stagnant. Once this is achieved the industry will move, as building new platforms will become viable; however, this will not be seen for another year/18 months.

A developer in the oil & gas sector stated that government strategy for the electricity industry drives demand for their power plants. The government wants to develop an electricity sector that addresses three elements: (1) de-carbonising and meeting climate change obligations; (2) secure supply; (3) making it as cheap as possible. Electricity prices need to be sustainable for new large-scale generation to encourage development.

Steel is used for the fabrication of a range of assets within the oil & gas sector, including platforms, manifolds, pipes, wellheads, drill pipes and casing.[55] **An industry body stated that there is potential for a large increase in the demand for steel due to a rise of wells being built for production of shale gas**. Currently, shale gas is in its appraisal phase. Then there will be an evaluation of the gas properties and then the flow of gas, which will primarily occur in the North of England. The assumption is that shale gas will be a success and lead to a boost in activity. The amount of steel required by the industry is unknown in terms of tonnage. However, it would need to support 12,500km of steel casing. The threat is that shale gas production does not go ahead, which will mean the continuance of modest activity and a relatively small demand for steel. They stated that just 10% of the potential shale gas in the North of England would power the country for 50 years.

Respondents stated that there may be some minor changes in specifications, but that steel is unlikely to be substituted by any other materials in the immediate future. An industry body stated that they do not see any immediate substitutions for steel occurring. However, there may be changing needs for processing and pipelines. Another industry body stated that there are not really any other materials that can substitute steel, so consumption should stay constant in terms of material choices and the industry would

[54] 4 interviewees stated this, representing 57% of the 7 oil & gas sector interviewees. This includes an industry body and 2 large oil & gas suppliers.
[55] Stated by two industry bodies.

not move away from steel. All the regulations relate to steel because of the importance of preventing leaks and the need of the material to withstand very high pressures. The standards are updated every year, but the materials would not change drastically and there would not be a move away from steel anytime soon. The grades change, but it is more about evolution rather than revolution.

Two large oil & gas companies stated that they were looking at changes in specification that were capable for deep-water environments. A large oil & gas company said that they are expecting movement to higher-grade steel in future, with heavier wall thickness, for more challenging operating environments such as deep water. There may potentially be an increase in the use of non-metallic pipe (e.g. concrete, plastic), but this is limited in use at present, representing less than 5% of their pipe usage. They are working together with the pipe mills to develop both higher-grade material for the tougher operating environment, and alternative material at lower cost. Another interviewee stated that they will use more lean design and lean specifications of steel quality to drive costs down, with steel use unlikely to increase. Specification of steel does not get changed quickly, taking seven years from first design to implementation. Another respondent stated that they do not anticipate a change of steel intensity or technical specifications in future.

A large oil & gas company stated that they are looking into the benefits and risks of using substitute materials, such as plastics, before considering the severity of implementing them. Another interviewee stated that they are considering using cement and composite materials for certain pipes and will use these in the first application soon. For gas transmission, recent legislation stopped permission of chromate coating of pipes, so they are considering other materials such as aluminium that are attractive due to recycling possibilities.

Competitiveness

In this market context, UK steel's competitiveness is hindered by a number of factors. This includes costs,[56] with European suppliers seen to be 10–20% more competitive on cost according to one interviewee. A large oil & gas company stated that UK steel is not competitive in the global market. It may be in specialist areas but not for the supply of the main materials they request. In particular, they cited that labour in the sector is costly as well as environmental factors they also have to consider. A stockholder stated that the costs of producing steel in the UK are currently too high. If it was possible, they would happily source some of their steel from the UK; however, there is a big question over these capabilities at the moment. They did state that there are other products – such as beams, columns and welded tubes – where the UK is seen as competitive.

One interviewee stated that there are pressures to look around the world for the cheapest supplier. They felt that energy costs in particular were a major factor impacting the UK steel sector's cost competitiveness. They stated that anything that can be done to reduce costs should be part of the government's approach. They stated that industrial users of energy need to be more creative in how they purchase power. There needs to be more joined-up thinking to support the sector. Another interviewee stated that most of their steel is sourced from Europe, China and the Middle East. They do have a relationship with one producer with UK-based production, but due to decreases in quality and uncompetitive prices they do not procure a lot from them. They used to procure most steel from UK

[56] 5 interviewees stated this, representing 71% of the 7 oil & gas sector interviewees. This includes a stockholder, large energy provider and large oil & gas supplier.

suppliers 30 years ago, but not anymore. Another industry body stated that the industry views mills as a stamp of quality. Price is always an issue; however, operators cannot risk the steel cracking so it is not as simple as buying the steel from the lowest bidder: quality is of the utmost importance.

The view of consumers and trade bodies in this sector was that if UK steel wants to compete in this sector then it needs to invest in steel making, continuous casting and rolling mills, so that it can offer the best quality products.[57] Given that UK oil & gas production is reducing in the UK and forecast to reduce significantly over the next five years (CAPEX is forecast to reduce by 80% in this period), this does pose a challenge to the UK steel industry as its future in this sector will become increasingly dependent on being able to compete internationally. For example, an interviewee stated that lack of investment in UK steel producers was a key reason why European competitors are more price competitive. A stockholder stated that investment is needed in one UK producer's tube lines to match the quality of other suppliers, and to catch up to their competitors. The UK currently does not have any state-of-the-art-mills, which means the UK steel industry is unable to offer the best quality products, such as HISTAR 460s, provided by European competitors. If the UK is serious about the steel industry it must invest in people and the industry. This would make the use of more modern and complex software systems easier for businesses.

Quality was raised as an issue by several interviewees.[58] An industry body stated that historically (in the 1980s), one UK producer's casing was not very good quality which led to overseas procurement. However, the quality has improved significantly since then.

Capability & Capacity

In terms of the type of steel required, at one end of the spectrum there is demand for high-quality steels – higher grade, thicker and more resistant (to challenging operating environments such as deep water) – but also standardised pipes that can be easily replaced. The UK is hindered by lack of capability for some products such as plates and seamless tubes.[59] An industry body stated that seamless and electric welded used to be produced in the UK but there is no longer a source for them. A large oil & gas company stated that a UK producer is only qualified for welded line pipe, not seamless. The UK does not have capability for seamless pipe for deep water uses. One tube stockholder stated that they deal in both welded and seamless tubes, but that the UK is only capable of producing welded tubing, no seamless. When seamless tubes and certain thicknesses of tubes are required, they must go abroad to source the materials. They also stated that the UK is unable to offer the best quality products, such as ArcelorMittal's HISTAR.

Long producer lead times were raised by a couple of interviewees, but this was not considered an issue in this sector. An industry body stated that the industry has long lead times with regards to its steel requirements, which means all the steel can be sourced easily. They stated that in the UK, 80–90% will come from stockholders and mills are typically used for more exotic/specific needs. A large oil & gas company stated that

[57] 6 interviewees stated this, representing 86% of the 7 oil & gas sector interviewees. This includes two large energy providers and a large oil & gas supplier.
[58] Stated by 1 stockholder.
[59] 3 interviewees stated this, representing 43% of the 7 oil & gas sector interviewees. This includes a stockholder and large energy provider.

sometimes it takes time (more than one year) for pipe mills to meet a specific customer need. Long-term relationships between pipe manufacturer and end user play a key role in such situations. The oil & gas company felt there was opportunity for the UK steel industry to better distinguish itself from competitors by providing small quantity, fast turnaround orders.

Supply Chains

There is also the need to increase the number of suppliers as this was seen, by one large stockholder, as key to creating the certainty and reliability that they would need before they moved to source from the UK. One interviewee highlighted how interconnected the energy industry is across the UK and Europe and that the government needs to acknowledge this in its EU exit plans.

f.) Machinery & Engineering

Machinery & Engineering – Historical Demand

Capability Summary

Finished Steel	Gaps	Commercial	Technical
WR (Drawing Quality)	No capability gaps observed		
Engineering Steels	High share of imports despite good range of technical capabilities	• Lack of suitable supply-chain presence • Customer service – timely deliveries and distribution facilities	• Gaps in technical capabilities to produce rods
Merchant Bars	Primarily in flat bars >300mm and small volumes of round bars	• Imports used to diversify supplier risk	• Demand volumes for flat bars >300mm not sufficiently large to justify investments to enhance capability
HRC	Thinner gauges		• UK is unable to roll thinner-gauge HRC typically below 1.8mm. Many European competitors have acquired this capability for more than a decade
CRC	No capability gaps, but CRC continues to be imported	• Supplier diversification • Better cost competitiveness of competitors	
Coated	Unable to fully meet UK demand		• Capacity gap of up to 1.0 Mt p.a.

Finished Steel	Gaps	Commercial	Technical
ODF	High share of imports despite good range of technical capabilities	• Imports are part of global supply chain for OEMs, which makes it challenging to penetrate these supply chains	
	Lack of higher press capacity and consequently unable to meet the full range of demand		• Sheffield Forgemasters press size is limited to 10 kt while its global competitors can go up to 12 kt to 13 kt

The machinery and engineering sector has declined by 2% since 2010 and is aligned to the long-term trends in the manufacturing sector. These trends are also validated by increasing imports of steel contained goods in the UK (please refer to Appendix 2).

The capability gaps of relevance in this sector are:

- Engineering steels, which is challenged by the high share of imports, despite the good breadth of technical capabilities. This is mainly because of the lack of adequate downstream supply-chain capabilities and issues of customer services such as delivery windows and distribution facilities.
- In hot rolled coil, the gaps are mainly around thinner gauges 1.5–1.8mm, of which Tata Steel has long struggled to achieve stabilised production.
- In cold rolled coil, there are no observed capability gaps but steel imported to mitigate supply risks and due to better cost competitiveness of imports.
- In coated products, there is a lack of capacity on the ground to meet the demand volumes.
- In open die forgings, the industry is constrained by lack of press size >10 kt, while its competitors have press sizes up to 13 kt.

Machinery & Engineering – Demand Forecast

1.0 Demand Outlook

The demand from the machinery and engineering sector is forecast to increase by 0.9% p.a. to 611 kt in 2030 from 538 kt in 2015. The total change in demand during this period is about +74 kt (+14%). The biggest growth is expected to be in wire rods (drawing quality), engineering steels and hot rolled coil.

2.0 Sector Outlook

The machinery sector has had a difficult past two decades and this has been evidenced in the declining demand from this sector. The machinery sector in the UK is quite dependent on exports to the EU. For sectors such as agricultural machinery, packaging and material handling, exports to the EU are almost 50–60% of the output.

The current EU exit negotiations are putting a drag on the outlook of the sector. It is not likely that, up to 2018, there will be major changes in output. The sterling currency weakness will provide support for the sector. Between 2018 and 2022, machinery and engineering output could remain relatively flat or even contract slightly. We expect that some growth in the sector could resume after 2022, by which time the uncertainty related to EU exit could be resolved and companies could commit further investments.

3.0 Improving Competitive Positioning

The machinery sector creates a demand pull for various finished steel products and improvement areas are required for a number of products. The improvement areas are listed below.

Finished Steel	Focus Areas
Engineering Steels	Improving cost competitiveness of steel production, which includes considerations around energy prices and business rates. Enhancing product mix to include rods. Invest in new product development and increase innovation in conjunction with the demands of customers. Increase presence in downstream supply chain processes such as forging.
Merchant Bars	Improving cost competitiveness of steel production, which includes considerations around energy prices and business rates. Enhancing product mix for sizes >300mm. This could enhance the product mix offerings and could help secure higher value and share of the demand for the UK.
HRC, CRC	Improving cost competitiveness of steel production.
Coated	Improving cost competitiveness of steel production. Address capacity gap in coated products.
ODF	Realigning its cost competitiveness as compared with suppliers in China, Poland and Romania. Enhance press capacity to >10 kt in line with some of its competitors. Modernising the facility and investing in automation and CAD for increasing product quality.

4.0 Uncertainties and Risks

The major uncertainty is whether the incumbent manufacturers will wait for the EU exit negotiations to play out or pre-emptively start scaling down operations and move offshore.

g.) Packaging

Packaging – Historical Demand

Capability Summary

Finished Steel	Gaps	Commercial	Technical
CRC	No capability gaps, but CRC continues to be imported	• Supplier diversification • Better cost competitiveness of competitors compared with UK producers	
Coated	Unable to fully meet UK demand		• Capacity gap of up to 1.5 Mt p.a.
Tinplate	Constraints in thickness closer to 0.13–0.15mm		• Underinvestment in the mill – in automation, flatness control etc. – needed to achieve these thicknesses
	Underinvestments in product development	• Reduced priority to invest in product development of high-strength and ductile grade tinplates, polymer-coated tinplate	

In the packaging sector, CRC and Coated Products are used for manufacture of drums for chemicals and lubricants whereas tinplate is used for can making, which is used for the packaging of food, beverages, aerosols and bottle closures. Of the three, tinplate accounts for the largest share of demand and is also the most demanding from a capability standpoint.

CRC: There are no technical barriers to supply to this sector. Steel is imported for supplier diversification reasons and better cost competitiveness of the imported steel.

Coated Steel: It is a case of lack of sufficient capacity in the UK to meet the demand.

Tinplate: Over the past two decades, alternative packaging materials such as paper, aluminium, plastics and glass have continuously eroded the share of tinplate. These alternative materials have advantages over tinplate in areas such as costs and marketability, content visibility, colour compatibility, appearance and shape flexibility. But tinplate has advantages such as recyclability, higher filling speeds and lower failure rates. Therefore, tinplate producers have had to respond to can makers' demands for downgauging in pursuit of lightweighting and a higher strength/weight ratio. As a consequence of these factors, there is increasing demand for thinner-gauge and higher-strength steel with little to no increases in volumes. These big gains to alternative materials have largely been achieved.

Tata Steel is the only producer of tinplate in the UK and the coating line is located in Trostre. This is not atypical because there are few tinplate lines in Europe and globally.

Local deliveries account for about 60% of demand which has declined from 74% in 2011. Consequently, exports have increased as an alternative to home markets.

Food cans account for a 54% share of tinplate consumption and this is likely to remain consistent over the foreseeable future. The balance of 46% is accounted for by beverages, closures, aerosols, general line and some non-packaging applications.

The UK's capabilities in tinplate have not kept pace with developments and changes in the packaging sector. There are capabilities gaps in thickness ranges of 0.13–0.15mm, which are increasingly in demand by can makers. In addition, there has been underinvestment in product development, largely due to the economic conditions in which the UK steel industry has been operating in the past few years.

Packaging – Demand Forecast

1.0 Demand Outlook

The demand from the packaging sector is forecast to remain relatively flat through the forecast period. Demand could grow by only 0.1% p.a. to 462 kt in 2030 and from 456 kt in 2015. This outlook is shaped predominantly by tinplate demand, which is expected to remain flat through the forecast period. These trends are well aligned to those seen in the EU over the past few years.

2.0 Sector Outlook

Over the next 15 years, population growth in the UK will be the main driver for an increase in demand for packaging of food, beverages and aerosols. However, that increase is likely to be largely offset by downgauging. There are no major changes envisaged in substitution with alternative materials, recyclability, or major changes in urbanisation rates or changes in lifestyle and convenience food consumption. On that basis, we expect demand to remain flat through the forecast period.

3.0 Changes in Specifications

There will be shifts of demand to lower thickness <0.15mm, particularly to 0.13mm and shifts to higher-strength DR material. This builds on the past trends that tinplate has been challenged with.

4.0 Improving Competitive Positioning

Finished Steel	Focus Areas
Tinplate	Thickness constraints, typically those tending to 0.13–0.15mm

5.0 Uncertainties and Risks

The uncertainties on account of the EU exit negotiation weigh down the outlook of tinplate as can makers could scale back production in the UK.

h.) Yellow Goods

Yellow Goods – Historical Demand

Yellow good refer to heavy construction equipment such as bulldozers and front end loaders.

Capability Summary

Finished Steel	Gaps	Commercial	Technical
Merchant Bars	Primarily in flat bars >300mm and small volumes of round bars	• Imports used to diversify supplier risk	• Demand volumes for flat bars >300mm not sufficiently large to justify investments to enhance capability
Plates	No capabilities in wear-resistant grades and Quench and Temper (Q&T) finishing		• Both plate producers – Liberty and Spartan have no steel-making capabilities for this grade. This is the main constraint for these grades • Both plate mills have Q&T facilities but there is little visibility on whether these facilities are operating now
HRC	No capabilities in wear-resistant grades and Quench and Temper (Q&T) finishing		• Some wear-resistant grades were produced in the past but appear to have been discontinued by Port Talbot
Seamless Tubes	No capacity in the UK	• Demand size not sufficiently large enough to justify the capital costs of an atypical configuration of EAF/Caster 500 kt p.a., tube mill of 350 kt p.a .	

The UK steel industry suffers from a lack of technical capabilities to meet the full range of demands from the yellow goods industry. In the past, the UK had some technical capabilities in Scunthorpe plate mill and Port Talbot. However, with the shutdown of the plate mill and Port Talbot almost discontinuing these grades, these have re-emerged as gaps in the capabilities.

The demand is met by imports, in particular imports from SSAB Steel in Sweden, which also has a warehouse and service centre in the UK.

Yellow Goods – Demand Forecast

1.0 Demand Outlook

The demand from the yellow goods sector is forecast to increase by 1.8% p.a. to 186 kt in 2030 from 142 kt in 2015. The total change in demand during this period is about +44 kt (+31%).

2.0 Sector Outlook

The yellow goods sector is more linked to global trends in investments in mining and power generation and less on the outlook in UK and EU. Global investment cycles shape the demand trends and demand can be very cyclical, as has been observed in the past.

Since 2012, mining industry CAPEX has been on a continuous decline as producers have reduced investments in greenfield projects due to weak commodity prices and have focused mainly on cost reduction, operations improvement and brownfield expansion. In 2016, mining CAPEX increased for the first time since 2012. The increase is mainly for equipment replacements, and this will be the main driver until 2020. There is an overhang of surplus equipment that could take 2–5 years to flush out. As a consequence the full benefits of this increase may not accrue to yellow goods manufacturers as evidenced in the Parker Bay index for shipments of surface equipment. We expect CAPEX in mining industry to strengthen after 2020 as new investments could be required to replace depleting resources in commodities like copper and zinc, and investments in rare earth metals to serve the growing electronics industry.

Globally, there is still a massive backlog of investments in power generation. In addition, the long-term trends suggest that generation capacity could expand from its current level by 60% by 2030. This implies a significant potential for the demand for yellow goods in the next 10–15 years.

Overall, we could expect the yellow goods industry in the UK to be the beneficiary of long-term growth from mining industry and power generation investments.

Exhibit 48: Global Mining CAPEX ($billion)

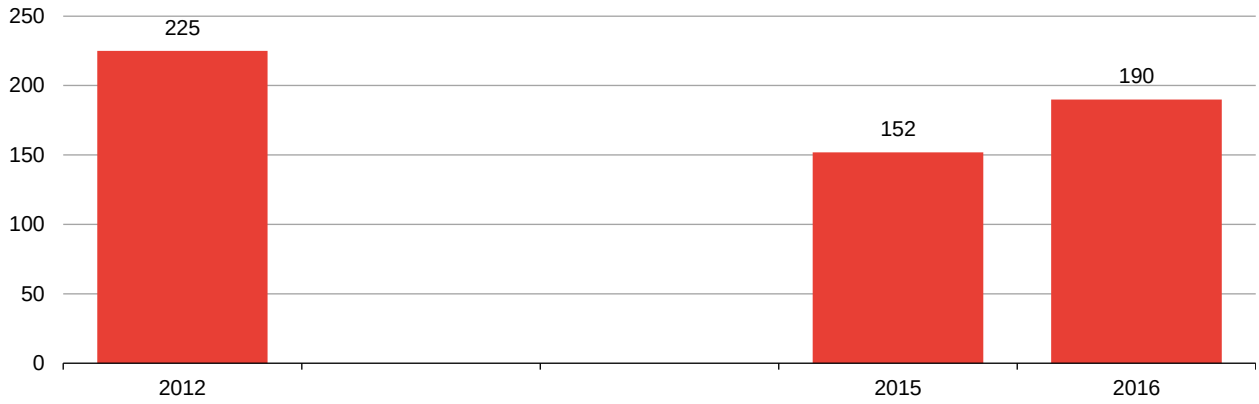


Exhibit 49: Parker Bay Index for Surface Equipment ($billion)

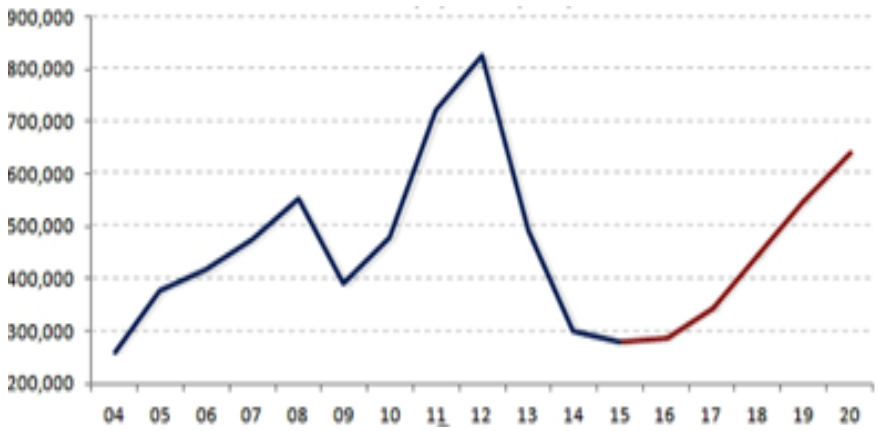
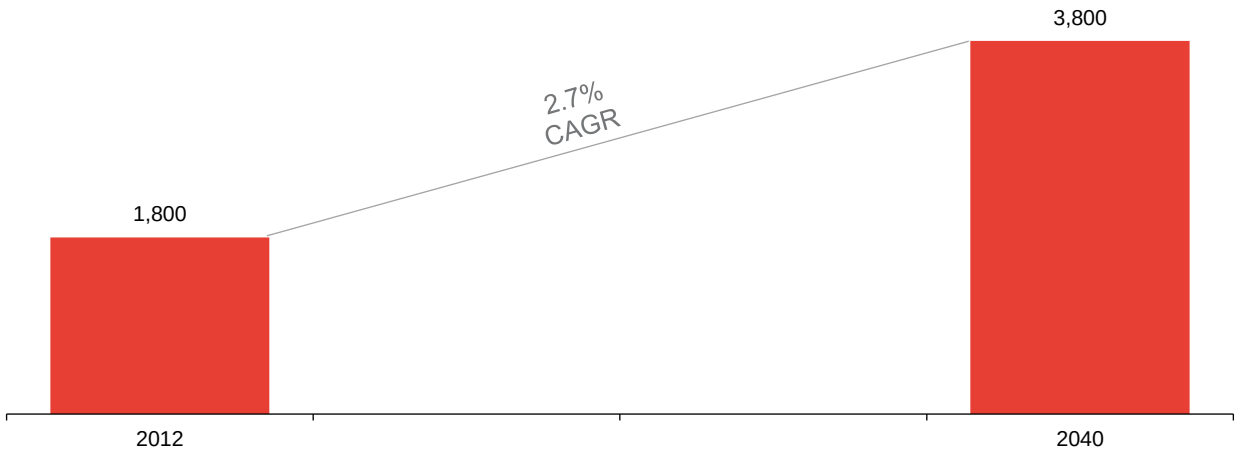


Exhibit 50: Power Generation Capacity Build-up (GW)



Source: SNL, Mining.com, Bloomberg Energy Finance

3.0 Improving Competitive Positioning

The key areas for improvement are in plates and hot rolled coil. Both of these will require investments to get the industry on a par with its competitors. The UK had these capabilities in the past; therefore, the knowledge and the soft skills can be utilised and leveraged to scale up.

Finished Steel	Focus Areas
Plates and HRC	• Build capabilities in wear-resistant grades. • For plates this will require control of steel making, which is a structural issue for the industry. In addition, restarting the Q&T facilities in the UK will need to be considered as part of the overall focus areas. • Alongside technical capabilities, customers also require stocking and downstream processing services such as cutting, welding and forming.
Merchant Bars	• Improving cost competitiveness of steel production, which includes considerations around energy prices and business rates. • Enhancing product mix for sizes >300mm. This could enhance the product mix offerings and could help secure higher value and share of the demand for the UK.

4.0 Uncertainties and Risks

Given the nature of investments in the individual sectors like yellow goods, there are uncertainties regarding the precise timing of the investment cycles and they are hugely influenced by government policy making. This has a knock-on effect on the demand cycle for steel.

i.) Rail

Rail – Historical Demand

Capability Summary

British Steel is the only producer of rail in the UK and is globally recognised as a technically competent supplier of rails. The rails are produced from the medium sections mill in Scunthorpe.

Compared with any other product, rails represent a success story for UK steel. Of the 250 kt procured in the UK in 2015, local deliveries account for over 95%. Network Rail is the largest customer for rails in the UK. The other customers are Transport for London (TfL), Crossrail and High Speed Rail.

Currently, there are no serious technical or commercial capability issues which are a deterrent to the business.

Exports have also increased significantly in 2014 and 2015, particularly when compared with the past 15 years. This is largely the result of changes in the process route from Teesside/Workington to Scunthorpe and more recently organisational changes which resulted in a greater focus on this product. Rails exports are destined mainly to the Middle East, Africa and Latin America.

Rail – Demand Forecast

1.0 Demand Outlook

Over the next 15 years demand is expected to grow from 166 kt in 2015 to 182 kt by 2020 and remain at comparable levels until 2030. Network Rail and TfL demand is largely expected to be the same as in 2015 over the foreseeable future. In addition, HS2 will demand an additional 172 kt of rails from 2020 to 2030.

2.0 Sector Outlook

Passenger rail spending is mainly driven by the passenger and mainline sector. There is already a major increase in spending committed to in CP-5. CR2 spend, estimated at £25 billion to £30 billion, is expected to be significantly higher than CR1.

Exhibit 51: Passenger Rail Spending 2010–2015 (£ billion)

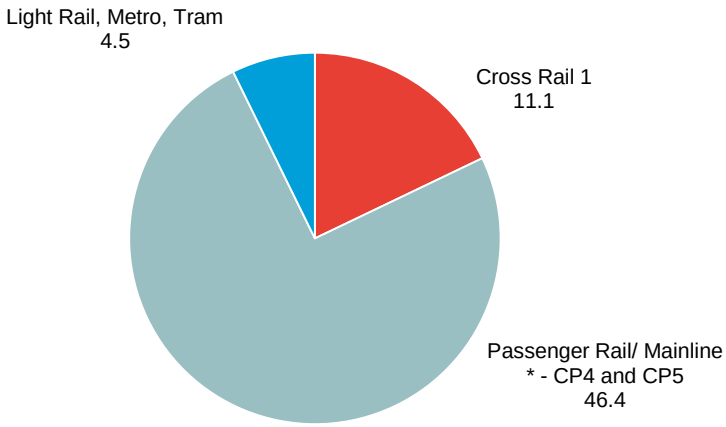
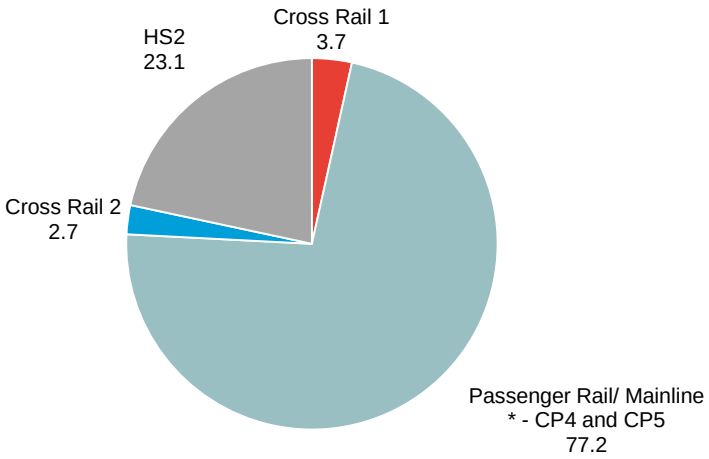


Exhibit 52: Passenger Rail Spending 2016–2020 (£ billion)



Source: Department of Transport, Crossrail, Parliament Research Briefings, Light Rail Policy Centre

3.0 Improving Cost Competitiveness

The UK steel industry is favourably positioned to serve the rail market. It is a preferred supplier to main customers – Network Rail, TfL and Crossrail. There are no deterrents to extending the existing capabilities and commercial relations for the High Speed Rail Project.

While the rail market presents a strong opportunity for the UK, it must also focus on the following:

Innovation and product development: the UK steel industry needs to address some customers' concerns that there appears to be some slack in product innovation and the capacity to invest in new products like corrosion-resistant rails. While some of the concerns may be genuine because of the closure of Swinden Technology Centre, the industry must emphasise to its customers the subsequent investments made in the new rail research centre at the University of Huddersfield.

Enhance its product finishing capabilities such as heat treatment and coatings. It should be highlighted that British Steel already operates such facilities in its rail mill in Hayange, France.

5.0 Uncertainties and Risks

A key uncertainty for the industry could be the schedule and project overruns for the multiple rail project in the construction stage. Such overruns and delays are not uncommon given the scale and challenges of these projects. If there are schedule overruns, then the future demand for rails could be lower than that forecasted.

Rail – Sector View

Markets

The rail sector represents a success story for UK steel, with demand largely being met by domestic supply.[60] A large rail consumer stated that they usually procure direct from mills, with approximately 96% of their rails consumption coming from a UK producer.

[60] 2 interviewees stated this, representing 33% of 6 rail interviewees. This includes two large consumers.

The rest comes from competitors abroad. Another large rail consumer stated that the key factors in procurement decisions are price, supply, specification and delivery time. The majority is purchased from a UK-based steel producer as they fit all of these requirements, with a smaller proportion coming from a European competitor. Having two main suppliers is beneficial in coping with unforeseen circumstances.

Sector respondents highlighted how they are highly dependent on government policy.[61] One large consumer stated that decisions are based on a five-year control period. The next control period is due to be settled in 2019 and as such this will be a key date for the UK steel industry – if there are a lot of new projects, then demand will increase. If it is more focused on maintenance, then demand will be lower. Another large rail consumer stated that demand is dependent on government decisions and packages from commercial contracts. While another large rail consumer stated that their activity is dependent on policy decisions and demographic change. As the population continues to grow, demand for their services will continue to increase. Maintenance projects, refurbishments and new investment projects are all necessary to facilitate the growing demand.

A number of respondents felt that there was further opportunity for exports of rails. Both the producer and consumers highlighted export opportunities for rails, with Europe, North America and Africa highlighted as target markets.[62] An engineering consultancy stated that the UK government can do more to provide assistance to UK companies in the international scene, and is lagging behind neighbouring countries such as France in doing this.

The general view of consumers was that they expect demand to remain fairly static over the next 10 to 15 years.[63] A large consumer stated that they are not expecting any growth but they are currently in a planning phase. For the moment, they are assuming static growth. Another large rail consumer stated that investment is forecast to be similar to the current amount of investment expenditure. The majority of direct steel spend is on rail tracks which are being refurbished due to wear and tear on existing lines. This spend is fairly static. They are coming to the end of their five-year investment plan so historical levels are higher than current levels. However, there is now much greater emphasis on driving value for money and so overall investment projects may be only slightly lower than they were five years ago. An engineering consultancy stated that there are changes in consumer preference driving demand. With car ownership in decline – particularly among younger people – there is a greater need for public transport such as rail.

Alongside the direct spend on rails there is also significant indirect spend in the sector through investment projects such as new station or other buildings and improvements to existing concourses. These projects are generally delivered by contractors so will be subject to many of the factors noted above in the construction sector.[64] For example, a large rail consumer stated that in addition to their direct spend on rails, there is also significant indirect spend on steel through investment projects, which

[61] 5 interviewees stated this, representing 83% of 6 rail interviewees. This includes 3 large consumers, a large contractor and an engineering consultancy.
[62] 2 interviewees stated this, representing 33% of 6 rail interviewees. This includes a producer and a large consumer.
[63] 2 interviewees stated this, representing 33% of 6 rail interviewees. This includes a producer and a large consumer.
[64] 2 interviewees stated this, representing 33% of 6 rail interviewees. This includes two large consumers.

are undertaken by a contractor who will invariably use steel in the formation of new stations, buildings etc. Another large steel consumer stated that their operations are split into two areas. Firstly, the existing rail network and renewals. Secondly, the new parts of the network which these figures do not include such as stations and piles. There is much less steel used in these areas and the majority is bought via suppliers, not directly.

It is also a level of demand that is expected to increase with minimal substitution expected.[65] A large steel consumer stated that they are not expecting any changes in the type of steel they consume going forward. There is not a significant requirement for technical innovation in the steel rail components required by this respondent. At best they will be incremental changes such as corrosion resistance. There is greater innovation in the monitoring of wear and tear to get a better understanding of the true useful economic life of the components. Another large rail consumer stated that it is too early to say what the future steel requirements will be, but they can see a change in grade and dimension but not strength or coating. They also stated that it is unlikely there will be substitution to other materials, but for non-critical bridges they could use reinforced timber, concrete or plastic. The maintenance of these structures going forward will be key in any decisions made. Another large consumer stated that they are moving to a focus on whole life cost. For example, head-hardened rail gives longer life so there may be an increasing demand for this. They stated that they do not envisage much change in the demand for steel as the market will always need rail.

In terms of changes in the indirect consumption of steel, one large consumer stated that further electrification might suggest more steel foundations, masts, boons etc. with a possible increase of around 5,000–10,000 tonnes per year. A large contractor stated that they will be using more steel in future for overhead lines, while a rail engineering consultancy stated that environmental issues will be key going forward. There is a strong focus now on designing for end-of-life recyclability, with better ways of recycling materials and ensuring that the actual components are re-usable/recyclable after use. They felt that there would be diminishing use of steel in rolling stock as other materials are used. However, technical specifications may increase in the future as speciality steels are used more prominently.

Capability & Capacity

One area of opportunity for the UK is to drive forward product innovation, particularly in relation to reducing corrosion and improving resistance (e.g. head-hardened rail). If the UK can build on its existing strengths and lead in this area, it will not only support its competitive position in bidding for new UK contracts, particularly with one consumer noting that they are moving to focus on whole life cost, but it will also strengthen its position in international markets. One large consumer stated that all assets will have a serviceable lifespan that must be maintained or replaced. Rails have seen incremental developments to increase their strength, while trains have developed so that they place reduced strain on the rails. This is increasing the lifespan of assets. However, there is no significant pressure from them to request better products from the component manufacturers.

In terms of indirect consumption, a large contractor stated that you can always source from the UK, but the question is whether it is more competitive to source from outside. A large

[65] 3 interviewees stated this, representing 50% of 6 rail interviewees. This includes three large consumers.

rail consumer stated that they may look at different sections in future, such as J sections, which come from Japan as the UK cannot deal with such requirements. Such sections could provide an opportunity for UK producers, but will likely be low volume.

Competitiveness

Relationships between rail producers and consumers were positive with the producers seen to be responsive in terms of day-to-day operations and supportive in terms of innovation (although this is in the context of a relatively stable market)[66]. A large consumer stated that a UK rail producer is not miles ahead of other suppliers, but being based in the UK helps. They did note that they are very good in terms of innovation, and have helped with new rail coats, head-hardened rails etc. They are also very responsive in terms of day-to-day operations. Another large rail consumer stated that they are satisfied with the service provided by a UK producer at the moment. They did say that they consider the UK steel producer they use to be more expensive than the European competition but are endeavouring to support them. A large contractor that deals with the indirect rail infrastructure stated that they were not sure how competitive UK steel is, but their core products come in from overseas so they assume there are better places to make steel at the source.

A large contractor did state that there is not a great deal of engagement within the sector and it could be a lot better than it is. There need to be the vehicles to incentivise innovation. This is happening more with HS2, which is encouraging, but too often design is outside the contractor's remit and needs to be tied up under one banner.

Supply Chains

Little was raised by consumers regarding supply chains in the rail sector. As stated by the UK's sole rail producer, and three of the UK's largest rail consumers, rail is procured directly from mills, so the producer is well placed to understand their needs. For the indirect rail expenditure, this will encounter similar issues to those raised in the construction section of this appendix. One large rail consumer did state that it prioritises UK sources when procuring, highlighting preference for UK sourcing.

j.) Nuclear

Introduction

For the nuclear sector, the quantitative analysis of historical demand and forecast demand has been considered as part of the construction sector due to the interconnectedness of the two and consequent difficulties in disaggregation of data. However, the sector views for the nuclear sector gained from the qualitative study have been presented separately. This will enable a clearer picture of interviewee views on trends in steel consumption in the nuclear industry. These sector views are outlined in the following pages.

[66] 3 interviewees stated this, representing 50% of 6 rail interviewees. This includes a producer and a large consumer.

Nuclear – Sector View

Competitiveness

Within the UK, the UK steel industry was generally regarded – by both sector bodies and consumers – as competitive.[67] One interviewee stated that the quantity, quality and transport costs give them confidence in the UK steel industry and they would look to use them for UK-based projects in the future. They went on to state that the UK and European markets are being challenged by South Korea, Japan, India and other emerging markets. Prices being offered from these emerging markets will challenge the established producers in established markets. In contrast, one interviewee did state that UK steel has not been competitive. They have mainly sourced structures from abroad over the past 10 years because materials are cheaper from places such as Italy and China.

Markets

Sector bodies and the consumers consulted saw little future change in technical specifications either through innovation or substitution of steel for other products. This is largely because the barriers to entry are very high and as such there is little appetite to adopt new products.[68] One interviewee stated that they anticipate more use of stainless steel as the market is currently happy with it and it has been used for decades. They did note that there has been some movement to other materials, such as use of plastic in chemical plants. Another interviewee stated that they do not expect any big changes in the type of steel that they consume, and the quantity will remain largely similar to what it is now with no threat from other materials. They may look to consolidate the grades they use. Safety is important for nuclear power and steel fits these needs. One respondent did state that there may be increases in the strength of steel, possibly heavier steel, which could be more fatigue resistant.

In terms of the scale of the market and future growth, all of those consulted felt that this was entirely dependent on government policy – be that decommissioning or new build.[69] Several respondents noted that the government has an important role to play in providing a greater degree of certainty around the plans.[70] An industry body stated that if government policy commits to building more nuclear power stations, the growth in demand could be significant. Each power station build is the equivalent to a London Olympics build. They stated that government is a key driver of both new build and decommissioning. Projects are delivered by private companies but it will be government driving this. As a result, the primary opportunity and threat is whether government can deliver new build. If the UK is to maintain the current nuclear mix, there needs to be £100 billion of domestic investment. The industry body stated that if the UK government is not proactive then the industry will decline. The demand for steel will be dependent on this. A decommissioning body stated that government policy is a key driver of their budget and affects what they can do each year. Budgets will peak in the next 5–7 years but will drop

[67] 4 interviewees stated this, representing 60% of the 5 nuclear interviewees. This includes an industry body and a consumer.
[68] 3 interviewees stated this, representing 60% of the 5 nuclear interviewees. This includes three consumers.
[69] 4 interviewees stated this, representing 80% of the 5 nuclear interviewees. This includes an industry body and three consumers.
[70] 3 interviewees stated this, representing 60% of the 5 nuclear interviewees. This includes an industry body and two consumers.

as the sites move into the care and maintenance phase. A developer of nuclear power plants stated that it is difficult to make forecasts of industry demand, as it depends on government to bring new schemes forward.

Government also has a role in ensuring that the procurement processes associated with any new build project support the UK steel industry. This latter point was something that the industry bodies felt was important as many of the nuclear developers are non-UK based and tend to procure from their own local supply chains.[71] An industry body stated that previous nuclear builds in the UK have used largely UK-sourced product, but this is unlikely to be the case today if nuclear goes ahead. Changes in government policy and approach mean that developers are reliant on other overseas organisations for support in delivering nuclear here in the UK. It is likely most steel will be sourced overseas due to the procurement strategies of the firms concerned. For example, work secured for some notional UK companies is being sub-contracted to Spain and elsewhere due to lack of UK commitment. One interviewee stressed that the UK needs to keep more work in the UK. For example, Italy and Germany design their own projects, which lead to them choosing their own supply chain to complete the work. The UK needs to help strengthen the whole chain, not just parts of it.

Respondents raised small modular reactors as an opportunity for the UK nuclear and steel industries.[72] One interviewee stated that the small modular reactor programme by the government has made the industry buoyant at the opportunity. The challenge is for organisations to find engineers with the right training to work in this niche sector. An industry body highlighted that small modular reactors present an opportunity to increase steel usage in future. However, there is slow progress being made in this at the moment and it is not certain whether this will take off unless government ensures that the UK is at the centre. Otherwise, all materials will be built offshore and shipped to the UK.

Capability & Capacity

UK capability and capacity was seen to be well placed to meet the majority of the industry's needs.[73] However, within this generally strong position, the UK is currently unable to meet the demand for certain higher-value grades. This includes large/ultra-large forgings, large plate material (e.g. for containment vessels, which need to be greater than three metres squared and four inches thick) and 'ballistic steel'. For example, one interviewee stated that the UK is currently well positioned to meet the majority of their needs. However, large forgings are problematic. Forgings can only be done in Japan and South Korea. They are not aware of any capability in the UK to do this but have spoken to both UK and other European suppliers to see if this can be done in future. There are a few specialist products, such as ultra-large forging capability, that have to come from Japan as they are the only ones who have the right steel production facilities. An interviewee involved in nuclear decommissioning projects stated that the majority of steel comes from UK suppliers, whereas 'ballistic steel' comes from the USA as the UK does not have the capability. Otherwise, they felt that UK producers meet their needs well and requirements do not tend to change much. Another interviewee stated that there is opportunity for supply of increased plate size. They need to be four inches thick, three metres in width and 20–40 feet in length. This currently comes from France and Belgium.

[71] Stated by an industry body and a consumer.
[72] Stated by an industry body and a consumer.
[73] 3 interviewees stated this, representing 60% of the 5 nuclear interviewees. This includes three consumers.

One interviewee, however, did state that there is a need for investment in steel and fabrication which has historically suffered from underinvestment. This would help improve the UK's credibility and status in engineering, which needs improving.

Supply Chains

Interviewees stated that products are sourced from parts of Europe (for large plate), Japan, South Korea (for the large forgings) and the USA (ballistic). If the UK's capability in these products can be developed, there are opportunities for increased supply into both domestic and international markets. The supply of these higher-value products is likely to become increasingly important for the UK as consultees saw a trend towards standard steels being provided by the lowest cost provider, with the emerging markets most likely to challenge established providers.[74] An industry body stated that the UK once had a strong nuclear industry. Today the developers, if they are able to go ahead, are based overseas and are likely to source much of their product overseas from their own countries – or others that are able to help provide finance. Standard steel will be provided by the lowest cost provider. High-grade NSSS (nuclear) grade steel will be sourced from specialist suppliers and there needs to be the highest standard of record keeping of how the steel has been sourced all the way through and who has worked on it. Another interviewee stated that they mainly procure from stockholders with steel coming from all over Europe. Source will depend on each project, which will have its own requirements.

k.) Aerospace

Introduction

The aerospace sector is marginal in terms of steel consumption (in terms of volume and value) relative to the other sectors, at less than 1% of demand. As a result of this, we have not included quantitative analysis of the sector. We have still sought sector views for the aerospace industry to gain insight into future levels of consumption and whether it will become more significant. These sector views are outlined in the following pages.

Aerospace – Sector View

Markets

From a market perspective the global growth outlook for aerospace is positive with record order books and strong fundamental drivers (i.e. GDP growth, population growth and international trade).[75] One industry body stated that the civil aerospace market is expected to increase over the next 20 years to a global market worth $5 trillion. The current market growth rate of 6% p.a. was cited by several respondents and backed up by other respondents' individual company forecasts. For example, one large OEM stated that there will be strong growth over the next 15 years, driven by new models and a 10-year backlog of orders. A tier 1 supplier stated that they are anticipating steady growth of 10% year on year over the next four years, driven by their customers' long backlogs due to increases in air travel. This positive industry forecast was backed up by a large aerospace manufacturer who stated there has been a huge growth in the number of engines between

[74] 3 interviewees stated this, representing 60% of the 5 nuclear interviewees. This includes an industry body and two consumers.
[75] 4 interviewees stated this, representing 67% of the 6 aerospace sector interviewees. This includes an industry body and two large OEMs.

2014 and 2018, almost doubling output. Thus, this particular market segment anticipates slower growth than the aerospace market overall.

One OEM of helicopters did contradict this positive outlook, stating that demand was likely to remain flat. Oil prices are a key driver of civil demand, with high prices increasing the number of helicopters needed to access offshore platforms. Meanwhile, rising geopolitical tension was a big driver in increasing military and defence spending and therefore use of military helicopters. The lack of these two factors coupled with declining ownership and increases in pay by the hour meant their demand had decreased.

Several respondents highlighted market opportunities in developing countries in both Asia and South America.[76] For example, an industry body stated that most market opportunities are in the faster developing markets such as China, South East Asia and South America. It is an implicit requirement for the UK supply chains to get more engaged in these markets. Those countries experiencing growth are also actively encouraging overseas aerospace companies to invest in local facilities. A large OEM stated that there has been an increase in the number of middle classes who want to fly, in Asia, and China in particular. Other opportunities are in emerging markets away from Europe where the market is mature.

A couple of respondents also highlighted that there will be growing demand for greener, quieter and more fuel-efficient aircraft going forward.[77]

The sector is a significant user of high-specification performance alloys and is increasingly using lighter-weight, stronger or more resilient materials such as aluminium, titanium and nickel alloys as well as carbon fibre composites. Steel alloys comprise a relatively small proportion of this demand (for example 5% of fabricated machine parts).[78] For example, an industry body stated that substitution away from steel is not a question of if, but when. The demand for conventional steel alloys is reducing as the industry increases its use of lighter-weight, stronger, or higher-temperature materials such as aluminium, titanium and nickel alloys and carbon fibre composites. This is driven by sector trends such as reducing weight, improving fuel efficiency, reducing noise and the environmental impact of travel.

A large OEM with UK operations focused on aerostructures and systems stated that steel is the exception rather than the norm with aluminium alloys or titanium used for key components. They stated that there has also been an increase in the use of carbon fibre as the industry looks to become lighter and stronger. Everything is designed to reduce the total weight of the aircraft. They went on to state that aluminium, titanium and carbon fibre will all likely take the place of steel going forward. They did state that this likely would not be for another 15–20 years until the next generation of aircraft. Graphene was also cited as another possibility; however, this is much further out.

A large tier 1 supplier stated that steel is not their material of choice with consumption between 1.5 t and 2 t per year across all of their programmes. To put this into perspective,

[76] 2 interviewees stated this, representing 33% of the 6 aerospace sector interviewees. This includes an industry body and a tier 1 supplier.
[77] 2 interviewees stated this, representing 33% of the 6 aerospace sector interviewees. This includes an industry body and a tier 1 supplier.
[78] 6 interviewees stated this, representing 100% of the 6 aerospace sector interviewees. This includes an industry body, four OEMs and a tier 1 supplier.

aluminium consumption is 100 t per annum. They anticipated that steel consumption will remain the same for 2020 to 2025. Although they did not think that use of steel would increase, they also stated that they are unlikely to move away from steel where they do use it. They also noted that there is potential for more steel to be used in ground support activities. A tier 1 supplier of aerostructures stated that the customers they provide for tend to use more aluminium and titanium rather than steel. For example, the structure of wings is made of aluminium, with joining parts made of steel. They currently use approximately 165 t p.a., whereas use of aluminium is around 8 kt to 10 kt.

This view was also stated by an OEM of helicopters who stated that steel usage will decrease because it is too dense and heavy, with the threat of substitution from titanium, aluminium and metallic composites. They acknowledged that some of these options may be more expensive, but if they show enough benefits in weight savings it may be worthwhile.

A manufacture of aerospace engines did contradict this trend by stating that their consumption of steel is likely to increase in future. They acknowledged that there is a tendency in the aerospace industry to use lighter-weight materials instead of steel, which is heavier. However, a new engine design they are set to make available in the mid-2020s is set to use significantly more steel. Consumption of steel is focused on smaller, more intricate speciality steels. They do not expect a fundamental shift in the type of steel they are using.

The view across several consultees within the sector was that consumption will most likely stay at the same low level, as the substitution of other materials will be offset by the growth of the industry.[79] An industry body stated that steel consumption will be much lower as a proportion of total material going forward as the industry moves to other materials. However, due to industry growth the absolute level of steel consumption will likely be maintained. The level of consumption is already low so this is unlikely to have too much impact on steel producers. An OEM stated that use of steel will remain the same for the 2020 and 2025 periods, albeit at the same low levels. This was backed up by another OEM who believed that the only way that steel consumption could increase, would be from increased production. Otherwise, they felt that steel use looks likely to decline and does not look like replacing any current aircraft parts. A tier 1 supplier stated that, despite production being likely to increase 5–10% over the next 10 years, any increase in steel consumption will be offset by substitution to other materials to save weight.

Where there is demand for steel this also tends to be for high-performance steels that are not currently manufactured in the UK at the volume required by the sector.[80] This was highlighted by an industry body who stated that the main applications for steel are engines and landing gear, and that use of steel alloys is to reduce the size of aircraft components. The trend in aerospace is to move towards carbon fibre, lightweight aluminium alloys, titanium or exotic high-performance steels that are not currently manufactured in high volumes in the UK. One OEM stated that for the steel consumption they are likely to have, they may potentially look at stronger steel and more corrosion-

[79] 4 interviewees stated this, representing 66% of the 6 aerospace sector interviewees. This includes an industry body and three OEMs.
[80] 4 interviewees stated this, representing 66% of the 6 aerospace sector interviewees. This includes an industry body and three OEMs.

resistant coating, which is key to extending product life. All research attempts are focused on finding competitive advantage in the final product.

Supply Chain

Although the aerospace industry has global supply chains,[81] the UK has a significant share of this market (17% according to an industry body) and a strong supply chain of smaller organisations that tend to produce components rather than finished products. **A challenge for UK steel is that the aerospace supply chain does not operate in the same way as other sectors, such as automotive, as OEMs do not dictate where materials are procured from.** Instead, suppliers dictate the sourcing of materials as long as they meet the specifications required, with specialist fabricators or stockholders playing a very important role within the supply chain.[82] For example, a tier 1 supplier stated they do not consume steel directly, with their tier 2s sourcing 50% from UK producers and the rest from all around the world. Materials choices are largely driven by the need to reduce weight. A large OEM and several tier 1 organisations stated that they do not consume steel directly, only through component parts they consume from the supply chain.

One large OEM did state that they are very involved in their supply chain in helping to drive innovation, and look to get involved early on in the design process, which ensures longer-term integration.

Capability & Capacity

Several interviewees did highlight capacity issues with UK producers not willing to meet small orders. For example, one large tier 1 supplier stated that they cannot get the required steel directly from UK mills as the low volumes they require mean that UK mills are not interested. A tier 1 supplier highlighted that the small volumes they require mean that mills are not interested in catering for them. Another tier 1 organisation stated that capacity is always an issue when procuring steel. The products required are in smaller volumes (with peaks and troughs) so there has to be a good understanding and reliance on suppliers. If they cannot get the products from the UK then they will go abroad, which increases risks in the supply chain. For example, when using a Russian mill you have to be careful of the ingredients they use as it may not be as pure. An industry body did highlight that this is the nature of the industry as steel produced by many of the UK facilities is not suitable for aerospace use. High-performance steels are produced in relatively low volumes in the UK.

Several interviewees did highlight capability issues with UK producers. For example, one large OEM stated that there is a lack of capability in the UK for precision tooling, with few tooling manufacturers, and that this is often sourced from abroad, e.g. Germany. The steel used in such components is also from abroad as these manufacturers use their home country supply chains. A tier 1 supplier noted that they had to move from use of a UK-based mill to another in Germany, because the UK mill stopped producing the thickness required.

One OEM of helicopters highlighted that there is no capability for forging in the UK, which forces them to source from Germany and Italy. There can be big backlogs when acquiring

[81] 4 interviewees stated this, representing 66% of the 6 aerospace sector interviewees. This includes an industry body, an OEM and two tier 1 suppliers.
[82] 5 interviewees stated this, representing 83% of the 6 aerospace sector interviewees. This includes an industry body and two large OEMs.

forgings, which can be anywhere from 6 to 12 months. They would like to see forging capabilities to help reduce lead times. There is a need to draw procurement into the UK and create the infrastructure for specialist steels, and there need to be the capabilities to forge, process and cut steel rather than just produce it. They believe that there is an opportunity for an integrated approach that can reduce the supply chain and cost.

An industry body did state that with the shift to new materials and the use of technologies such as additive manufacturing, there is need for new disruptive technologies and innovation within the UK supply chain. This could provide an opportunity for the UK in relation to advanced materials processing. The UK could begin to develop a global supply chain in this area. To take advantage of this opportunity, steel producers would need to adapt their products to be able to better meet the requirements for lighter, stronger and higher-tolerance materials.

Competitiveness

Several interviewees raised issues that impact UK steel producers' cost competitiveness. For example, one OEM of helicopters stated that the cost of acquiring steel components has increased as energy costs rise and it has become more expensive to produce.

One industry body highlighted the wider market pressure to reduce costs and deliver more efficient products. The larger OEMs are under pressure to reduce price as volumes increase. These pressures are then trickling down the supply chain which provides challenges for the lower tier companies.

There were mixed views on innovation in the sector by steel producers. For example, a tier 1 supplier stated that mills are inflexible and not responsive enough. They never anticipate demand, and are always reactive. However, the same respondent supplier stated that they are not aware of any future changes in the type of steel, with specifications not changing much over time and some even as they were in the 1970s. Instead, there is more of a focus on improving aluminium and titanium, with more research in these areas. An OEM of helicopters stated that steel innovation is stagnant, and that they are still working to pre-war specifications. However, they also went on to state that they do not have the need for steel innovation so there has been no drive to innovate in this area.

An industry body stated that the UK has a sector-specific industrial strategy that has been running for the past six years and has seen significant investment by government in R&D activities such as the Aerospace Technology Institute, which has made the UK aerospace sector more attractive and helped growth.

l.) Renewable Energy

Introduction

The renewable energy sector is marginal in terms of steel consumption (in terms of volume and value) relative to the other sectors, at less than 1% of demand. As a result of this, we have not included quantitative analysis of the sector. We have still sought sector views for the renewable energy sector to gain insight into future levels of consumption and whether it will become more significant. These sector views are outlined in the following pages.

Renewable Energy – Sector View

The UK renewable energy sector covers a broad range of technologies, including wind (onshore and offshore), bio-energy marine technologies and solar. The UK renewables sector has benefited from a long-term policy and financial framework, which has driven the increased deployment of renewable energy.

The focus of the sector interviews is on wind energy, where steel consumption is greater due to the greater deployment of these technologies and the greater quantity of steel not only in offshore turbines but also foundations and substations continues to drive the consumption of steel in this market segment.

Currently, UK deployment stands at 10.2GW of onshore wind and 5.1GW of offshore wind – these are expected to reach around 13GW onshore and around 10GW of offshore wind by 2020. The UK could support 10GW of new offshore wind in the 2020s provided the costs continue to come down.

The previous government was elected with a manifesto commitment to end subsidies for new onshore wind projects and to give local people the final say on planning applications for projects. The Energy Act 2016 delivered on the commitment to end subsidies by closing the Renewables Obligation (RO) early on 12 May 2016 to new onshore wind projects. Grace periods were set out in the Act to protect investor confidence, allowing some projects to continue to access the RO where they meet certain criteria. The government now wants to see lower-cost renewables being built without government support, where they are supported by the local community, which includes onshore wind projects. Some developers have already announced their intentions to build projects without support, making use of corporate power purchase agreements or relying on revenue from the wholesale market alone. Other developers have called on government to support deployment by introducing a 'market-stabilisation' contract for difference.

The government set out its intention in its manifesto to maintain the UK's position as a global leader in offshore wind and remains committed to contracts for difference (CFD) auctions for offshore wind and other less established renewable technologies. The second CFD allocation round is now underway with a budget of £290m annual support. The auction will take place later in August 2017 with results known in September 2017. Details in relation to the timing and budget for future auctions will be set out in due course.

Markets

Respondents tended to focus responses on the tower; however, steel is also consumed in foundations, substations and forged casting in the turbine itself. UK manufacturing capability is in towers, foundations (both jacket and transition pieces for monopole), topsides and jackets for offshore substations.

All respondents saw offshore wind as the key opportunity within the renewable energy sector, with government the key driver for more activity in the UK. Numerous respondents did feel that there is a lack of long-term stability in relation to a clear government policy around the future of wind power.[83] This was cited as something other European countries have done in order to help encourage further private sector

[83] 6 interviewees stated this, representing 67% of the 9 renewable energy interviewees. This includes an industry body and 4 consumers.

investment. However, in their views alongside clear policy, if UK steel is to effectively compete with existing European producers in this sector then substantial investment will be required.

An industry body reiterated that government is the key driver for the industry and there will always be a role for government in renewables. Government needs to make a clear statement that wind power is a large consumer of the steel industry and make a commitment to the industry. They felt that investment can only happen if there is certainty and at the moment this is not the case. They stated that this does not necessarily have to be a continuation of CFD auctions. The industry body would like to see commitment beyond 2025 to provide more certainty to the industry. The more penetration there is, the more wholesale prices will decrease.

Another interviewee reiterated that offshore wind is driven by government policy. The opportunity/threat is whether government will commit to more. The industry has made massive progress in lowering costs over the past years and this provides opportunity for a strong future. The previous government committed to support 10GW of new offshore wind in the 2020s, provided the costs could come down. The industry has now lowered costs much more than expected, so the industry would like to see more investment committed. They did, however, praise the UK government for its provision of subsidies. The respondent felt that there is opportunity for further work. They stated that the country has long coastlines with particularly good conditions in the North, which has good sea bed and water-depth conditions. Another interviewee highlighted that the pipeline is over the longer term which poses a threat.

It is a market that is also expected to see an increased use of steel at it moves towards larger turbines (and associated towers and foundations).[84] Alongside the towers, there is also the opportunity for other heavy plate supply for foundations. This opportunity was identified by a number of interviewees. For example, the size of rotors is expected to increase by the 2020s, meaning that units that produce greater than 8MW may be developed requiring stronger towers and more steel. Another stated that steel consumption will be level as a proportion, but volume will increase by 10–20%.

Several respondents noted that there are unlikely to be further opportunities for onshore wind in the UK,[85] following the closure of the RO incentive scheme and current lack of an alternative route to market. Another interviewee felt that the political climate is moving away from onshore towards offshore. Historically, projects have been government backed and were strong at supporting the supply chain. Consumers were willing to pay more for products using UK content.

Capability & Capacity

There are challenges with UK producers' current capability – particularly in terms of the width and thickness of plate it can provide – which is limited.[86] **Numerous interviewees stated that UK steel does not currently provide, or provides very little,**

[84] 7 interviewees stated this, representing 88% of the 9 renewable energy interviewees. This includes an industry body and 6 consumers.
[85] An industry body and a consumer stated this.
[86] 3 interviewees stated this, representing 38% of the 9 renewable energy interviewees. This includes 3 consumers.

to the offshore sector.[87] The fact that the UK does not produce the greater widths of plate does not mean their products cannot be used in the sector. The smaller plate sizes would, however, require more welding compared with use of larger sizes of plate. This makes use of those plate sizes produced in the UK less favourable, with greater cost to weld these together. It is a limitation that will become more pronounced as the market shifts to large towers, as this will require even higher-quality grades. For example, one large offshore wind organisation stated that 70% of what they require is outside of the capabilities of UK producers in terms of the thickness and size they are able to produce. The UK can only produce a maximum plate width of 3.85m, which creates restrictions when the bigger turbines require plates with a 4.2m width. The interviewees stressed that they want the biggest products available to reduce the need for welding, and this depends directly on the fabricators and mills. They have not yet received any actual products from the UK as yet so they cannot comment on the quality. However, having undertaken a full audit of the production process, they believe the equipment is available to make quality steel in the UK. Another large renewables company stated that an issue for the UK is the size of the slabs and plate dimensions produced. The UK does not produce the tower plates they require, although this is starting to change as an organisation has entered the market. The UK would require substantial investment to make the steel required for towers. Without another industry requiring a similar product the business case is probably not there. An engineering consultancy stated that the UK is generally well catered for in terms of steel needs, but this is not seen on large-scale offshore projects.

One interviewee raised issues of capacity, where they felt UK producers were only focused on larger volume orders. They stated that they are quite low volume, which does not make them attractive to UK steel producers who are focused on higher volumes. When volumes were higher the UK fabricators were interested in hubs but as volumes fell they produced nuclear boxes instead.

While fabricators in the offshore sector consume significant amounts of steel, this would only represent a small quantity of UK steel producers' total production.

It is a market that is not anticipating major changes in technical specifications.[88] There have, however, recently been some positive moves towards improving the UK capability in this sector, with investment made in steel tower production. For example, one respondent stated that they do not anticipate real change in specifications, with no change in grade to 420/460. They require mass, not necessarily strength, to avoid buckling. Another respondent stated that they see no change in specifications. They want to keep it basic and at a grade that is available in all markets, as they have 32 manufacturing factories with suppliers from across the world. Another interviewee stated that there would not be any major changes in steel. The higher the tower gets, the more need there is to reduce the weight or the thickness of the plate they are using. It will also require larger foundations to support the larger diameter tower. An industry body stated that the industry is having to overcome engineering issues, with offshore towers now having to tackle

[87] 6 interviewees stated this, representing 67% of the 9 renewable energy interviewees. This includes an industry body and 4 consumers.
[88] 6 interviewees stated this, representing 67% of the 9 renewable energy interviewees. This includes an industry body and 5 consumers.

deeper waters and structures getting larger. These are design issues that will need to be overcome. This is an opportunity where the industry needs to meet with steel producers.

Several cited the opportunity of concrete foundation; however, there is little desire to move away from steel in tower production or in turbines.[89]

Supply Chains

The bulk of fabrication for tower production is done in Europe and then brought into the UK.[90] An industry body stated that there is lots of investment happening in tower production but this tends to be in continental Europe. The perception was that there needs to be more certainty around the UK's future commitment to the industry as it is affecting investment decisions. To address this will require an incremental approach to building capability. This is something that is starting to happen through international investment in the manufacture of towers. This can also be enhanced through close working between the producers and existing UK companies that are fabricating products for the offshore wind industry.

One respondent stated that government policy is needed to provide certainty over future offshore wind projects and to develop a strong supply chain. It needs to have long-term visibility with a long pipeline to make this viable. If projects run on a piecemeal basis, it is difficult for a supply chain to be established. The respondent claimed that they are the first serial customers for these products, which creates lots of risk for them, and they are looking for other suppliers who can produce more varied sizes and create some price competition. They are trying to develop a UK-based supply chain. It will be interesting to see how these fabricators/the supply chain react when the oil price increases. It will show how serious the suppliers are in meeting the sector's need. There is a question over how dedicated they are to the sector when old clients come back as the oil price rises. It is important to note that while addressing these issues may provide more certainty to the industry, they will not necessarily address the issue around the use of UK-produced steel.

Another respondent stated that fragmented policy in the past has meant that the market is always stopping and starting. It is logical for the supply chain to want to have consistency. This respondent stated that they have the benefit of being flexible across markets (i.e. exporting). In Europe there has been long-term investment in the sector, which is very different to the stop-start nature of the UK. As a result, it is difficult for UK suppliers unless you can get into the European market. The respondent stated that they have recently invested in a factory in Hull, which brings in parts worldwide and assembles the various components for each wind turbine. The tower and turbine components, are brought in from different fabricators across the world (e.g. Denmark), with the blades manufactured in the UK. However, they do not consume any steel content. Again, it should be noted that while this will help provide certainty to the industry, it will not address the issue around the use of UK-produced steel.

In contrast to these views, a manufacturer of onshore towers said they are now targeting the UK offshore market. This is the new opportunity and they are investing heavily in this. At present, this market is all imported. They stated that they would like to see a UK model

[89] 4 interviewees stated this, representing 57% of the 9 renewable energy interviewees. This includes 4 consumers.
[90] 6 interviewees stated this, representing 67% of the 9 renewable energy interviewees. This includes an industry body and 5 consumers.

that works. They would like to use UK suppliers as this reduces transport costs and lead times. Another respondent stated that the steel they use in the UK comes from Spain, both through traders and direct from mills, where it is then assembled in the UK. They also use producers from China and South Korea.

While investment decisions are not solely focused on costs of production, an industry body felt that the higher production costs in the UK meant that investment is happening elsewhere instead. When comparing the UK with other countries in investment decisions, costs are often far lower elsewhere (e.g. Poland). Renewables developers are under huge pressure to reduce costs so these are key factors in decisions. Prices in the sector are half the price of what they were five years ago.

Competitiveness

In addition to the lack of capability in UK producers to provide to the renewables market, several interviewees raised issues with cost competitiveness.[91] One interviewee stated that all of the steel they use comes from outside of the UK. When they have looked to source steel from the UK, prices have been too high. They were 40% more expensive than imports from Spain. Another respondent stated that their projects have a relatively small impact on the UK steel market. Because of this small footprint, they find it difficult to get volume-driven discounts from UK steel manufacturers. Another interviewee stated that producers have adapted well over the years and believe they will continue to do so from here on out. If UK industry could lower costs then they could then become more competitive. Another stated that they have not used UK steel in 6–8 years and instead source from Spain, with UK prices 20% more expensive than competitors. The local industry for tower manufacturing is not competitive against China or Spain. However, they did say that if costs were lower in the future they would use local producers.

One interviewee stated that the UK steel industry is currently not competitive in the supply to offshore wind manufactures. All steel currently comes from Europe or further afield. They use large steel plates to spread the weight of the towers when being assembled on land. These should have been a simple to procure locally, but were cheaper to procure overseas and then ship to the UK. Another stated that they use a mill in Germany because of the quality and price. They have used a mill with UK operations before but had price and quality issues. The mill they use now has a higher quality than the UK at a lower price, even when factoring in transport costs. UK prices are €50–90 more expensive per tonne than their European competitors and are even more expensive when compared with Asia and the emerging markets.

One interviewee felt that the government's industrial strategy would be a great opportunity to drive jobs and growth, but requires energy policy that drives offshore wind. Consistency is needed regarding demand in the market and investment in the supply chain. They were encouraged by the opportunity for a joined-up industrial strategy, helped by business and energy policy being brought together in the Department for Business, Energy & Industrial Strategy.

[91] 6 interviewees stated this, representing 67% of the 9 renewable energy interviewees. This includes 6 consumers.

m.) Conclusions

Conclusions – Historical Demand

The industry's capabilities have not kept pace with the demands of the market. The capabilities gaps are more in flat products as compared with hot rolled coil, cold rolled coil and coated products in automotive, oil & gas, yellow goods and packaging sectors. Capabilities in automotive flats has seen migration out of the UK due to economic reasons, leaving the UK steel industry unable to service the sector.

There are capacity constraints in some products – HDG, seamless tubes and stainless steel. In seamless tubes, demand volumes are still not sufficiently large enough to support investments in UK-based facilities. In stainless steel, this is due to Europe-wide capacity rationalisation as a large part of demand has migrated out of Europe.

At a high level, it would appear that adding new capacities could potentially address the gaps. However, this also needs to be considered together with cost competitiveness of the new entrant vis-à-vis imports and existing producer/s.

The UK steel industry also has its share of success stories such as rails, wire rods and sections.

The requirements of the steel-consuming sectors are constantly evolving and will continue to do so in the future. Themes such as lightweighting of cars, increasing offshore wind tower heights, demanding environments for oil & gas pipelines and thin-walled cans implies that the steel industry will have to constantly invest, improve and innovate in new product development to service its customers.

A number of interviewees suggested that the UK faces a cost disadvantage on business rates and energy prices and that that lower energy prices and business rates would help address the structural cost disadvantages of the industry. This report does not dispute this cost disadvantage aspect. It goes beyond this to highlight that there are some serious gaps in the downstream finished product capabilities. The evidence gathered in the study suggests that while lowering energy prices and business rates are important levers, there are numerous issues which need to be addressed urgently in the downstream for the industry to attain the required technological capability.

The success of the steel industry is dependent on the success of its customers – manufacturing, construction and infrastructure. For far too many years, manufacturing and supply chains have been allowed to migrate and hollow out. It is very challenging for the steel industry to invest in an environment of policy uncertainty. This has had a cascading effect on consumers, who find it challenging to build long-lasting, sustainable relationships with a steel industry that is uncertain about its own future.

Conclusions – Demand Forecast

After nearly two decades of continuous decline, demand in the UK could be on a path to recovery. This will build upon green shoots of recovery in 2012–2015. The recovery is likely to be slow and gradual and involves responding to numerous evolving changes in customer demands, which are likely to continue unabated. The biggest boost to demand will be from the increasing infrastructure investments supported by the government to grow the economy. A key factor, which is weighing the prospects of acceleration of demand

recovery, is the uncertainty on the EU exit. This uncertainty is cascading across industrial and commercial construction, machinery and packaging.

The demand scenario works on a conservative basis of local content in automotive production and presence of supply chains in the UK. It is acknowledged that the government will push forward with broad inclusive industrial strategy. However, it may take some time for benefits to accrue to the steel industry. Large-scale reshoring of manufacturing and supply chains can be very challenging and time consuming. But despite the challenges there is room for demand improvement, such as automotive supply chains, renewables supply chains.

The demand recovery presents an excellent opportunity for the UK steel industry. But the industry has to address numerous capability issues and it has to break out of the cycle it finds itself in and make the leap forward to position itself competitively. The demands of the customers cannot be met by incremental improvements or capability enhancements. The industry must take full advantage of the demand recovery, with possible government support on renewed industrial policy, and plan on building up an industry that is fit for purpose in the coming years.

4. Appendix 4: Product Analysis

a.) Introduction

This appendix provides detailed analysis of consumption for the following steel products: Rebars, Wire Rods, Merchant Bars, Engineering Steels, Rails, Open Die Forgings, Sections, Hot Rolled Coils, Cold Rolled Coils, Coated Products, Tinplate, Seamless Tubes, Stainless Steels.

The first section of the appendix begins by providing an overview of product findings from the information collected in the historical demand analysis and demand forecasting. Then the analysis goes through product by product providing a detailed overview of the historical steel demand in each sector, forecast steel demand in each sector and sector views on current and future steel consumption trends provided by businesses that consume that particular product.

The penultimate section of the appendix provides analysis of the value of products over time and finishes with some conclusions made from the historical demand analysis, demand forecasting and product views gained from interviews with the industry.

b.) Summary

Summary – Historical Demand

1.0 Summary of Steel Producing Assets in the UK (2015)

	Steel Making Route	Cap-acity	Flat Capacity (mtpy)					Long Products Capacity (mtpy)						Other
			Plate	HRC	CRC	Coat-ed	Tin plate	Rebars	Wire Rods	Merch-ant bars	Light Sect.	Medium Sect/ Rails	Heavy Sect.	
British Steel	BF-BOF	3.25						x	0.85	x	x	0.6	1.05	
Celsa UK	EAF	1.2						0.89		0.35				
Bromford I&S	x	x								0.11				
Caparo	x	x								0.49				
Liberty Rother-ham	EAF	0.8												0.9**
Acenta Steel	x	x												0.07**
Sheffield Forge Masters	EAF	0.15												0.15^^

	Steel Making Route	Cap-acity	Flat Capacity (mtpy)						Long Products Capacity (mtpy)							Other
			Plate	HRC	CRC	Coat-ed	Tin plate	Electr-ical Steel	Rebars	Wire Rods	Merch-ant bars	Light Sect.	Mediu m Sect/ Rails	Heavy Sect.	Speci al Profil es	
Liberty Newport	EAF	0.9*	x	1.6	x	x	x									
Liberty Dalzell	x	x	0.43	x	x	x	x									
Tata Port Talbot	BF-BOF	4.5	x	3.2	1.2	x	x									
Tata Llanwer n	x	x	x	3.3*	0.7*	0.5	x									
Tata Trostre	x	x	x	x	0.7	x	0.68									
Tata Shotton	x	x	x	x	x	0.66	x									
Cogent	x	x	x	x	0.33	x	x	0.49								
Met-invest Spartan	x	x	0.2	x	x	x	x	x								
Outu-kumpu	EAF	0.4														0.03

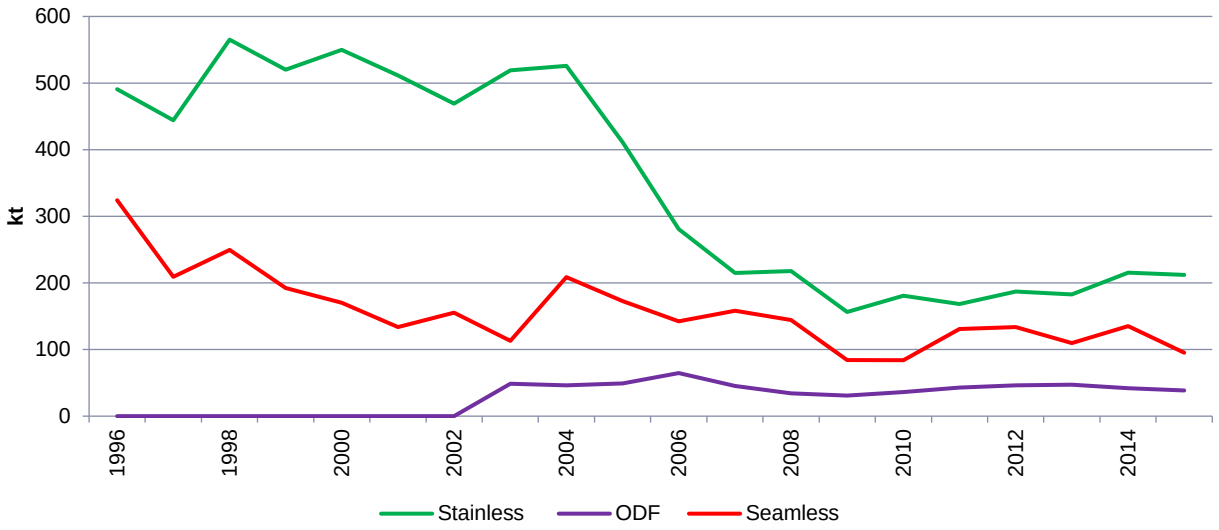
* Not operating ** Engineering Steels ^^ Open Die Forge

Source: Company Information, VdeH, James King

The UK steel industry comprises of 11 Mt of crude steel capacity, 5.5 Mt of long products, 5.8 Mt of flat products, 0.15 Mt of open die forgings and 0.4 Mt of stainless steel. Of the total 11 Mt steel capacity, BF-BOF route accounts for 70% share while EAF route accounts for the balance (30%). The UK has a good mix of assets producing the full spectrum of finished steel products. The only exception is that the UK has no seamless tubes production capacity since the closure of Timken Desford Tubes.

2.0 Summary of Finished Steel Demand

Exhibit 53: Trends in UK Finished Steel Demand



Source: ISSB, Hatch

At a macro level, finished steel demand in the UK presents a picture of structural decline over the past 20 years. Demand for longs and flats has contracted by 31% and 34% respectively. However, for stainless steel and seamless tubes demand contraction has been more profound, wherein the total contraction has been more than two-thirds. Much of the demand fall was already in progress prior to the financial crisis in 2008, but the crisis exacerbated the situation. Since 2008, demand has been on a slow recovery path but has not managed to reach anywhere near the pre-crisis levels. It must be highlighted that since 2011, demand for all finished steel is showing signs of some stabilisation. Between 2012 and 2015, long products demand has expanded by 9%. This signals the arresting of long-term decline in demand for the first time in the past 20 years.

There are numerous reasons for the demand contraction:

- **Fixed Assets Investments (FAI)**: Steel demand is driven by investments in infrastructure, machinery, construction, shipbuilding, automotive etc. FAI as % of GDP in the UK has declined from 20.3% in 1996 to 15% in 2009. Although it has started to recover, it was still 17.3% in 2015, considerably lower than 1996.
- **Manufacturing Migration**: The UK, like many developed countries, has seen large steel-intensive manufacturing sectors decline and migrate abroad. Examples are shipbuilding, capital equipment, home appliances, wire drawing. As a consequence, steel demand has been negatively impacted.
- **Supply Chain Consolidation**: In sectors such as automotive, supply chains have become more efficient and regionally consolidated to strip out costs. More components and systems can be produced from the same facilities and can be shipped to the point of demand more efficiently and timely, thereby reducing the need of having manufacturing spread out in the EU and UK. The UK does not appear to be a beneficiary of this consolidation.
- **Downgauging of steel**: In the past two decades, there have been enormous improvements in product developments and the introduction of new grades and types of steel. Higher-strength steel grades result in better strength-to-weight ratio in steel and consequently demand volumes decline. Such trends have been seen in steel

usage in home appliances, pipes for oil & gas, offshore platforms, automotive, construction and packaging. These trends have influenced steel demand globally and trends in the UK are a mirror reflection of that.

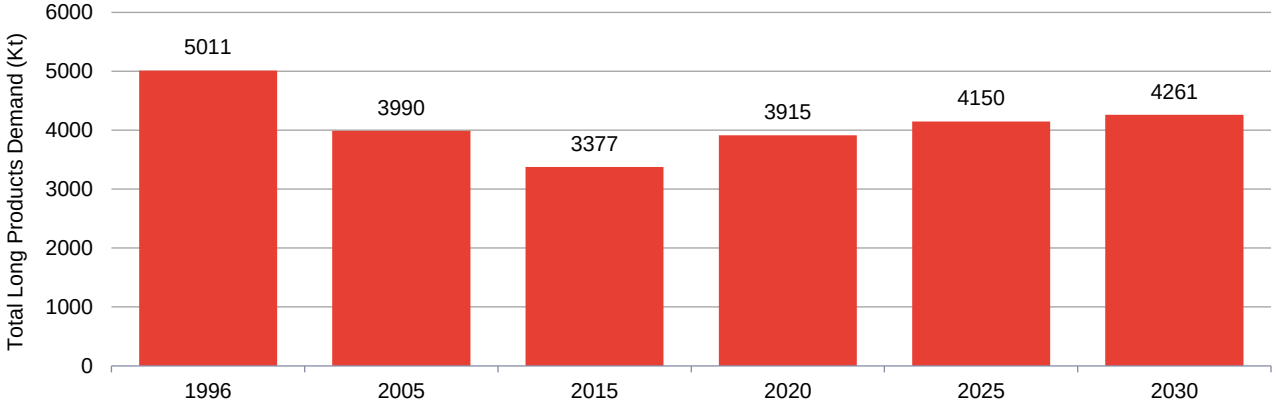
- **Substitution**: In some applications, like automotive and packaging, alternative materials such as aluminium, paper, glass and plastics have replaced steel. In premium cars, pressures of lightweighting have resulted in aluminium replacing steel in BIW parts. In beverage cans, aluminium has largely replaced tinplate cans and as a consequence can weights have reduced by more than half in the past 20 years.

In an environment of such sharp demand decline, the UK steel industry has achieved some success in substitution which needs to be highlighted. A promotional campaign by Corus in the 90s and early 2000s markedly displaced reinforced concrete as the preferred material in commercial buildings. The promotion involved lobbying government and industry decision makers, education of students, architects, structural engineers in steel design and commercial interaction through the steel fabrication industry, industry bodies British Constructional Steelwork Association (BCSA) and entire supply chain. As a result of this promotion, share of steel frames in commercial buildings in the UK increased from 40% to 70%, and it continues to remain at comparable levels (Source: BCSA).

Summary – Demand Forecast

Summary Forecasts

Exhibit 54: Forecast Demand for Long Products (kt)



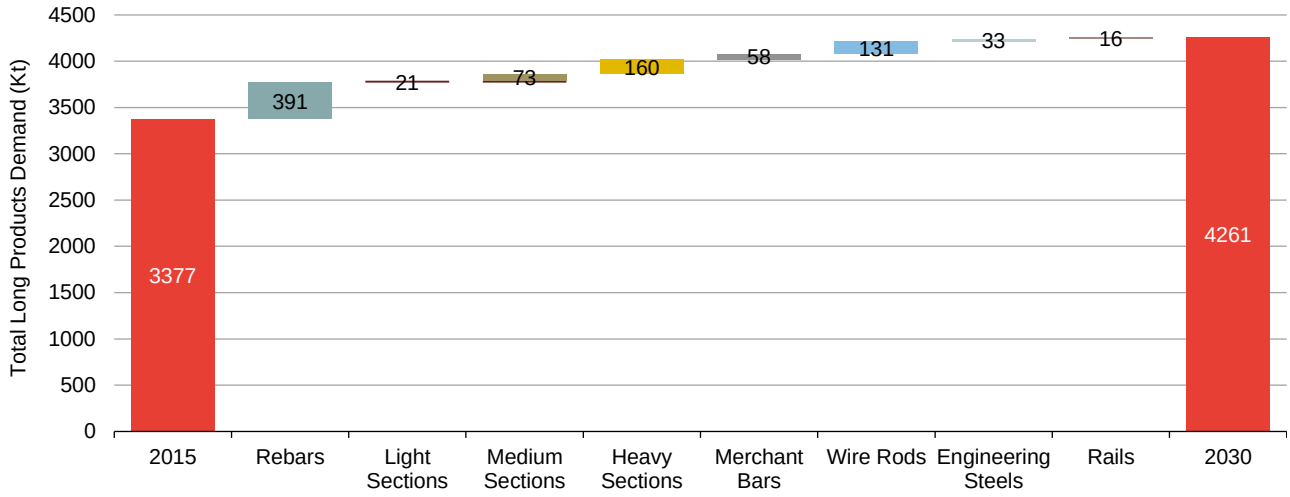
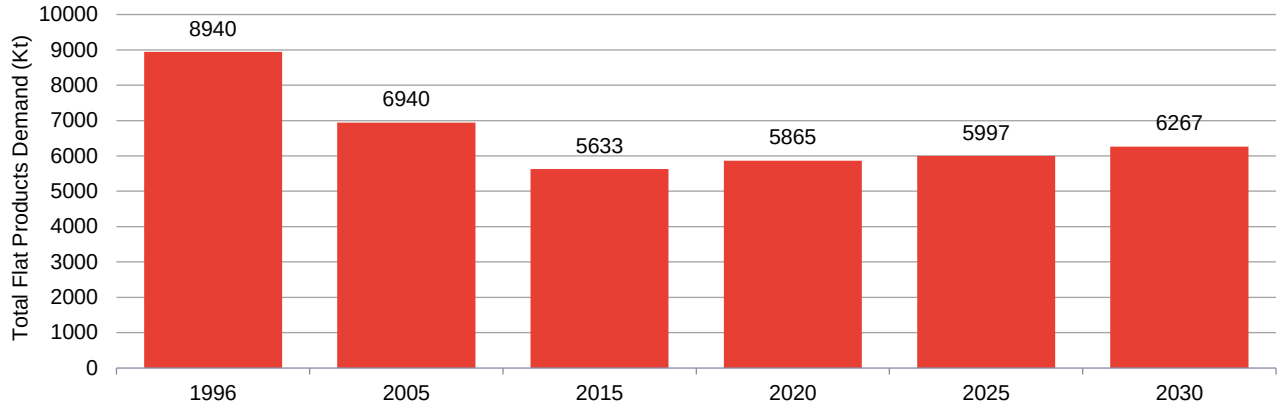


Exhibit 55: Forecast Demand for Flat Products (kt)



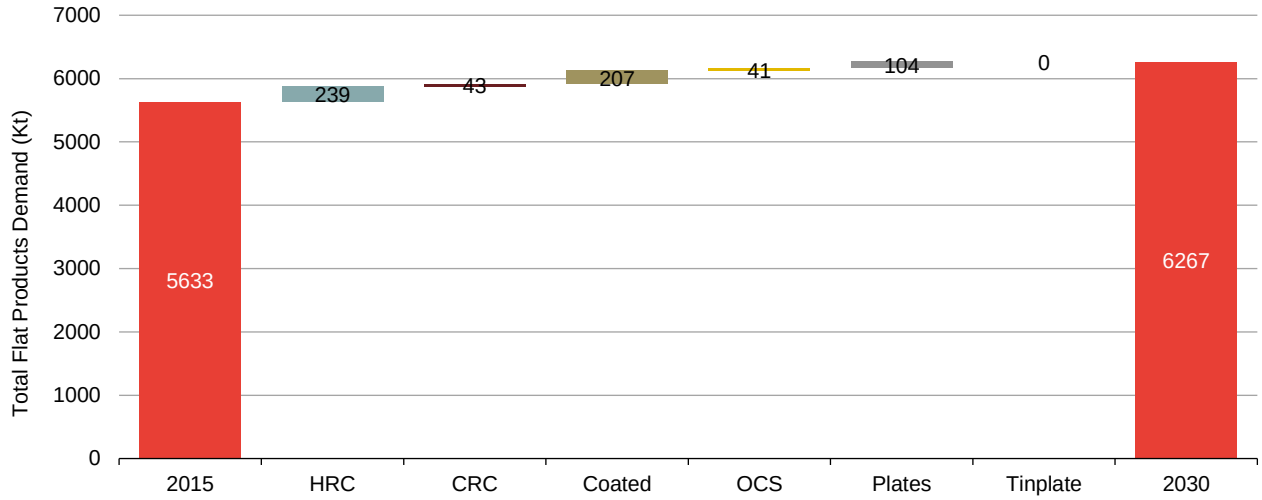
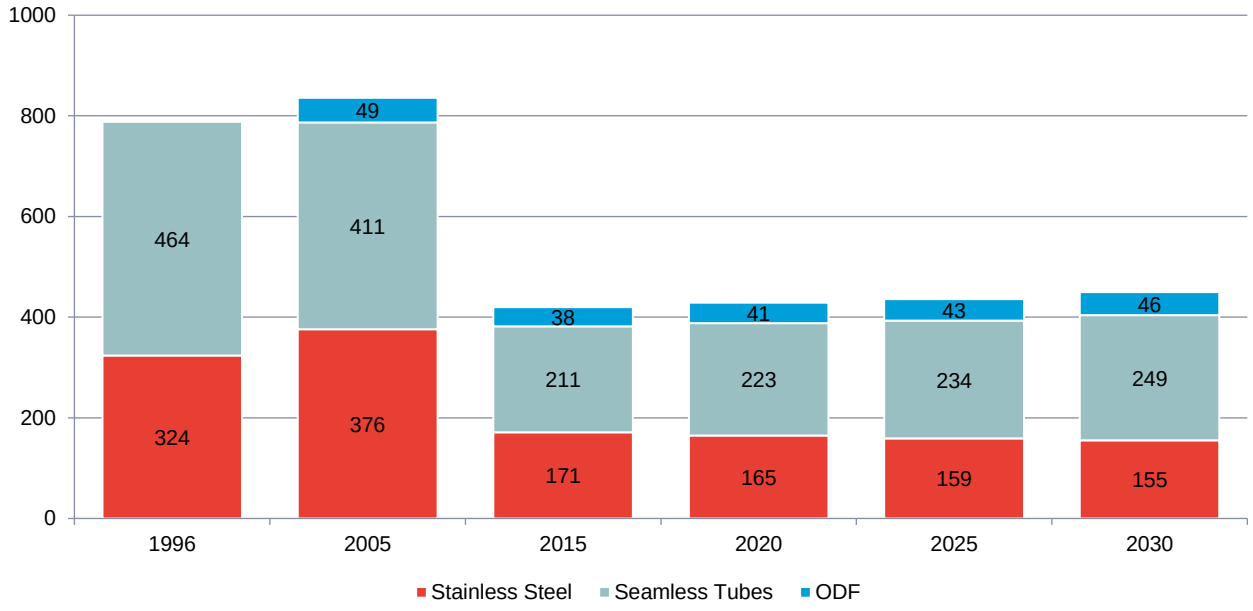


Exhibit 56: Forecast Demand for Other Steel Products (kt)



Source: Hatch

The total finished steel demand is forecast to grow at 1% p.a. to 11.0 Mt in 2030 from 9.4 Mt in 2015. The increase in demand is predominantly from long products and this increase is estimated to be 0.9 Mt. The increase in demand from flat products is estimated to be 0.63 Mt. One of the key themes of the demand forecast is that there are no major upward shifts in manufacturing sectors which are steel intensive through the forecast period. Although it is understood that the UK government is broadly supportive of an inclusive industrial strategy, there is no visibility on which specific sectors would benefit. This view is also supported by interview findings across different sectors, wherein interviewees largely assume no changes in manufacturing activities in the UK or deteriorating even further due to a hard landing from the EU exit.

Alternative Demand Forecast Scenarios

In addition to base, two alternative demand scenarios were developed. The key assumptions for the scenarios are presented below:

High Case	Low Case
• EU exit process, trade agreements uncertainty resolved quicker • Better support for manufacturing in the UK and pick up in reshoring of supply chains • Improved localisation of automotive production – +10% increase • Positive spillover effects on industrial and commercial construction • Funding constraints for infrastructure projects less constrained	• Hard landing from EU exit • Further hollowing of supply chains • Manufacturing activity remains weak due to tariffs • Auto localisation drops by 10%

Source: Hatch

Exhibit 57: Alternative Demand Forecast Scenarios (Mt and £b)

	Demand 2030 (Mt)			Growth (p.a)		
	2015	Base	High	Low	Base	High	Low
Finished Steel	9.4	11.0	11.8	10.5	1.0%	1.5%	0.7%
Long Products	3.4	4.3	4.5	4.1	1.6%	2.0%	1.4%
Flat Products	5.6	6.3	6.8	6.0	0.7%	1.3%	0.4%
Other Products	0.42	0.45	0.46	0.45	0.4%	0.6%	0.4%
	Demand 2030 (£b)				**Growth (p.a.)**		
	2015	Base	High	Low	Base	High	Low
Finished Steel	3.8	6.0	6.4	5.7	3.1%	3.6%	2.8%
Long Products	1.3	1.8	2.0	1.8	2.6%	3.0%	2.4%
Flat Products	2.0	3.4	3.7	3.2	3.6%	4.1%	3.2%
Other Products	0.5	0.8	0.8	0.8	2.5%	2.7%	2.4%

Source: Hatch

The demand forecast scenarios imply that the upside for demand is quite significant: ~7% of the base demand.[92] The future opportunity is £3.8bn in the central case, but could be as low as £3.6bn or as high as £4.2bn under the different scenarios. The key to fruition of the upside opportunity is to advance the EU exit negotiation process and trade agreements, which would help remove the uncertainty surrounding the planned investments in many sectors. Specifically for the automotive sector, steel demand growth could be supported by improved localisation of component manufacturing. In addition, if this is combined with a positive, inclusive industrial strategy, it could support further expansion of steel demand in the UK by support of reshoring of supply chains and its positive spillover effects on industrial and commercial construction spend.

[92] The sensitivity analysis uses different scenarios for UK steel demand in tonnes but a single set of forecasts for global steel prices.

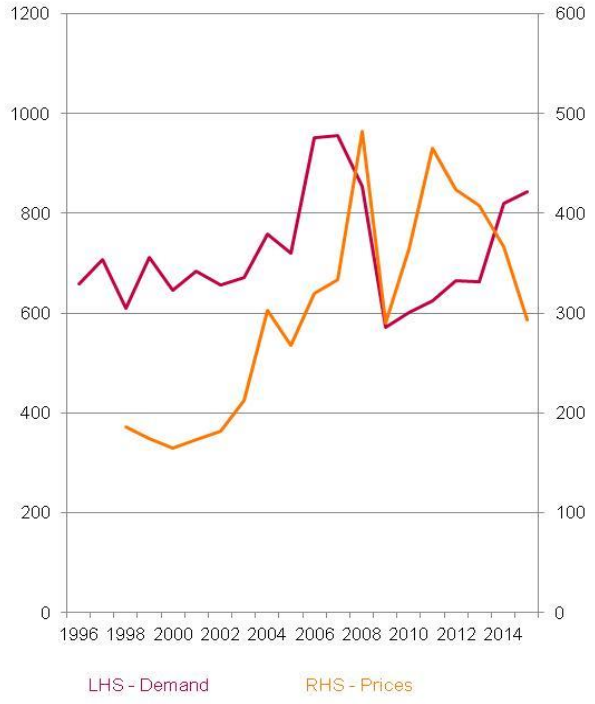
On the other hand, the downside on demand could be up to -5%. The main reason driving this scenario is the EU exit process. As a consequence of the hard landing, we expect the effects to manifest itself in:

- Construction sector, primarily in industrial and commercial construction;
- Manufacturing and further hollowing out of supply chain;
- Automotive – a contraction in localisation and more outward migration of supply chains;
- The infrastructure construction spend is likely to relatively immune to EU exit effects as these are largely committed projects. Beyond 2025, government fiscal pressures may not allow continued investments in infrastructure investments.

c.) Rebars

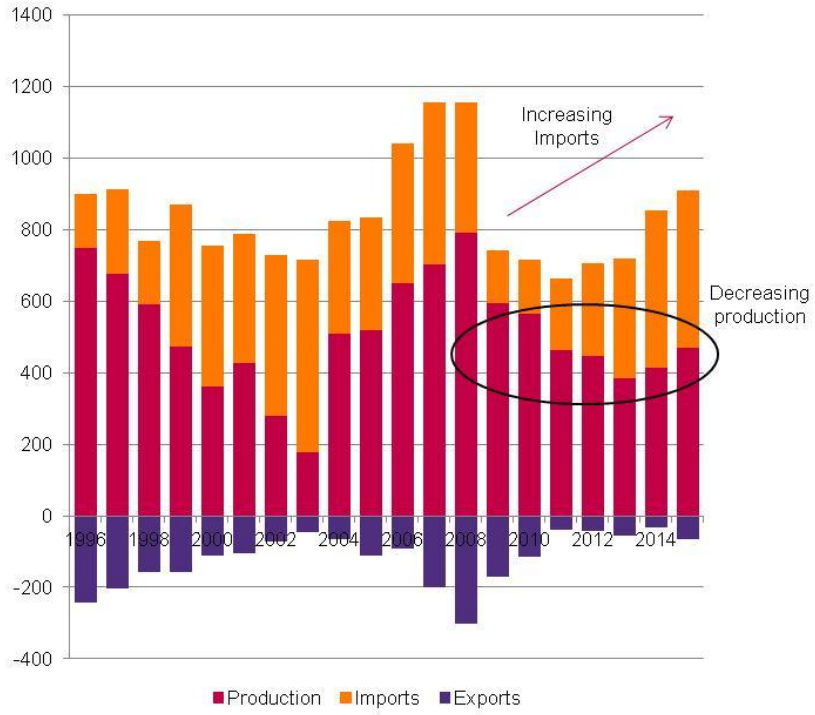
Rebar – Historical Demand

Exhibit 58: Rebar Demand in UK (kt) and Prices (£/t)



Source: ISSB, Platts, Hatch

Exhibit 59: Rebar Supply in UK (kt)



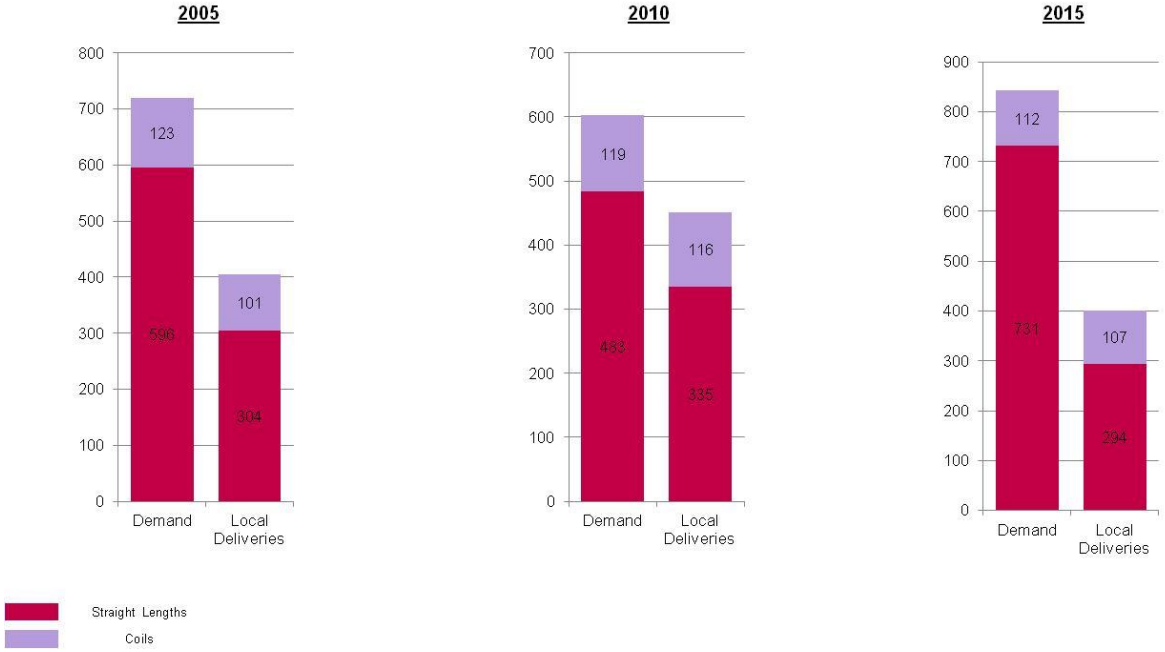
Source: ISSB, Platts, Hatch

UK demand for rebar increased from approximately 658 kt in 1996 to about 844 kt in 2015. Demand peaked at over 956 kt in 2007, sharply declining to around 570 kt in 2009, before recovering in the subsequent years. Between 2013 and 2015, demand increased by 27%, driven mainly by infrastructure construction spend, which increased by nearly 33% during the same period.

In the UK, one producer, Celsa, produces rebar. In the past 20 years, domestic production has declined and its share of demand has been eroded by imports, changing from a 74% share in 1996 to a 48% share in 2015. While rebar demand appears to have recovered since 2013, this has not translated into any benefits for the UK steel industry. On the contrary, the UK's production share in demand has been eroded by imports. In the past few years, rebars have been imported mainly from China, Spain, Portugal and Turkey.

In 2016, the EU imposed antidumping duties on rebars of Chinese origin. The duties range from 18.4% to 22.5% and will remain in place for five years. These duties are expected to create fairer competition for UK producers and could help regain market share back from imports.

Exhibit 60: Rebar Demand Breakdown vs. Local Deliveries (kt)



Source: Hatch

Rebar is supplied in straight lengths of standard diameters and lengths or in coils. This is largely specified on the basis of strength, or more specifically, yield strength and ductility, although other attributes can sometimes be specified in certain circumstances. Rebars are used in concrete-based buildings. Rebar is fabricated into cages or mesh/fabric used as a tension device in reinforced concrete and reinforced masonry structures, to strengthen and hold the concrete in compression. Rebar is an undifferentiated product and will remain so for the foreseeable future. As such, construction spend in infrastructure, private commercial construction, public non-housing commercial construction and industrial construction are the key drivers of rebar demand in the UK.

Given the requirements of the UK market, rebar in coils is supplied predominantly from the UK. As indicated in Exhibit 60 the main capability gap in local deliveries from the UK is in rebar in straight lengths.

Capability Summary

Attributes	Gaps	Reasons	
		Commercial	Technical
Rebars in Straight Lengths	Unable to meet the full demand requirements. Local suppliers' share of demand has declined to 37% (2015) from 66% (2010)	• The cost of steel production is high relative to imports from Turkey, China, Spain and Portugal, and this is primarily driven by high energy prices • Lack of sufficient capacity to meet demand • Supplier diversification: UK currently has one rebar producer. Customers prefer to diversify supplier base and therefore tend to import the products • Predatory pricing from imports	• Celsa is the sole producer for rebars from its bar-rod combi mill. The same mill also produces wire rods. Even after factoring Celsa's current wire rods production, there is some capacity slack to increase production • Overall, there is a lack of rebar mill capacity to meet UK demand, which can be addressed through capacity enhancements or restarting of mothballed capacities

The rebar big-picture scenario points towards a lack of capacity, even after factoring in some capacity slack in Celsa. It is worth highlighting that the rebar market globally is very competitive and customers can switch suppliers rapidly. Although an increase in production in rebars can meet the supply gap in rebars in straight lengths, it may not be possible to completely erode out imports. Customers will continue to import rebars for supplier diversification and for price arbitrage.

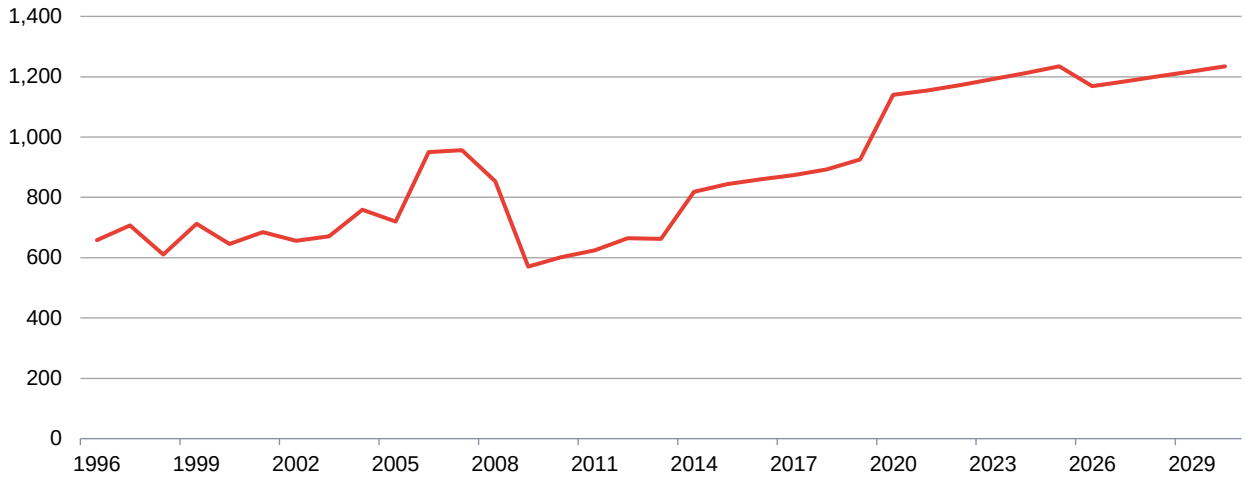
Rebar – Demand Forecast

Demand Outlook

Demand is forecast to grow by 2.6% p.a. to 1,234 kt from 843 kt between 2015 and 2030. This translates to an additional demand of +391 kt (+46%) over 2015 levels. We could expect an increasing demand for rebar in coils, and its share could increase from 13% currently to 15%, but on a much larger demand base.

In 2020, rebar demand could breach the 1 Mt mark, which was the highest achieved historically.

Exhibit 61: Forecast Demand for Rebars (kt)



Source: Hatch

Sector Outlook

Construction spend in the UK could grow at 1.9% p.a. until 2030. Within construction, infrastructure spend could grow at much higher rates of 2.7% p.a. After many years of anaemic growth in infrastructure, spend appears to be on a steady and solid growth path, building on the strong trends seen since 2010. These factors will drive the baseline growth in rebar demand. Between 2015 and 2019, Experian forecasts that infrastructure spend is expected to increase from £19.5 billion to £22 billion. This will sustain the growth in rebar demand up to 2019. Significant growth in demand is likely to accrue to the UK from 2020 onwards driven by two major infrastructure projects – HS2 and Hinkley Point C nuclear power plant. According to the government Infrastructure Project Pipeline estimates of steel requirements, these two projects alone could require 1.8 Mt of rebars up to 2030, starting from 2020.

Opportunities

There are no technical capability issues that could deter the UK industry from capturing the expected growth in rebars. The strong growth in rebar demand and the opportunity of eroding its imports implies that the industry has a potential to address an additional +832 kt of rebar demand. The total value of this opportunity for the industry is estimated to be about £315 million p.a. in 2030. The interview responses suggest that customers will continue to seek supplier diversification, and on that basis it may not be possible for the UK to capture the full value of this opportunity. Despite this challenge, rebar is a significantly large opportunity and the UK sector's current operating capacity is not sufficient to meet this.

There are a number of issues that need to be addressed for the industry to position itself favourably for this opportunity:

- Capacity and Production Enhancement: When the future demand of 1,234 kt in 2030 is compared to the Celsa's mill capacity 890 kt, it is clear that there could be a capacity constraint to meet the demand growth. There may be opportunities to address this through capacity enhancements and restarting mothballed rebar mills. This could also address and diversify the supply risk issues highlighted by some customers.

- Improving cost competitiveness of steel production which includes factors such as higher energy prices and business rates.
- Steel Procurement in Public and Infrastructure Projects: Steel produced in the UK can be at a disadvantage to imported steel and overseas suppliers who have been known to practise 'predatory pricing'. The government has introduced steel-specific procurement guidance to take account of social and environmental factors, but that the nature and duration of contracts may take some time for the full effects to be felt.

Uncertainty and Risks

A key uncertainty in the forecasts is construction schedules for major infrastructure projects. Example: Nuclear power plant projects have a history of schedule overruns. If there are schedule overruns, then the future demand could be lower than that forecasted. However, we highlight that the overall growth opportunity for rebars is still robust for UK.

Rebar – Sector View

Competitiveness

The UK position within this market has been influenced and will continue to be influenced by a range of factors. However, **the single most notable factor expressed by interviewees is how competitive it can be on cost.**[93] In part this was viewed as the result of high costs of production relative to imports from countries such as Turkey, China, Ukraine as well as other parts of Europe. However, the UK's domestic market share was also seen by the primary producer in the market to have decreased because of predatory pricing and high levels of dumping from 2014 onwards.

These producers, consumers and stockholders saw much of the cost challenge being driven by the higher energy prices within the UK relative to other countries.[94] Even with assistance from government, the UK's sole rebar producer stated that an industry study shows that there still remains a disparity of £17 per MWh compared with continental rivals. One processor highlighted how this is a key area affecting investment in UK producer facilities versus European competitors such as Germany.

The challenge will, however, remain around cost competitiveness, as both consumers and stockholders note that while they take a balanced view to procurement – looking at factors such as price, quality, origin and availability – invariably price has the heaviest weighting.[95] One large contractor stressed that this was difficult to avoid given that government often wants the lowest cost provider.

Throughout the interviews there were **no identified issues around customer service within the UK, but both producers and consumers stated a desire for better engagement.**[96] This was stated by consumers and the UK's sole rebar producer, with one

[93] 9 interviewees stated this, representing 53% of the 17 interviewees where rebar is a relevant product. This includes the UK's sole rebar producer, consumers and stockholders.
[94] 4 interviewees stated this, representing 24% of the 17 interviewees where rebar is a relevant product. This includes the UK's sole rebar producer, consumers and a stockholder.
[95] 6 interviewees stated this, representing 35% of the 17 interviewees where rebar is a relevant product. This includes 4 consumers.
[96] Stated by an industry body and large contractor.

large contractor expressing that engagement would help them become more competitive and give them an edge.

Several interviewees highlighted price certainty as an area for improvement.[97] One interviewee wanted more certainty on rebar pricing stating that it could not be fixed for more than one or two weeks. Placing orders early runs the risk of a supplier closing down and not fulfilling the order.

Capability & Capacity

These limits on competitiveness also appear to have shaped the UK's position in terms of capability and capacity. **While there were no major capability gaps identified through the interviews, the low rebar prices have meant that producers are highly unlikely to operate at capacity and are going to focus on other products where commercial returns are potentially greater.**[98] One large contractor expressed concern over the UK's rebar capacity, while another consumer even stated that UK mills are not interested in supplying rebar. Others highlighted that the producer's inability to meet supply has led them elsewhere.[99]

Coupled with this is the fact that the UK currently has one rebar producer. This was seen as an issue by a number of consumers who noted a preference to procure their steel from multiple producers and as such maintain a diverse supplier base in order to manage their supply risk. This factor has therefore further driven the increase in imports as consumers either source direct from overseas mills or through UK-based stockholders who import foreign products.[100] The UK's sole rebar producer stressed that it is unrealistic to assume they can supply all UK capacity because of this factor.

There may be opportunity for mothballed mills with rebar capacity in the UK to not only add additional capacity but also to help consumers and stockholders better manage supply risk. Two interviewees specifically stated the need for an additional rebar mill in the UK[101] and another stated the need for more competition. One industry body highlighted the need to meet capacity above 1.2 Mt to better manage spikes in demand, where production currently struggles due to capacity constraints.

Supply Chain

The fact that the UK only has one rebar producer is further complicated within the UK because of the producers' downstream ownership of the supply chain. This means that certain UK suppliers are often deliberately not used because they are part of the same parent group of companies that are considered competitors.[102]

[97] 3 interviewees stated this, representing 18% of the 17 interviewees where rebar is a relevant product.
[98] Stated by the UK's sole rebar producer.
[99] Stated by an industry body and large stockholder.
[100] 9 interviewees stated this, representing 53% of the 17 interviewees where rebar is a relevant product. This includes the UK's sole rebar producer, consumers and a stockholder.
[101] Stated by an industry body and processor.
[102] 3 interviewees stated this, representing 18% of the 17 interviewees where rebar is a relevant product. This includes consumers and an industry body.

Markets

Large infrastructure projects were seen by many respondents as the key opportunity, with government infrastructure contracts as one of the principal drivers of rebar demand.[103] HS2, Hinkley Point C and Thames Tideway were commonly cited opportunities.

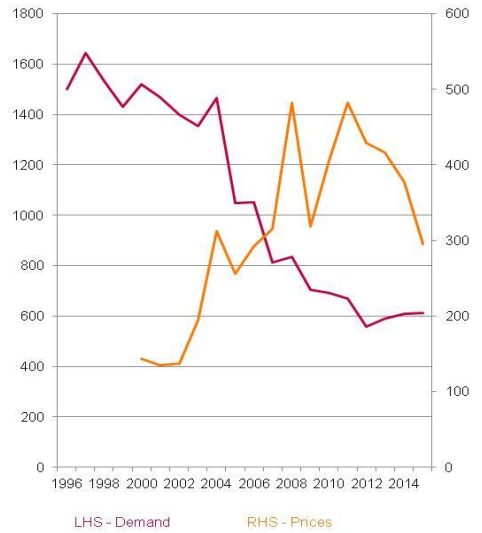
There may be some opportunities to better support UK rebar consumption through procurement. As part of the procurement process **several interviewees pointed to the need for increased monitoring of material sourcing as part of government procurement and particularly focusing on what is UK produced** as opposed to re-rolled or simply transferred.[104] Two respondents stated the need for better policing and education around perceived 'grey areas' in procurement rules,[105] while a processor also felt local authorities need to adhere to these requirements as well.

There was little anticipated change in specification, but there were some emerging ideas from interviewees about changes in rebar use.[106] One large contractor saw concrete fibres replacing rebar in tunnel segments of rail infrastructure. A high-end housing developer anticipated changes in the type of rebar they use through an increase in concrete frames moving to post-tensioned slabs. The rebar goes under tension leading to thinner materials that could allow an extra storey in buildings.

d.) Wire Rods

Wire Rods – Historical Demand

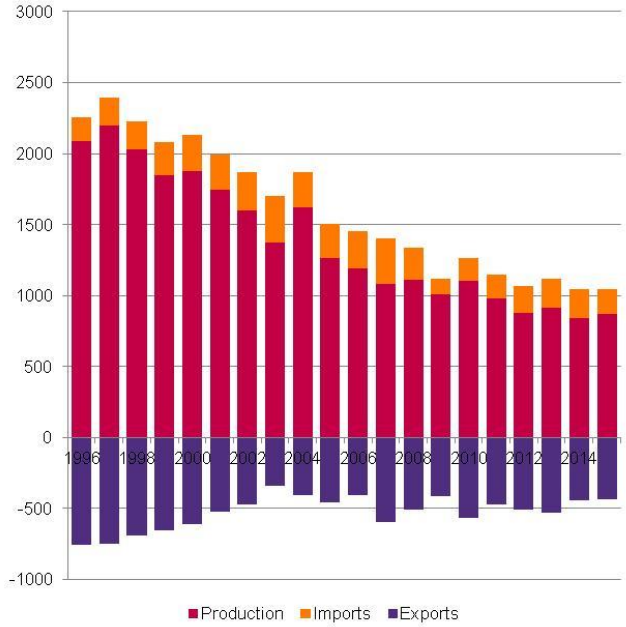
Exhibit 62: Wire Rods Demand in UK (kt) and Prices (£/t)



Source: ISSB, Platts, Hatch

[103] 11 interviewees stated this, representing 65% of the 17 interviewees where rebar is a relevant product. This includes an industry body, stockholders and consumers.
[104] 3 interviewees stated this, representing 18% of the 17 interviewees where rebar is a relevant product. This includes the UK's sole rebar producer and a consumer.
[105] Stated by an industry body and processor.
[106] 6 interviewees stated this, representing 35% of the 17 interviewees where rebar is a relevant product. This includes processors and consumers.

Exhibit 63: Wire Rods Supply in UK (kt)



Source: ISSB, Hatch

Wire rod is a hot-rolled product produced from billets and is supplied in a coil form. There are two different product types for wire rods.

Mesh-quality wire rod

A basic commodity steel that is also used as feedstock for reinforcement for concrete in the form of mesh/fabric.

Drawing-quality wire rod

A less commodity product that is drawn into smaller diameter coiled wire and used in a multitude of products. The different types of drawing quality wire rods are:

- Low-carbon wire: highly commoditised product and is used in fencing, baling, nails, coat hangers etc.
- High carbon wire: used in springs such as furniture and mattresses and wire rope.
- Premium wire: used in tyre cord, pre-stressed concrete applications and automotive and aerospace parts such as fasteners.

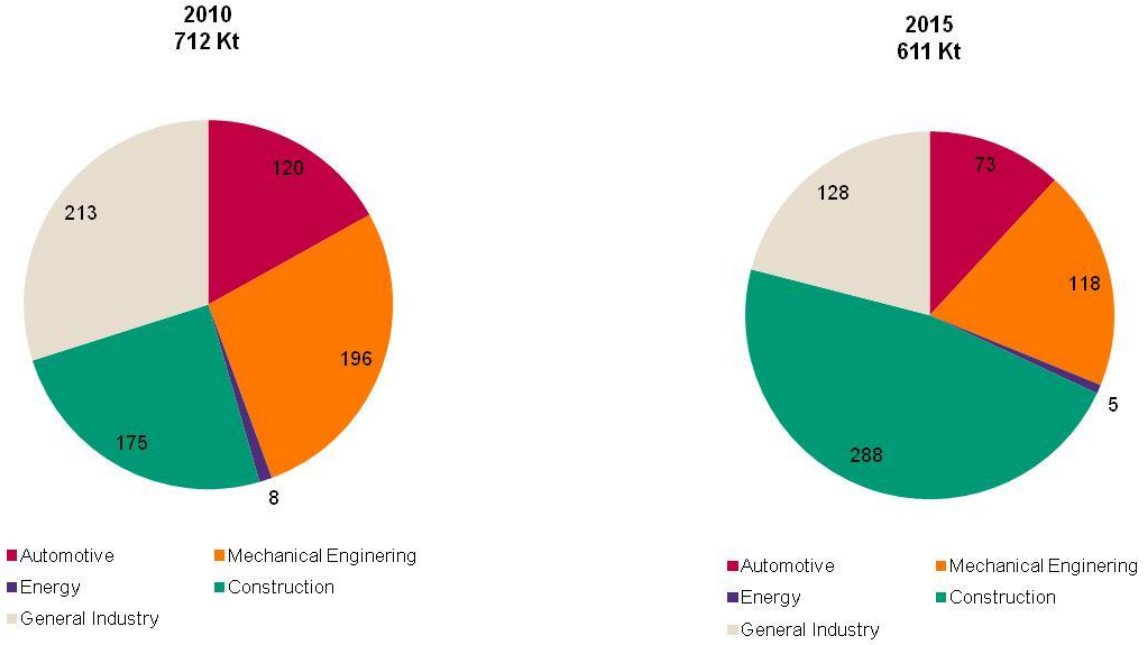
Wire rod demand has halved since 1996 and this is primarily the result of a 60% decline in the demand for the wire-drawing sector. The wire-drawing sector reflects the decline in manufacturing activity in the UK and its migration out of the UK. However, more recently, demand has made a marginal recovery and grown by 9% since 2012, driven largely by an increase in infrastructure construction spend.

There are two producers of wire rods in the UK – Celsa, which produces mesh-quality wire rods, and British Steel, which produces drawing-quality wire rods.

The share of local deliveries of wire rods has been consistently high. About 71% of the UK demand is met by local deliveries. The imports of wire rods are mainly from the Czech Republic and Germany. The UK is also a large exporter of wire rods. Nearly 50% of its

production is exported mainly to the EU. Some of its exports include high-quality wire rods of tyre cord grades.

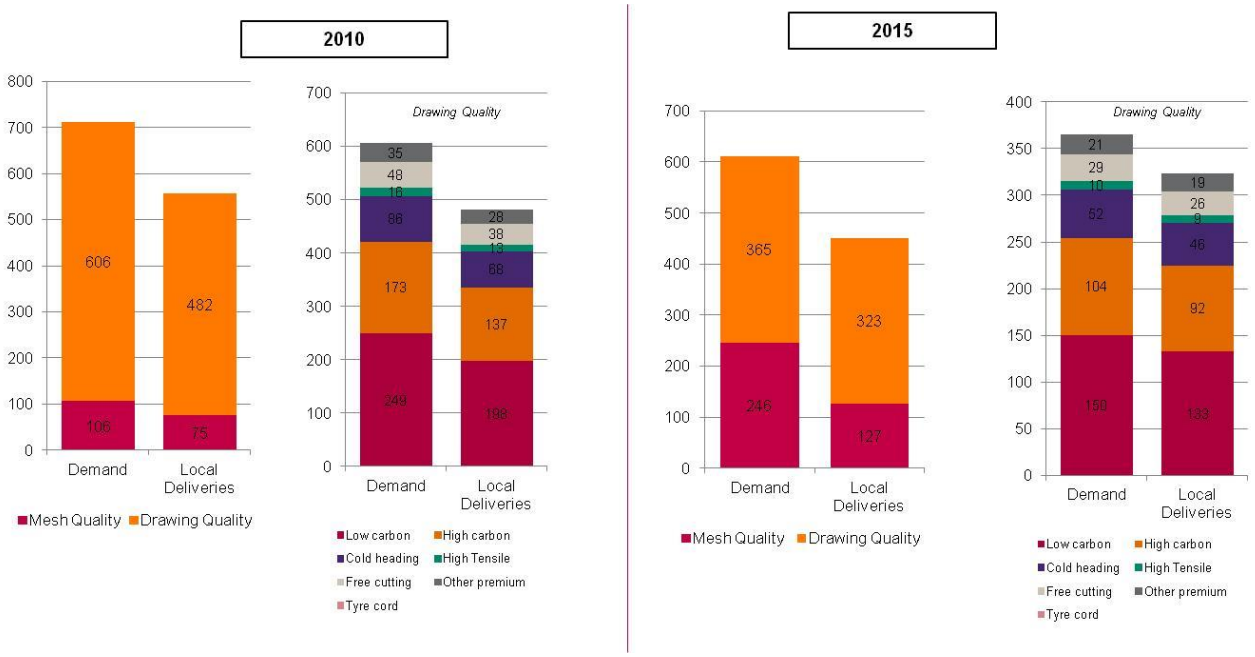
Exhibit 64: Wire Rods Sector Breakdown (kt)



Source: Hatch

Mechanical engineering and construction are the two largest consuming sectors for wire rods. Together they account for nearly 66% of the share of the demand, which has increased from 52% in 2010. The increase in share in construction is primarily from mesh-quality wire rods in the reinforcing market. The decrease in non-construction sectors in wire rods demand is a reflection of the contraction in the wire-drawing market, which has migrated out of the UK.

Exhibit 65: Wire Rods Demand Breakdown vs. Local Deliveries (kt)



Source: Hatch

There are no fundamental gaps between demand and supply of wire rods from the UK. The industry is technically capable of serving both the downstream mesh and wire-drawing industry. In particular, it should be highlighted that the UK has considerable strengths in drawing-quality wire rods and supplies the full range of grades from low carbon, high carbon, cold head quality, high tensile, free cutting, premium to tyre cord grades.

Capability Summary

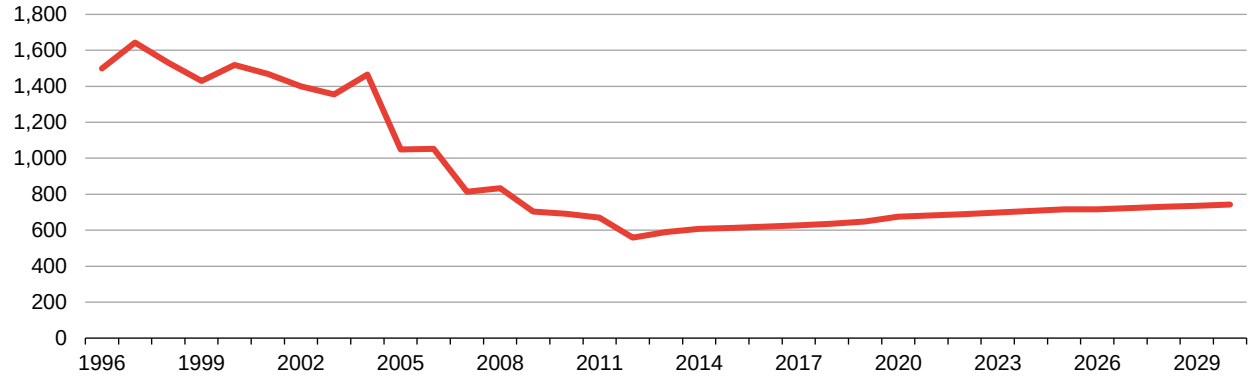
		Reasons	
Attributes	**Gaps**	**Commercial**	**Technical**
Mesh quality WR	Unable to meet the supply/full demand requirements		• WR (mesh) is a commodity finished steel • No capability gap to meet demand by way of grades or sizes • Celsa is the sole producer for WR (mesh) from its bar-rod combi mill. The same mill produces wire rods, so supplies can be constrained in a combi mill • Current gap of 119 kt between demand and local deliveries is not sufficiently large to justify investments in additional capacities
Drawing quality WR	No capability gap observed		

Wire rod represents a reasonable success story for the UK steel industry, despite the structural contraction of demand. It highlights the trends in demand for products which are more exposed to manufacturing-based demand. It also emphasises how export demand for drawing-quality wire rods has somewhat sustained the industry, and this was driven mainly by superior technical capabilities.

Demand Outlook

Demand is forecast to grow by 1.3% p.a. to 743 kt from 612 kt between 2015 and 2030. This translates to an additional demand of +131 kt (+21%) over 2015 levels. Mesh-quality wire rods will contribute to a larger part of the additional demand, growing at 1.9% p.a., while drawing-quality wire rods could grow at much lower rates of 0.9% p.a.

Exhibit 66: Forecast Demand for Wire Rods (kt)



Source: Hatch

Sector Outlook

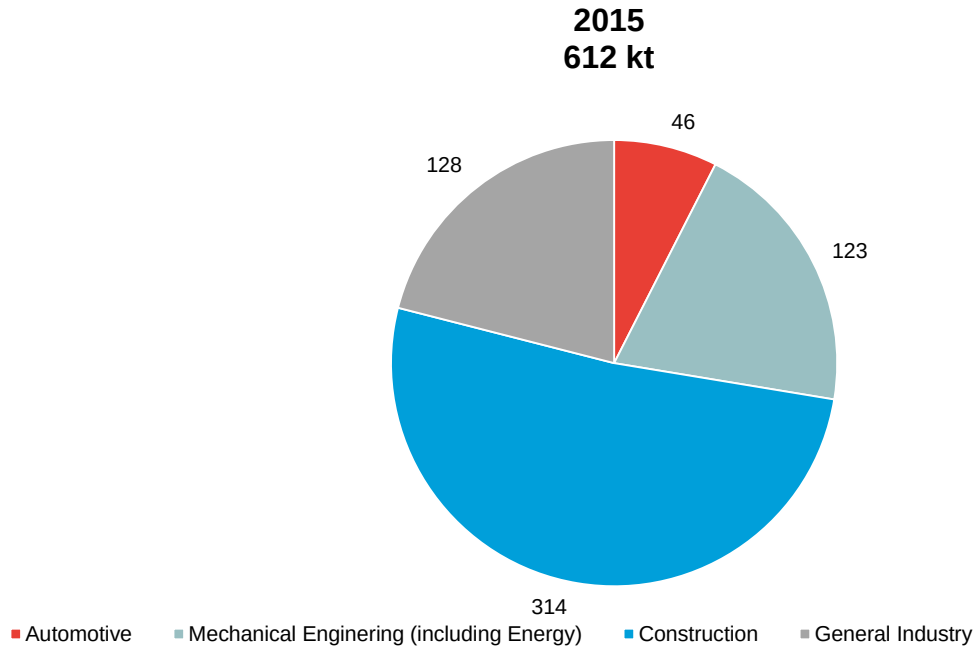
Mesh-Quality Wire Rods

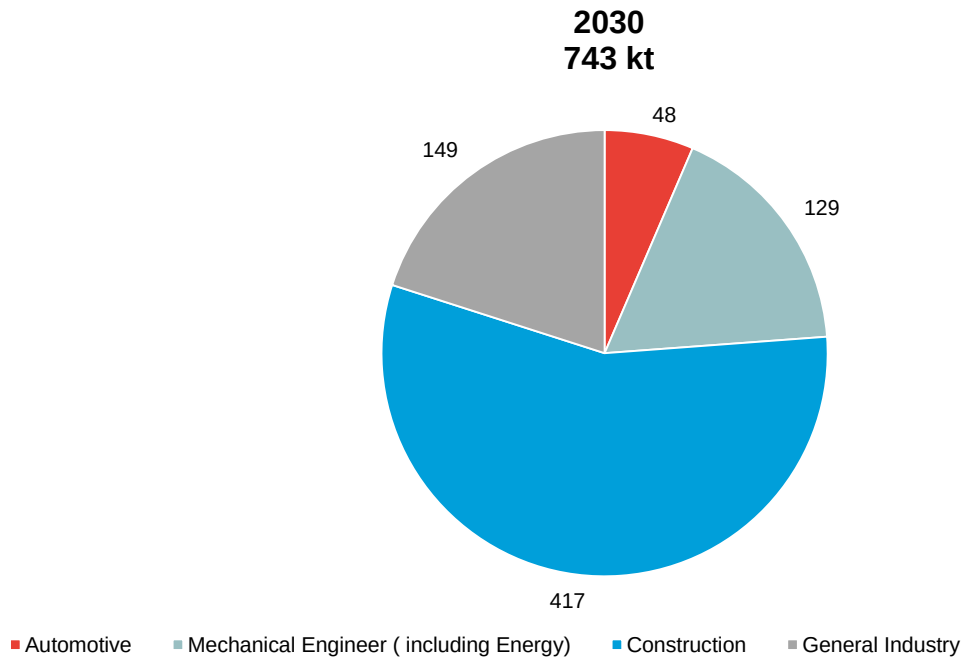
Construction spend in the UK could grow at 1.9% p.a. until 2030. Within construction, infrastructure spend could grow at much higher rates of 2.7% p.a. After many years of anaemic growth in infrastructure, spend appears to be on a steady and solid growth path, building on the strong trends seen since 2010. These factors will drive the baseline growth in wire rods demand. Significant growth in demand is likely to accrue to the UK from 2020 onwards driven by two major infrastructure projects – HS2 and Hinkley Point C nuclear power plant.

Drawing-Quality Wire Rods

Demand for drawing-quality wire rods is unlikely to see strong growth like mesh-quality wire rods. Demand prospects in the future are expected to track the changes in the manufacturing index with growth in automotive production providing some additional demand support. There is a lack of evidence from end users or industry reports that would suggest new investments in the wire-drawing industry in the UK, or even reshoring back some of the industry which migrated out. On that basis, it is expected that drawing-quality wire rods is expected to remain weak in the foreseeable future.

Exhibit 67: Sector Breakdown for Wire Rods (kt)





Source: Hatch

Opportunities

There are no capacity constraints or technical barriers on this part of the UK steel industry to prevent it meeting the additional growth in demand. The main opportunity for the UK is to participate in the organic demand growth in the coming years. There is also some marginal opportunity to increase share in the UK as the existing market is 71%, which is high and robust. We expect that the UK would continue to export wire rods to the EU as it has done for many years.

There are a number of issues that need to be addressed for the industry to position itself favourably for this opportunity:

- Improving cost competitiveness of steel production, which includes factors such as higher energy prices and business rates.
- Steel procurement in public and infrastructure projects: This applies primarily for mesh-quality wire rods which are consumed in construction. The government has introduced steel-specific procurement guidance to take account of social and environmental factors, but that the nature and duration of contracts may take some time for the full effects to be felt.
- Continue investments in new product development: This is relevant for drawing-quality wire rods which have a range of applications in different sectors. There are stringent customer requirements on technical specifications, such as strength, fatigue life, tolerances, surface properties, which are constantly evolving. To stay ahead of the competition, the UK would need to invest in research in new product development.

Uncertainty and Risks

A key uncertainty in the forecasts is construction schedules for major infrastructure projects. Example: Nuclear power plant projects have a history of schedule overruns. If there are schedule overruns, then the future demand for mesh quality rods could be lower than that forecasted.

Wire Rods – Sector View

Supply Chains

Wire rod demand has halved since 1996 and this is primarily the result of a 60% decline in demand for the wire-drawing sector. **The wire-drawing sector reflects the decline in manufacturing activity in the UK and the hollowing out of the supply chain.**[107]

Exports of wire rod are therefore playing an increasingly important role for producers, with the majority going to the automotive sector within Europe. This factor was therefore seen as evidence, for one producer, of the impact of hollowed-out supply chains for component manufacturing.

One UK producer stated that the demise of the UK wire drawing sector is potentially linked to overcapacity in the past. Where UK wire rod production exceeded levels of domestic demand in the past, large quantities were then exported at a price cheaper than that provided domestically. This allowed foreign consumers to produce finished goods more efficiently than the domestic supply chain. Consequently, the domestic UK supply chains struggled to compete.

Markets

The UK market is small and predominantly focused on construction (mesh quality) and engineering, where there are many end-use applications (e.g. fencing, bedding springs, concrete strands, automotive springs, reinforcing of steel tires). The fact that there are many end-use applications, and that these are specialised activities, was seen by one

[107] Stated by the UK's two wire rod producers.

producer as another potential cause of decline within the UK. To have successful growth in these areas it will need consolidation and a big outfit to take these overheads.

Large infrastructure projects were seen my many respondents as they key opportunity going forward, with government infrastructure contracts seen as one of the principal drivers of construction demand.[108] HS2, Hinkley Point C and Thames Tideway were commonly cited opportunities.

There may be some opportunities to better support UK wire rod consumption through procurement. As part of the procurement process **several interviewees pointed to the need for increased transparency on reporting material sourcing as part of government procurement, particularly focusing on what is UK produced** as opposed to re-rolled or simply transferred.[109] The government has introduced steel-specific procurement guidance to take account of social and environmental factors.

Competitiveness

Producers and consumers saw production cost challenges being driven by the higher energy prices within the UK relative to other countries.[110] Even with assistance from government, one producer stated that an industry study shows there still remains a disparity of £17 per MWh compared with continental rivals. One processor highlighted how this is a key area affecting investment in UK producer facilities versus European competitors such as Germany.

Capability & Capacity

There were no major capacity or capability issues raised by interviewees regarding wire rod. One consumer did state that they have to purchase their post-tensioning strand from a mill in Portugal following the withdrawal of the UK's only strand producer from the market. All other requirements were considered to be provided by the UK's sole producer.

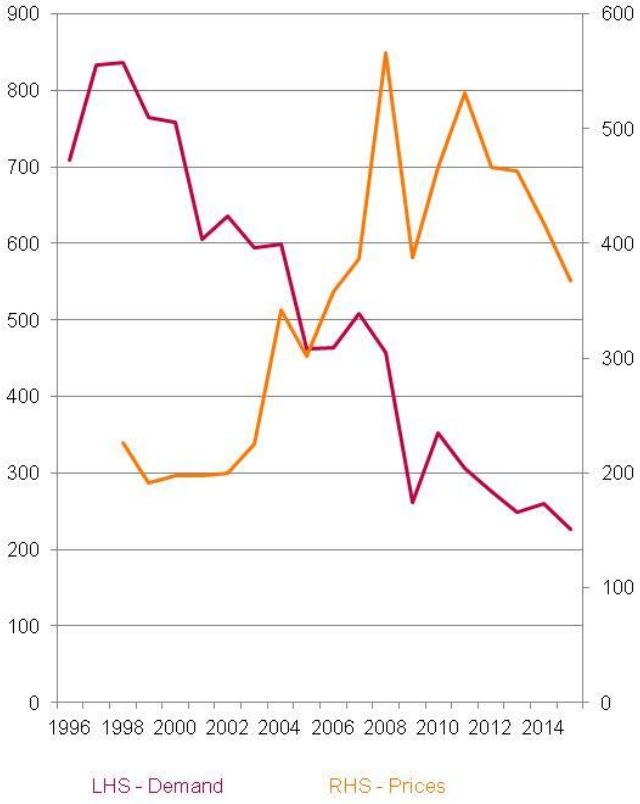
One producer stated that they were anticipating future growth of higher-value wire rod product and mix enrichment rather than a growth in volume. This would be dependent upon investment to update product capability in wire rod rolling.

[108] 3 interviewees stated this, representing 60% of the 5 interviewees where wire rod is a relevant product. This includes a producer and consumers.
[109] 3 interviewees stated this, representing 60% of the 5 interviewees where wire rod is a relevant product. This includes a producer and consumers.
[110] 3 interviewees stated this, representing 60% of the 5 interviewees where wire rod is a relevant product. This includes two producers and a consumer.

e.) Merchant Bars

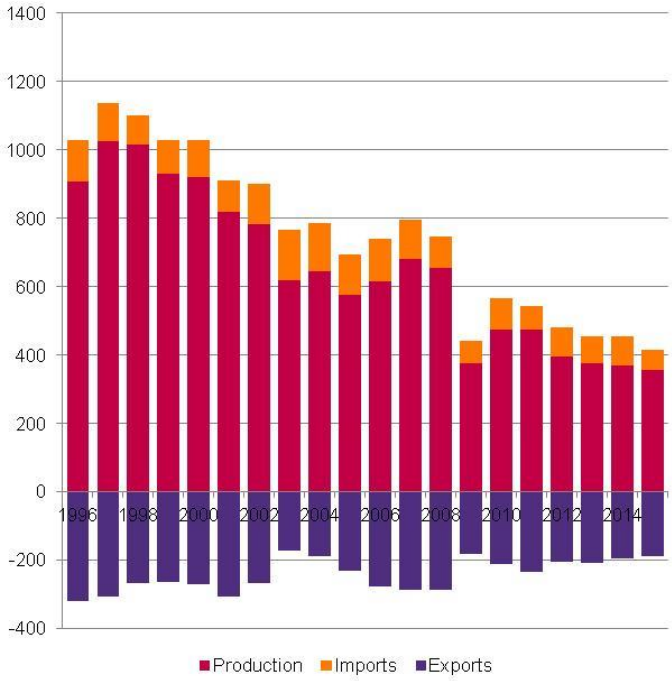
Merchant Bars – Historical Demand

Exhibit 68: Merchant Bar Demand in UK (kt) and Prices (£/t)



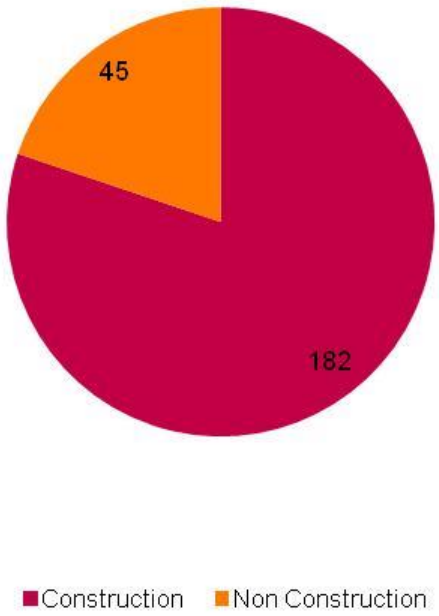
Source: ISSB, Platts, Hatch

Exhibit 69: Merchant Bars Supply in UK (kt)



Source: ISSB, Hatch

Exhibit 70: Merchant Bars Demand Sector Breakdown (kt) – 2015



Source: Hatch

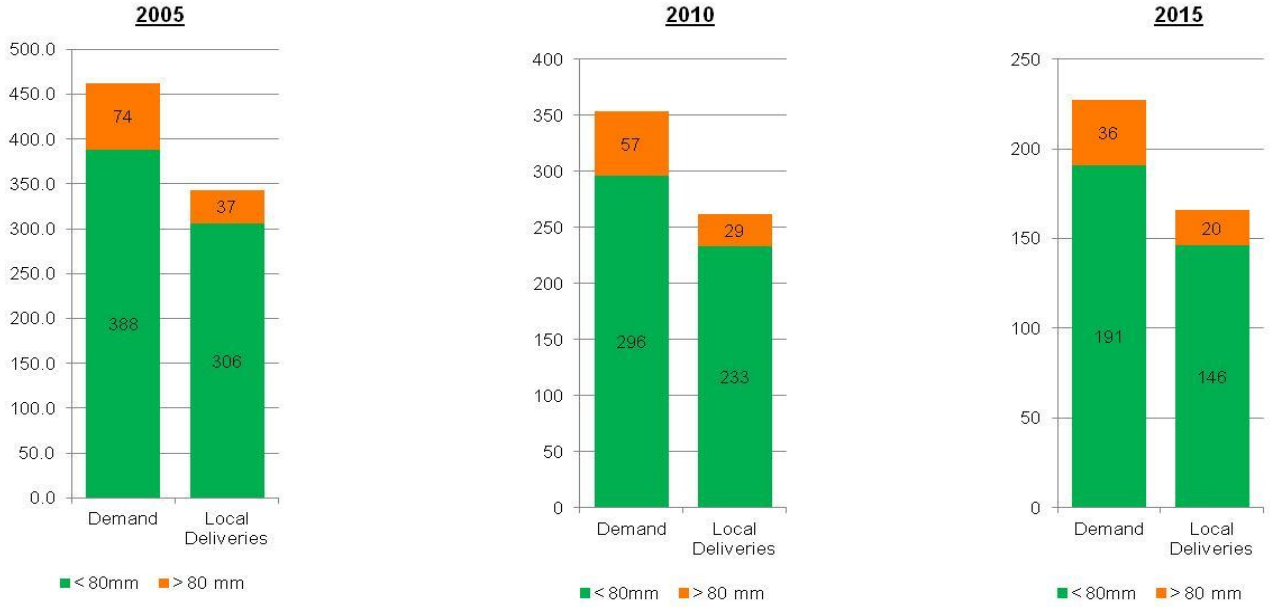
Merchant bars are not a technically demanding product compared with plates or automotive steel and it is largely viewed as a commodity product. Merchant bar is used in the simplest forms of engineering and manufacturing to provide a structure or frame. It has a very diverse range of applications, such as equipment, transport, material handling, wind towers, shipbuilding, offshore, mining machinery, construction. It requires minimal quality and supporting certification because such applications are not load bearing

Demand for merchant bars is currently at 227 kt and it has steadily declined over the past 20 years and is currently about a third of its level in 1996. These trends are a reflection of the decline in manufacturing activity in the UK and its migration out of the UK, similar to wire rods for drawing quality. About 80% of the demand is driven by construction and the balance (20%) from manufacturing such as material handling equipment, machinery, transport equipment, agricultural equipment. The share of manufacturing in demand has contracted due to a reduction in manufacturing activity. A revival of manufacturing activity and increased inward investments could revive a growth in merchant bars demand.

There are three producers of merchant bars in the UK – Caparo Steel, Celsa and Bromford Iron and Steel. Caparo Steel has now been acquired by Liberty Steel.

About 70% of UK demand is met by local deliveries from the UK. The balance (30%) of supplies are imports, predominantly from EU. The UK is a large exporter of merchant bars. It exports about 200 kt, mainly to the EU.

Exhibit 71: Merchant Bars Breakdown vs. Local Deliveries (kt)



Source: Hatch

The UK market is reasonably well serviced by its producers. There are some capability gaps on flat bars >300mm, but the volumes are marginal. These are met by imports, mainly from the EU.

Capability Summary

		Reasons	
Attributes	**Gaps**	**Commercial**	**Technical**
Merchant Bars	Primarily in flat bars >300mm and small volumes of round bars	• Imports used to diversify supplier risk	• Demand volumes for flat bars >300mm not sufficiently large to justify investments to enhance capability

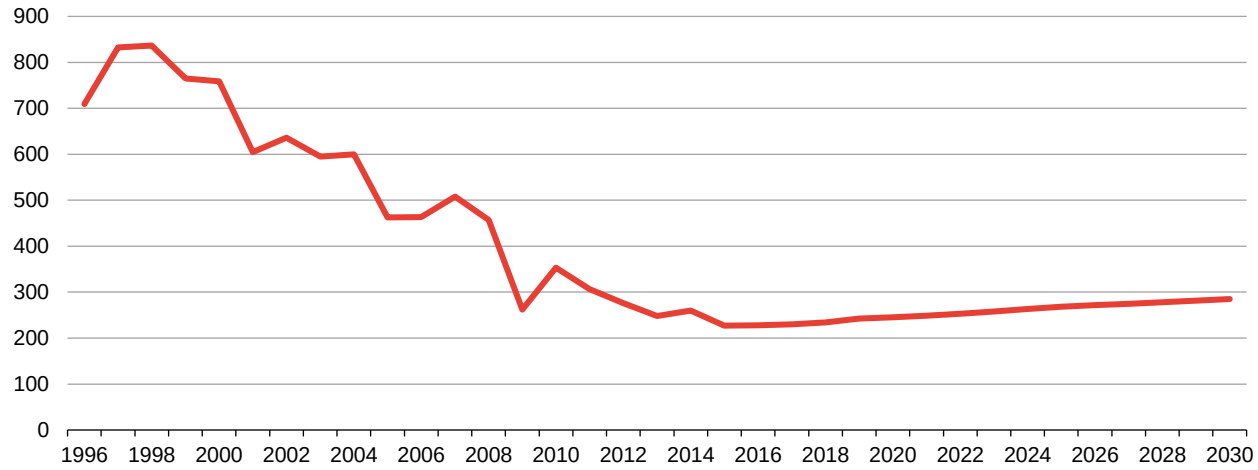
The merchant bar market is relatively well served by UK producers from a commercial and technical capability standpoint. This is mainly because of the requirements to supply multiples sizes and grades to stockholders in a single load. Alongside this, merchant bars are relatively low value, which largely mitigates pressures from imports.

Merchant Bars – Demand Forecast

Demand Outlook

Demand is forecast to grow at 1.5% p.a. to 285 kt from 227 kt between 2015 and 2030. The total increase in demand is +58 kt (+26%) over 2015.

Exhibit 72: Forecast Demand for Merchant Bars (kt)



Source: Hatch

Sector Outlook

About 80% of merchant bar demand is construction driven and therefore construction spend will be the main driver which will shape its future outlook. Spend in construction (less residential construction spend) is expected to grow at 1.7% p.a. The non-construction part of the demand is likely to track changes in the manufacturing index. In the past five years, changes in the manufacturing index have averaged about 0.2%. We expect similar rates to continue in the near future before a marginal improvement to 0.5% on account of an improved industrial policy and accelerating economic growth from 2020 onwards.

Opportunities

There are no capacity constraints or technical barriers on this part of the UK steel industry to prevent it meeting the additional growth in demand. The key opportunity for the UK is to consolidate on the existing customer base and demand share and participate in the organic demand growth in the coming years. There is also some marginal opportunity to increase share in the UK as the existing market is 73%, which is high and robust. We expect that the UK would continue to export wire rods to the EU as it has done for many years.

There are a number of issues that need to be addressed for the industry to position itself favourably for this opportunity:

- Improving cost competitiveness of steel production which includes factors such as higher energy prices and business rates.
- Enhancing product mix for sizes >300mm. This could enhance the product mix offerings and could help secure higher value and share of the demand for the UK.

Uncertainty and Risks

The uncertainty around the EU exit could further slow investments in commercial and industrial construction spend as investors wait for a clearer regulatory and business environment before committing to further investments.

Merchant Bars – Sector View

Markets

Eighty per cent of the demand is driven by construction and the balance (20%) from manufacturing, such as material handling equipment, machinery, transport equipment, agricultural equipment. The share of manufacturing has contracted due to a reduction in manufacturing activity, a view expressed by several interviewees.[111] The low levels of demand in the UK market mean there is a need to compete in the European market, with the main UK producer stating that 50% of all merchant bar produced will be exported.

Capability & Capacity

Merchant bars are not a technically demanding product as compared with plates or automotive steel, which is largely viewed as a commodity product. **In terms of capability the UK is in a relatively strong position with little competition**, not least because one producer is able to bundle many product types together – often with many stock keeping units – with the result that others would find it difficult to compete. There are, however, some capability gaps on flat bars less than 300mm, but the volumes are marginal[112].

Competitiveness

This strong position is then further enhanced by **the relatively low value of this product, which largely mitigates against imports** (with the small level of imports likely to be the result of a desire to manage supplier risk). Alongside the relatively low value of merchant bars, the construction industry is very price sensitive. This point was reinforced by one contractor who stated that price was the key factor in their purchasing decisions given the tight margins they work to. The combination of these factors has therefore meant that there is limited incentive among producers and consumers to innovate in relation to process improvements to remain competitive.

The **ability of the main UK producer of this product to compete in the European market is seen as more challenging because of the higher production costs in the UK, particularly in relation to energy.[113]** Even with assistance from government, this producer stated that an industry study shows there still remains a disparity of £17 per MWh compared with continental rivals. In terms of productivity, the producer considered themselves competitive.

There were no issues identified in customer service, though relationships with suppliers were seen as a key factor in purchasing decisions for some. One contractor did state that they would like to use more UK-sourced steel but would need to build stronger relationships with suppliers to do this. Given that many of their contracts come through last minute, they are restricted to using stockholders for their orders as producers need longer lead times.

Supply Chains

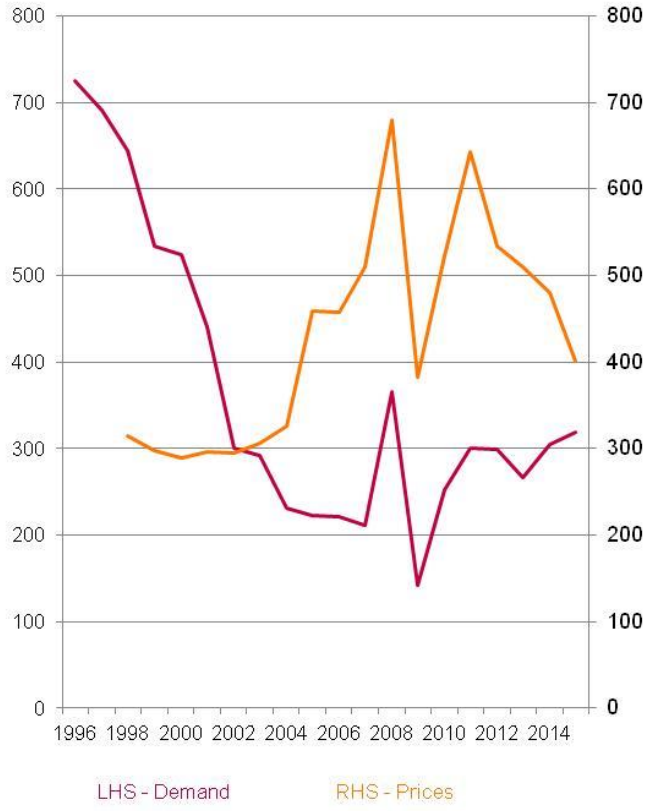
There were no supply chain issues raised by interviewees regarding merchant bar.

[111] 2 interviewees stated this, representing 67% of the 3 interviewees where merchant bar is a relevant product. This includes a producer and consumer.
[112] Stated by a producer of merchant bar.
[113] Stated by a producer of merchant bar.

f.) Engineering Steels

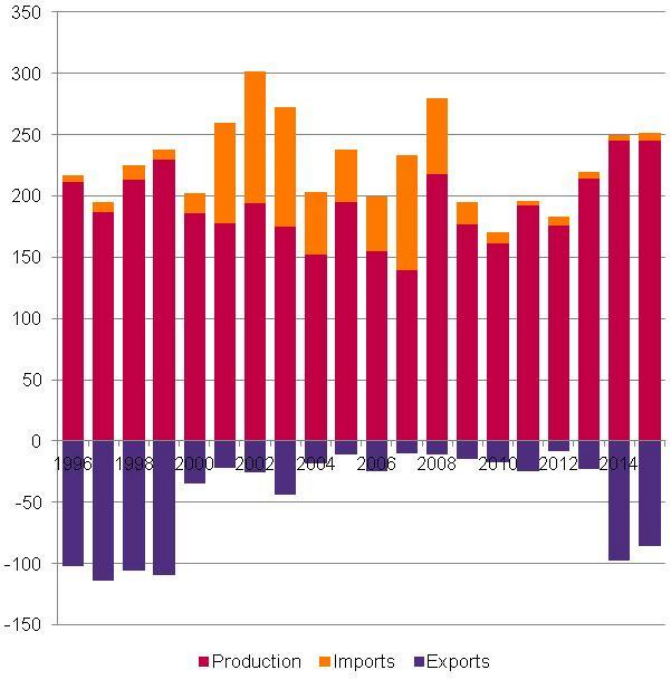
Engineering Steels – Historical Demand

Exhibit 73: Engineering Steels Demand in UK (kt) and Prices (£/t)



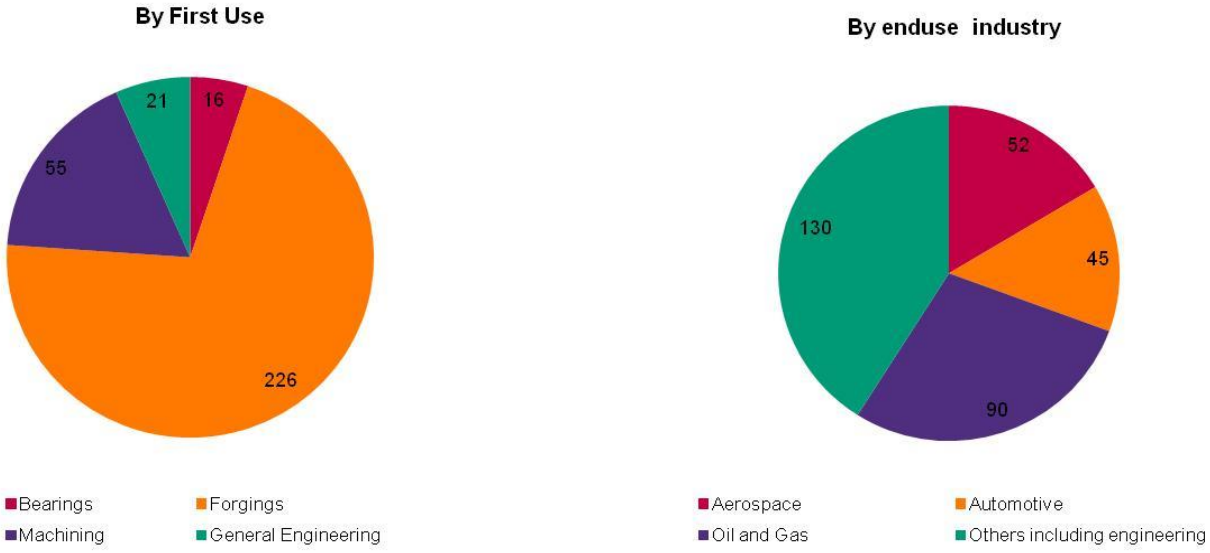
Source: ISSB, Platts, Hatch

Exhibit 74: Engineering Steels Supply in UK (kt)



Source: ISSB, Hatch

Exhibit 75: Engineering Steels Demand Sector Breakdown (kt) – 2015



Source: Hatch
Note: First use is the processed product and end use is where the processed product in used.

Engineering steels by definition are steels which take a load and are used for further processing almost exclusively in machinery or automotive. As a consequence, several in-process characteristics are important for the steel to be fit for purpose to customers – machinability, formability, weldability, tolerances. It is supplied in black bar (hot-rolled condition) or bright bar (drawn, turned, peeled and/or heat treated). It is supplied as bars or in rods.

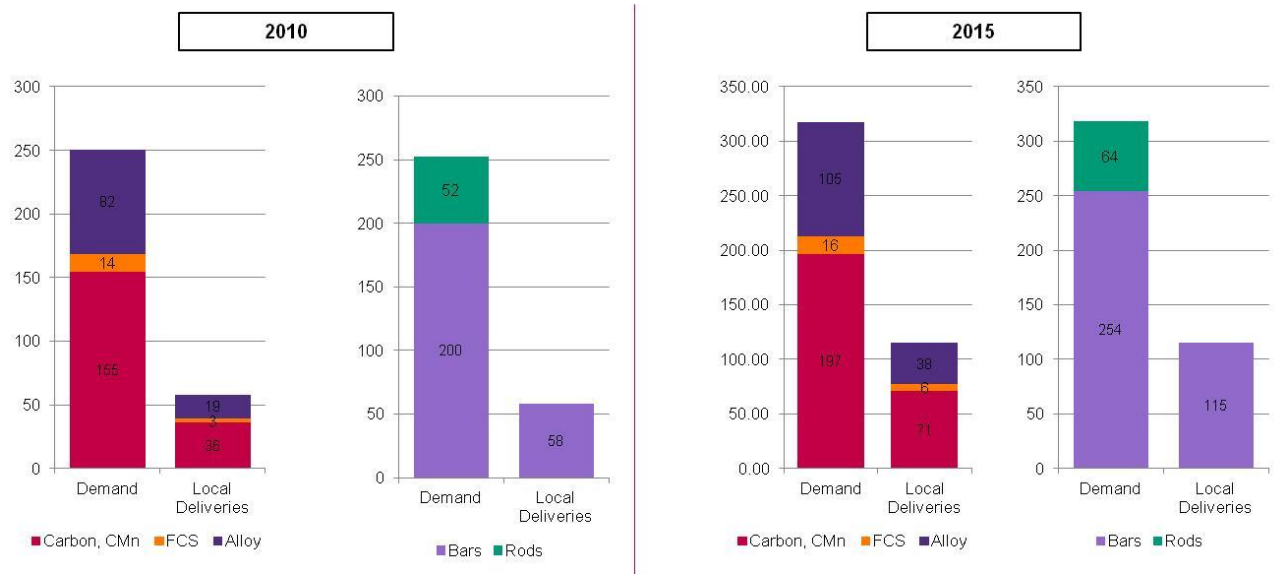
Engineering steel demand was 318 kt in 2015. Demand has contracted by 57% since 1996, but it has steadily recovered from the collapse during the global financial crises period.

Demand for engineering steels is predominantly for forgings, bearings and machinery, for applications in automotive, aerospace, oil & gas and engineering. The decline in engineering steels mirrors the state of decline in manufacturing in the UK. The supply chains for forgings, bearing and machinery have hollowed out and have relocated overseas, largely in the EU. While the UK has considerable strengths in the aerospace industry, demand from aerospace is not sufficiently large to offset declines in other sectors. Additionally, the aerospace industry is constantly innovating in use of alternative lightweight materials, such as aluminium and composites, and as such steel does not make up a large share of their material requirements.

The UK has two producers of engineering steels – Liberty Steel facilities in Rotherham and Stocksbridge and Acenta Steel in Dudley.

Local deliveries from the UK account for only a third of the demand. Consequently, imports account for nearly two-thirds of the UK demand. However, nearly 80% of the UK's production is exported, mainly to the EU and US.

Exhibit 76: Engineering Steel Demand Breakdown vs. Local Deliveries (kt)



Source: Hatch

From a grades standpoint, the UK can produce the full range of requirements of the market. The industry can only supply in bars and there is no capability to produce it in rods. Rods account for about 20% of the demand and as a consequence of the lack of capability, imports serve this market.

Capability Summary

Attributes	Gaps	Reasons	
		Commercial	Technical
Share of imports	High share of imports despite good range of technical capabilities	• Lack of suitable supply chain presence • Customer service – timely deliveries and distribution facilities	• Gaps in technical capabilities to produce rods

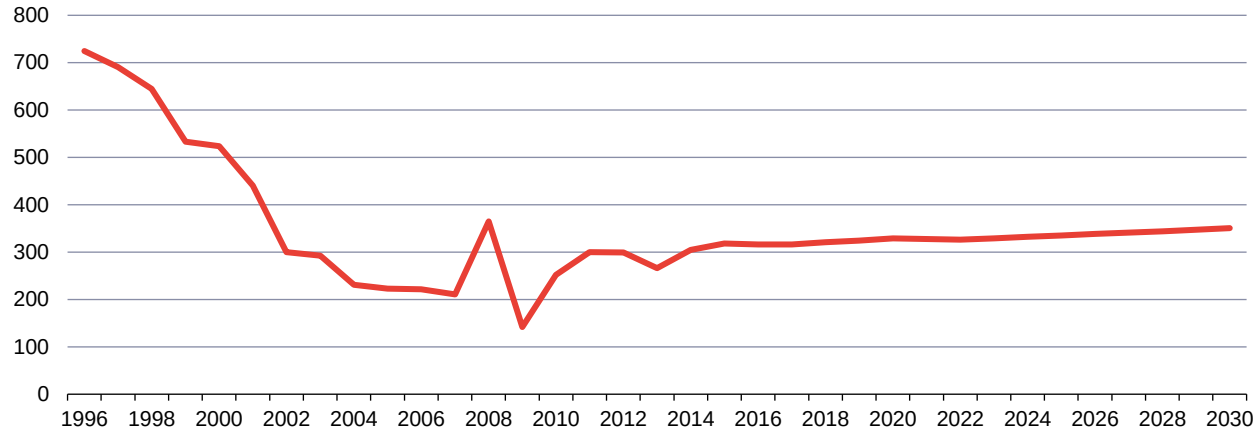
Despite having a strong capability range, the UK steel industry suffers from low share of the demand. The anomaly for the industry is it exports more than it serves the local demand. Lack of capabilities in rods partially explains the low share of imports, but there are bigger issues on capabilities such as supply chain presence, distribution, downstream processing and timely delivery.

Engineering Steels – Demand Forecast

Demand Outlook

Growth in demand for engineering steels is forecast to be much lower than other long products. The average change in demand for the next 15 years is forecast to be about 0.7%. Demand could remain relatively flat and unchanged before growth picks up in 2018. The total change in demand is forecast to be about +33 kt (+10%).

Exhibit 77: Forecast Demand for Engineering Steels (kt)



Source: Hatch

Sector Outlook

The long outlook of the different sectors on which engineering steels serve is mixed, varying from positive and robust to decline and uncertainty, which on an aggregated basis provides a somewhat weak outlook.

A review of long-term outlook and forecasts provided by the ADS Group (which represents the UK aerospace, defence, space and security sectors), Boeing and other position papers on the industry present a very positive and strong long-term picture for aerospace

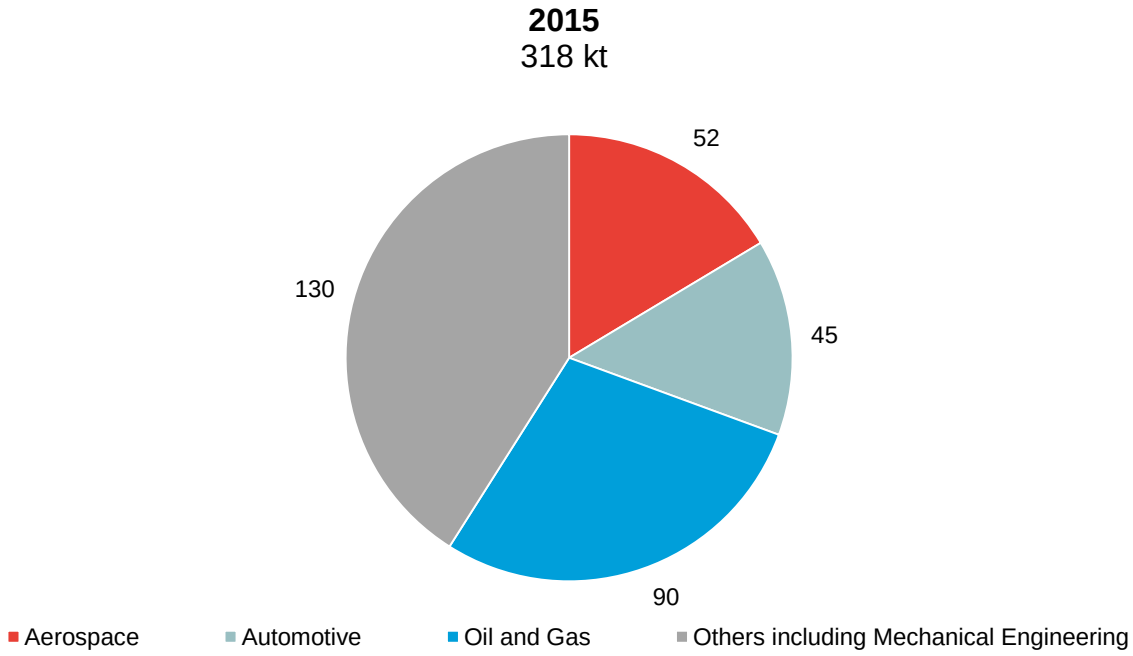
production and deliveries. The industry is of the view that increasing demand for travel, and replacement of existing aircrafts will support growth in production of aircrafts. Total production of aircrafts and deliveries globally is likely to grow by 8% p.a., increasing from 1397 units in 2015 to 2050 units in 2020. Beyond that, production is expected to grow at about 2.1% p.a.

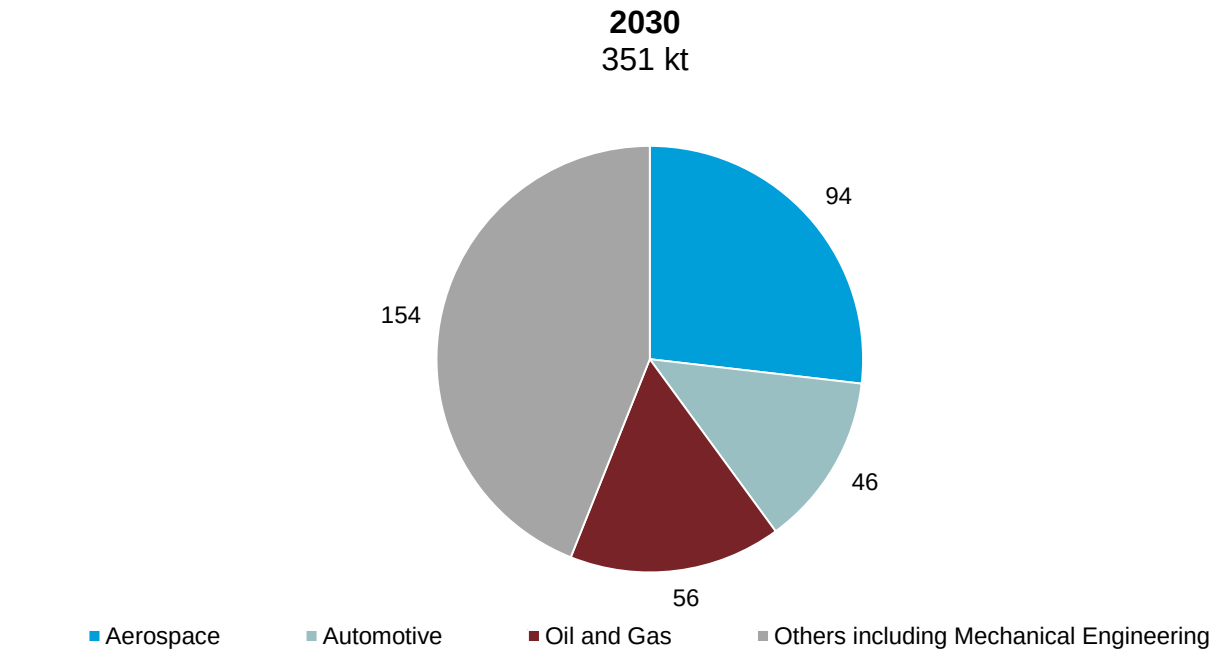
Demand from the automotive sector will be driven by the increase in production in the UK from 1.7 million units in 2015 to 2.13 million units by 2026. Some of the growth will be offset by lightweighting pressure as the auto industry is likely to forge ahead with weight reduction of about 15% in the next decade to meet the new emissions target set in the EU.

Engineering and machinery, which accounts for the largest consuming sector, presents a weak outlook, at least until 2022, as the weak trends seen pre-EU exit continue. This sector is heavily dependent on exports to the EU and as such it is much more vulnerable to the outcome of EU exit negotiations.

Demand for the oil & gas sector is expected to be aligned to the projected decline in production from the UKCS.

Exhibit 78: Sector Breakdown for Engineering Steels (kt)





Source: Hatch

Opportunities

The UK industry is reasonably well placed to address the future demand for engineering steels. The larger opportunity is to address the large share of the imports in the UK demand. This is an anomaly given the existing capabilities in the industry. The total opportunity for the UK to address on account of the imports gap and demand growth is +236 kt (c. £127 million).

To position the industry competitively, it would need to address:

- Improving cost competitiveness of steel production which includes higher energy prices and business rates, among other factors.
- Enhancing product mix to include rods.
- Invest in new product development and increase innovation in conjunction with the demands of its customers.
- Increase presence in downstream supply chain processes such as forging.

Uncertainty and Risks

The uncertainty surrounding EU exit negotiations and outcomes could worsen the demand outlook for engineering steels. The longer such negotiations take, the more uncertainty could be induced in the machinery and engineering sector, which depends on large capital investments to be made. This therefore risks that growth acceleration could be pushed out beyond 2022.

Engineering Steels – Sector View

Capability & Capacity

In terms of capability, from a grade standpoint, no interviewees raised any major concerns regarding the UK producers' grade capabilities. One aerospace OEM did

state that the lack of forging capability in the UK means that they have to procure from Germany and Italy. The OEM stated that the UK needs to change its raw steel process to increase strength and create specialist products.

Several interviewees raised concerns about the lack of innovation from steel producers. One aerospace OEM stated that there has been little change in the type of steel used, with some specifications the same as were used in the 1970s. They felt that mills are very inflexible, and like to aggregate complex demands. Another aerospace OEM felt that steel innovation is stagnant and that they are still working to pre-war specifications, although they did state that there is no real drive or need to innovate on their part. The lack of innovation by UK producers was also echoed by one large automotive OEM.

Markets

The aerospace industry is only a small user of steel alloys, which is declining as the industry increases its use of lighter-weight, stronger, or higher-temperature materials such as aluminium, titanium and nickel alloys and carbon fibre composites.[114] For example, one OEM stated that steel is not their material of choice and represents only 5% of their fabricated machine parts. Another stated that if steel could be lighter and stronger then it would be better placed to compete with these other materials.

The proportion of steel used in aerospace relative to other materials is expected to decrease in future, but due to industry growth the absolute level of steel consumption may be maintained.[115] One aerospace OEM cited the example of gear designs where they are looking to reduce the content of steel to reduce weight and improve performance. In contrast, another aerospace OEM stated that they are unlikely to move away from steel, albeit they are currently using very low quantities.

Price, strength and weight are key drivers in material choice for the automotive sector, with a trend of lightweighting and higher-strength steel,[116] which are primarily driven by the government's emissions agenda. OEMs noted there is an increasing use of aluminium and plastics to replace steel. Conversely, one OEM stated that they do not foresee any change in the type of steel they procure.

Competitiveness

There were few comments regarding UK competitiveness in engineering steels. One aerospace OEM highlighted that producers are experiencing increasing costs through the price of coke, while two other interviewees cited energy costs as a problem for steel production.[117]

Several interviewees felt that there is an opportunity to increase responsiveness to market. One large aerospace OEM stated that UK producers are not interested in the low volumes they source so they cannot procure directly from mills. Another stated that all mills struggle with lead times and responsiveness.

[114] Stated by six aerospace interviewees where engineering steels is considered a relevant product. This included an industry body and several large aerospace OEMs.
[115] Stated by three aerospace interviewees where engineering steels is considered a relevant product. This included an industry body and several large aerospace OEMs.
[116] Stated by five automotive interviewees where engineering steels is considered a relevant product. This included an industry body and several large automotive OEMs.
[117] Stated by a large automotive OEM and an aerospace OEM.

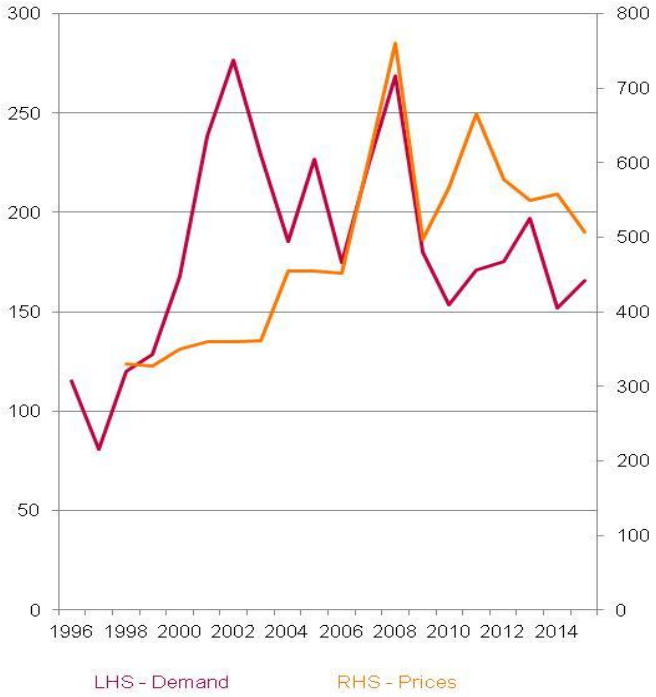
Supply Chains

There were no supply chain issues specific to engineering steels raised during the interviews. The broader supply chain issues associated with aerospace and automotive are explained in detail in Appendix Three.

g.) Rails

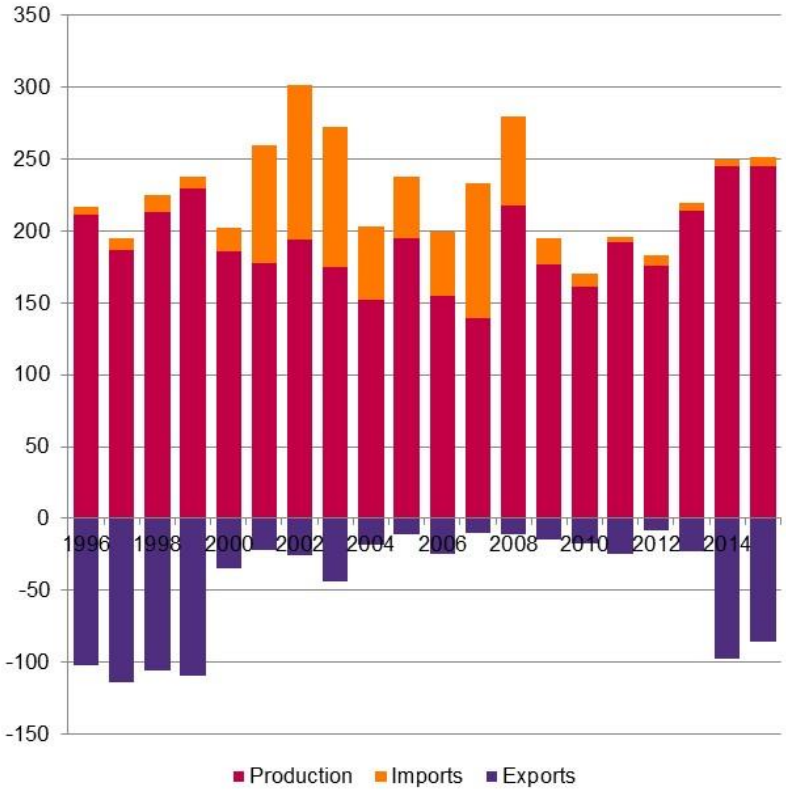
Rails – Historical Demand

Exhibit 79: Rails Demand in UK (kt) and Prices (£/t)



Source: ISSB, Platts, Hatch

Exhibit 80: Rails Supply in UK (kt)



Source: ISSB, Hatch

Rails are complex sections that are produced to customer designs in terms of shape, dimensions and chemistry. Tolerances are tighter than commodity sections, and volumes tend to be much smaller compared with commodity sections. Quite often customers for rails are limited to one or few national rail companies. Steel grades and other specifications are often special or tailor made.

British Steel is the only producer of rail in the UK and is globally recognised as a technically competent supplier of rails. The rails are produced from the medium sections mill in Scunthorpe.

Compared with any other product, rails represent a success story for UK steel. Of the 250 kt procured in the UK in 2015, local deliveries account for over 95%. Network Rail is the largest customer for rails in the UK. The other customers are Transport for London (TfL), Crossrail and High Speed Rail.

Exports have also increased significantly in 2014 and 2015, particularly when compared with the past 15 years. This is largely the result of changes in the process route from Teesside/Workington to Scunthorpe, and more recently organisational changes which resulted in a greater focus on this product. Rails exports are destined mainly for the Middle East, Africa and Latin America.

Exhibit 80: Rails Infrastructure Spend in the UK (£billion)

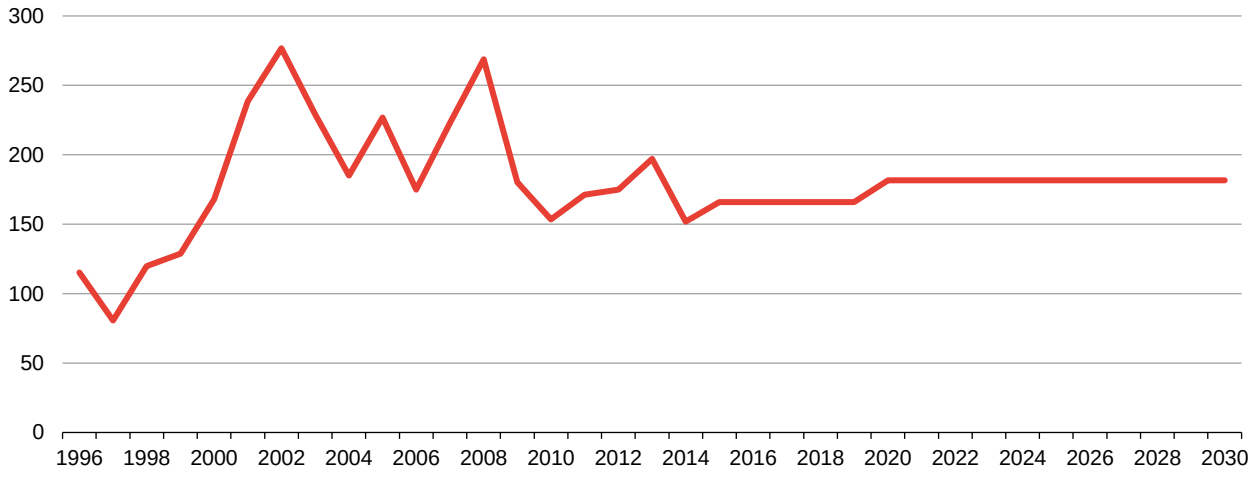
Source: Department of Transport, Crossrail, Parliament Research Briefings, Light Rail Policy Centre

Rails – Demand Forecast

Demand Outlook

Over the next 15 years, demand is expected to grow to 182 kt from 166 kt between 2015 and 2020, and remain at comparable levels until 2030. Network Rail and TfL demand is largely expected to be the same as in 2015 over the foreseeable future. The total demand from HS2 is estimated to be 172 kt between 2020 and 2030.

Exhibit 81: Forecast Demand for Rails (kt)

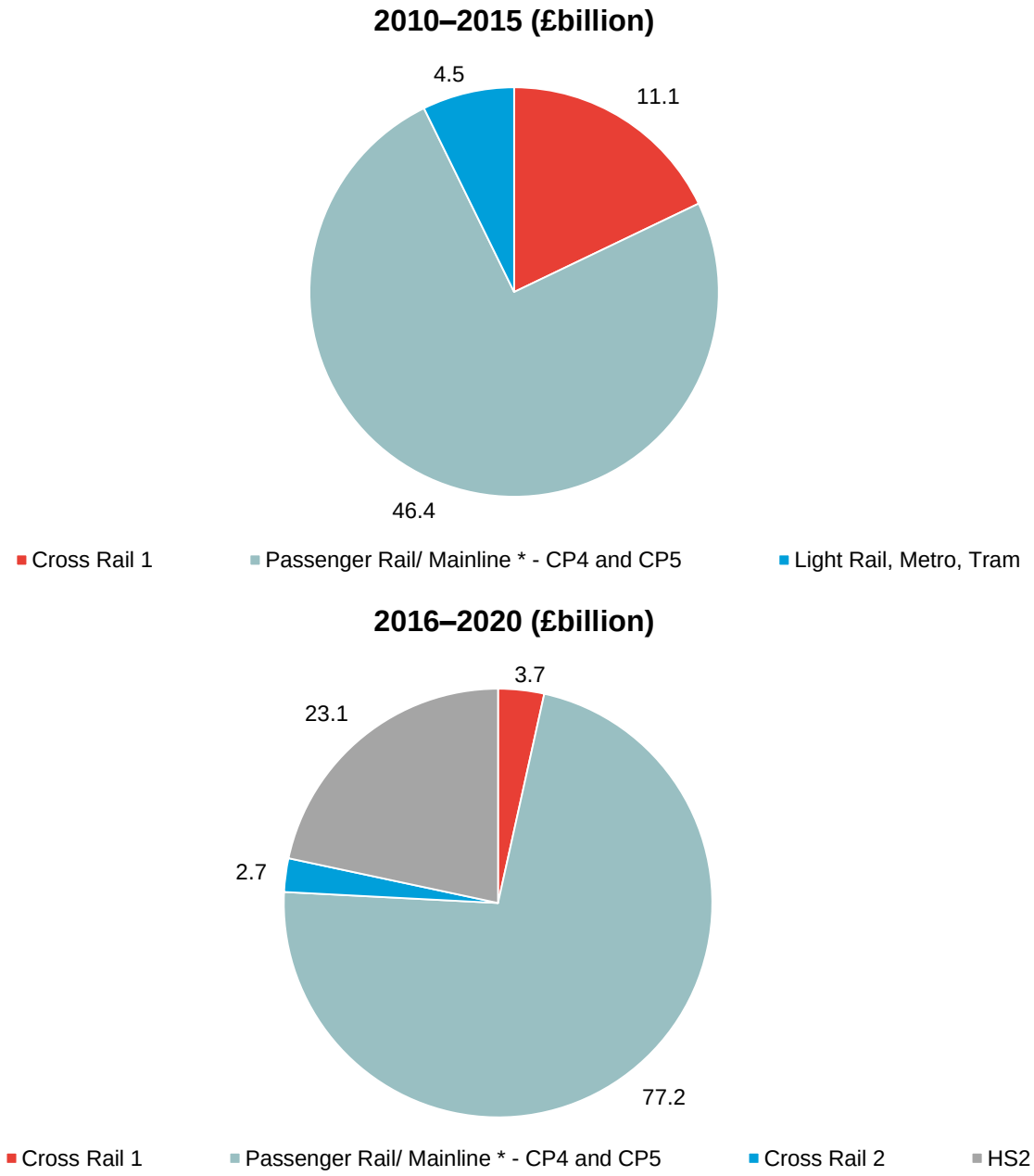


Source: Hatch

Sector Outlook

Passenger rail spending is mainly driven by the passenger and mainline sector. There is a major increase in spending committed already for CP-5. Crossrail 2 spend, estimated at £25 billion to £30 billion, is expected to be significantly higher than CR1.

Exhibit 82: Rail Infrastructure Spend in the UK



Source: Department of Transport, Crossrail, Parliament Research Briefings, Light Rail Policy Centre

Opportunities

The UK steel industry is favourably positioned to serve the rail market. It is a preferred supplier to main customers – Network Rail, TfL and Crossrail. There are no deterrents to extend the existing capabilities and commercial relations for the High Speed Rail Project.

While the rail market presents a strong opportunity for the UK, it must also focus on:

- Innovation and product development. It needs to address some customers' concerns that there appears to be some slack in product innovation and the capacity to invest in new products like corrosion-resistant rails. While some of these concerns may be genuine because of closure of Swinden Technology Centre, the industry must

emphasise to its customers the subsequent investments made in the new rail research centre at the University of Huddersfield.

- Enhance its product finishing capabilities such as heat treatment and coatings. British Steel already operates such facilities in its rail mill in Hayange, France.

Uncertainty and Risks

A key uncertainty for the industry could be the schedule and project overruns for the multiple rail projects in the construction stage. Such overruns and delays are not uncommon given the scale and challenges of these projects. If there are schedule overruns, then the future demand for rails could be lower than that forecasted.

Rails – Sector View

Markets

Like construction, the demand for rails is heavily dependent on UK infrastructure expenditure.[118] The UK's sole rail producer felt that the UK market is currently subdued, but that new projects could see this grow 20% over the next three years. This view was reinforced by two large consumers who stated that their direct spend on rails is likely to be stable going forward.

The UK's sole rail producer felt there was an opportunity for government to further support the sector through encouraging customers to take into account the full range of socio-economic benefits of procurement decisions for the UK. By not doing this, they believed, the UK would fall behind many competitors. They added that the government's industrial strategy would provide a good opportunity to emphasise local sourcing.

Respondents did not mention the government's introduction of steel-specific procurement guidance to take account of social and environmental factors, which suggests that the nature and duration of contracts may take some time for the full effects to be felt.

Competitiveness

The UK's sole rail producer was generally considered competitive by all interviewees given that it provides over 95% of the rails used in the UK, as well as exporting large quantities (exporting 75% of all rail produced in the UK). A large consumer stated that the UK's sole rail producer is very responsive in terms of day-to-day operations. They did, however, note that they were not miles ahead of other suppliers in terms of competitiveness, but being based in the UK is always helpful. Another large consumer of UK rail stated that they do consider the UK's sole rail producer to be more expensive than European competition, but that they have a preference for buying British and will continue to support them.

Unlike other products, the UK's sole rail producer **provides 100% to the user or installer so is well placed to understand consumer needs**. This was reinforced by one consumer who stated that they have excellent working relationships with the UK rail producer.

[118] 2 interviewees stated this, representing 50% of the 4 interviewees where rails are a relevant product. This includes a producer and consumer.

The UK's supply routes and supply chain connectivity are seen to help support local deliveries and provide a degree of protection from foreign producers, with imports being expensive. However, logistics costs within the UK still provide a challenge, making up to 25% of the total cost and potentially more to remoter regions.[119]

A number of respondents felt that there was further opportunity for exports of rails. Both the producer and consumers highlighted export opportunities for rails, with Europe, North America and Africa highlighted as target markets.[120]

Capability & Capacity

The UK's sole rail producer is considered capable of meeting the needs of UK consumers, where purchasing decisions are based on price, security of supply, specification and delivery. Despite this, consumers also noted that they like to have a second supplier in Europe to ensure security of supply for any unforeseen circumstances.[121]

Development of new products was also considered to be satisfactory by producer and consumers. The UK's sole rail producer highlighted their investment in metallurgically based products such as HP and Zinico corrosion-resistant rails, which will improve the whole life cost of the products as well as their competitiveness.

There is also a potential risk for the industry, identified by one major consumer, in the lack of drive to innovate and a lack of investment in product innovation, particularly given the relative stability of the market. This view from the market does show, however, a disconnect with the producer who identified a focus on reducing corrosion and improving resistance as an opportunity for the UK to build on its existing strengths in this product.

A large consumer stated that they do not envisage much change in requirements, but there may be an increase in head-hardened rails that give longer life. They believed the UK's sole rail provider is very good in terms of innovation and have helped with new rail coats and head-hardened grades.

Another large consumer stated that they are always seeking improvements in specifications that lead to longer life in rails and higher-performance steel materials, but that any changes expected are likely to be incremental changes for corrosion resistance as it is a very stable market. They did state that producers will sometimes come forward with new developments, but this is not often. However, they considered that they meet their needs very well.

Supply Chains

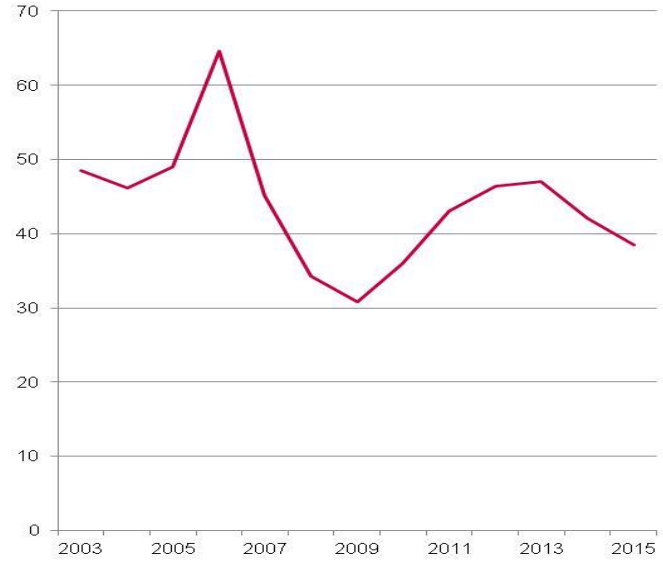
No supply chain issues were raised during interviews in relation to rails.

[119] 2 interviewees stated this, representing 50% of the 4 interviewees where rails are a relevant product. This includes a producer and consumer.
[120] 2 interviewees stated this, representing 50% of the 4 interviewees where rails are a relevant product. This includes a producer and consumer.
[121] 2 interviewees stated this, representing 50% of the 4 interviewees where rails are a relevant product. This includes two consumers.

h.) Open Die Forgings

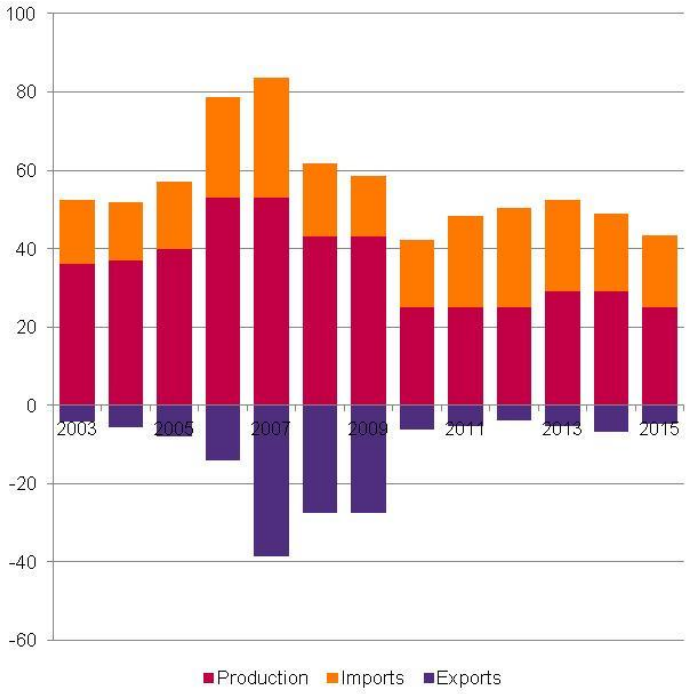
Open Die Forgings – Historical Demand

Exhibit 83: ODF Demand in UK (kt)



Source: ISSB, Euroforge,Hatch

Exhibit 84: ODF Supply in UK (kt)



Source: ISSB, Euroforge, Hatch

Open die forging is a very different industry from the typical rolled-product sector. The nature of the industry is piece/batch work rather than continuous process. Typical capacities for such plants range from 10 kt p.a. to 30 kt p.a. Independent standalone forgers may not own steel-making facilities but some of them do.

Open die forging is a highly specialised steel for power plants, nuclear reactors, ship building, petrochemcials, defence and steel plants. Demand is heavily influenced by investment cycles and government policies. There are very few open die forging producers and supply chains are global.

On average, demand in the UK has fluctuated between 40 and 50 kt p.a. However, in 2015, demand has reduced to 38 kt, partly reflecting the downturn in global investments. The share of imports has been growing since 2009. In 2015, imports accounted for nearly half of the UK's demand. This is because imports are part of the global supply chain. There is better price competitiveness from producers in China, Poland and Romania, and there are gaps in the UK's technical capabilities.

Sheffield Forgemasters International Limited (SFIL) is the only producer of open die forging in the UK and has in-house steel-making facilities. SFIL press is limited to 10 kt while its competitors go up to 12–13 kt.

Capability Summary

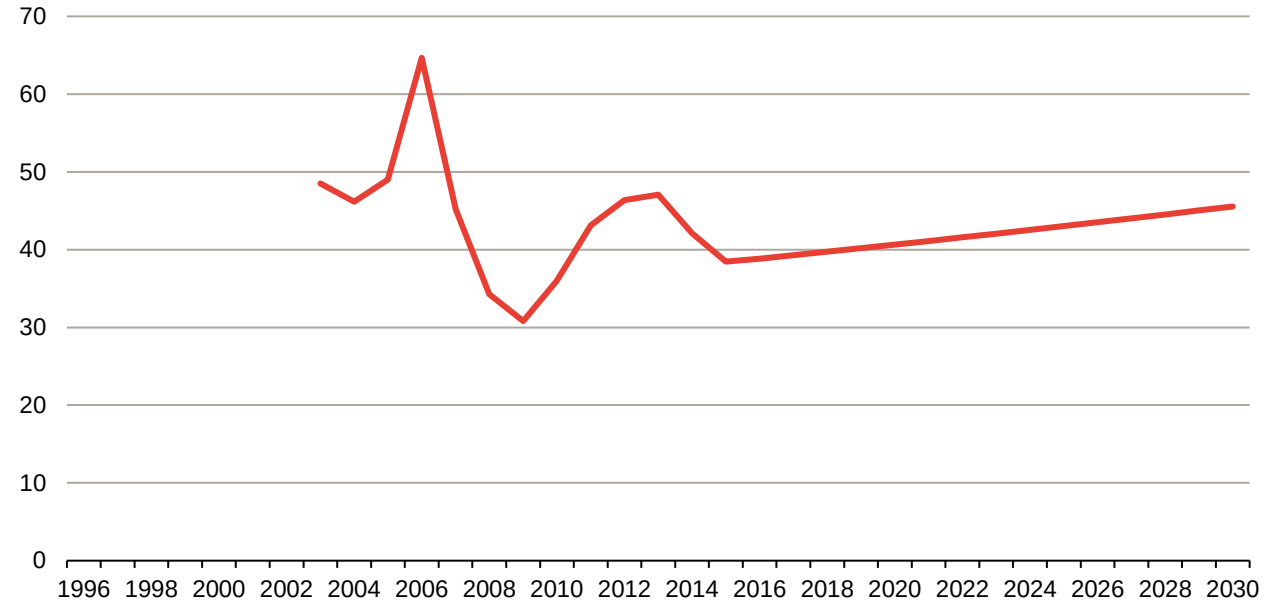
		Reasons	
Attributes	**Gaps**	**Commercial**	**Technical**
Share of imports	High share of imports despite good range of technical capabilities	• Imports are part of global supply chains for OEMs, which makes it challenging for SFIL to penetrate these supply chains	
Press size	Lack of higher press capacity		• SFIL's press size is limited to 10 kt while its global competitors can go up to 12 kt to 13 kt

Open Die Forgings – Demand Forecast

Demand Outlook

Demand for open die forging is forecast to grow at 1.1% p.a. to 46 kt p.a. from 38 kt p.a. between 2015 and 2030, which is comparable to levels achieved in 2012 and 2013.

Exhibit 85: Forecast Demand for ODF (kt)



Source: Hatch

Sector Outlook

The following trends support the outlook for open die forging demand:

- Power sector – Globally, investments in power generation capacity are set to grow at 2.7% p.a. in response to growing demand and replacement of ageing power plants.
- Demand from the nuclear sector will be supported by the planned investments in Hinkley Point C nuclear power plant.
- The oil & gas sector demand is likely to be impacted negatively as it responds to the slowing production in the UKCS.
- Demand from steel plants for works rolls and back-up rolls is likely to be steady on the back of investments in new and existing rolling mills.

Opportunities

The major opportunities for the UK to address in the open die forging market are the imports and the organic growth in the market. Put together, they represent a total opportunity size of 26 kt, which is 123% of what the industry is current supplying to the UK market.

The key areas that the industry needs to focus on to position itself favourably to address this opportunity are:

- Cost competitiveness: Realigning its cost competitiveness as compared with suppliers in China, Poland and Romania.
- Enhance press capacity to >10 kt in line with some of its competitors.
- Modernising the facility and investing in automation and CAD for increasing product quality.

- Steel Procurement in Public and Infrastructure Projects: The government has introduced steel-specific procurement guidance to take account of social and environmental factors, but that the nature and duration of contracts may take some time for the full effects to be felt.

Uncertainty and Risks

Demand is very dependent on government policy which could accelerate or completely put projects off the development cycle. This is especially true of power plants and nuclear projects. In addition, there are uncertainties and risks surrounding supply chains which are contracted out for the projects. Supply chains are global and it is entirely possible that contractors can procure steel from outside of the UK and import it as manufactured systems or equipment, putting UK base producers at a disadvantage.

Supply Chains

Both the nuclear and oil & gas industries have global supply chains where there is pressure to be globally competitive. This was reinforced by an interviewee from the oil & gas sector who stated that there are pressures to look around the world for the cheapest supplier.

Competitiveness

One consumer again pointed to the challenge of high energy prices impacting the UK steel industry. They stated that any help on this should be part of a government strategy.

Markets

It is also a product that is highly dependent on government policy, particularly in relation to the development of power plants.[122] However, even if the building of new power stations was approved, the view from the industry was that it is highly likely that most of the steel would be sourced from overseas due to the procurement strategies of the firms involved and the requirement of highly specialised grades (particularly in the case of nuclear power). For example, one interviewee highlighted that the UK needs to keep more work 'in-house'. Where Italy and Germany design their own projects they are then likely to use their own supply chains for competitive work. The UK does not seem to want to do this.

No major changes in technical specifications were anticipated. One interviewee stated that they do not anticipate fundamental changes in the type of steel used in power plants.

Capability & Capacity

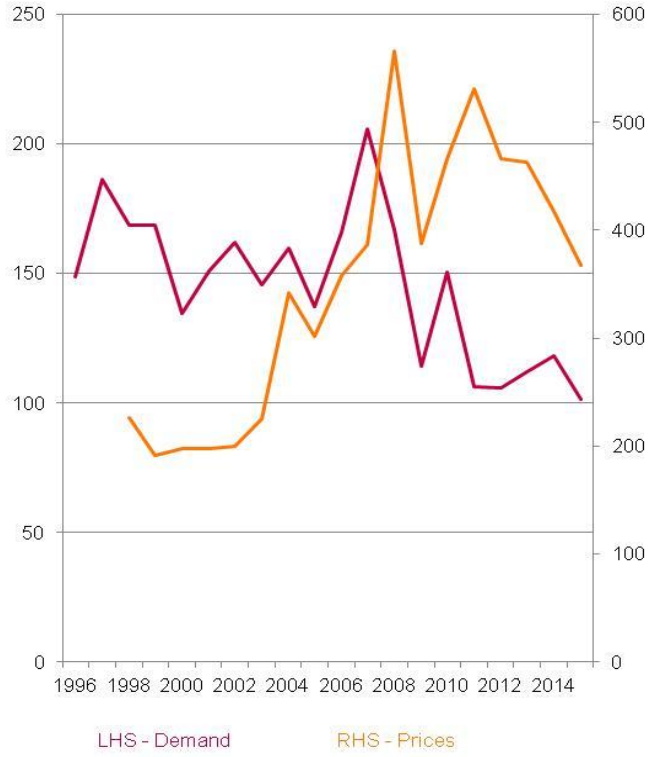
No interviewees raised issues on capability and capacity regarding open die forging.

[122] 3 interviewees stated this, representing 43% of the 7 interviewees where open die forging is a relevant product. This includes two industry bodies and a consumer.

i.) Sections

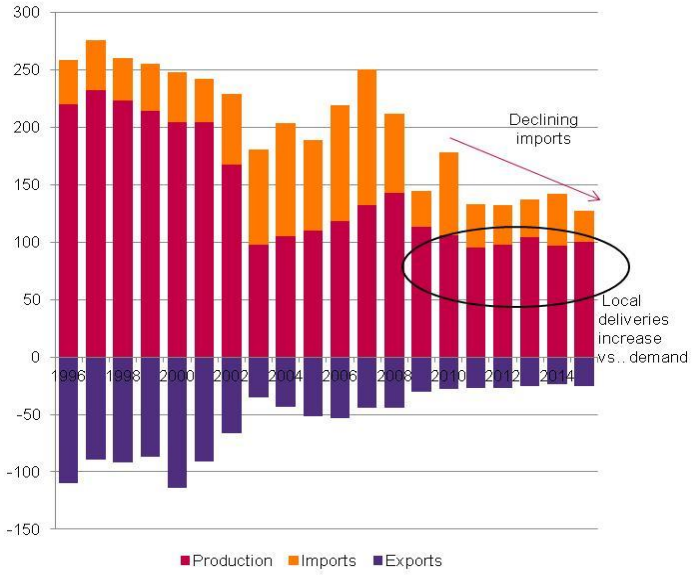
Light Sections – Historical Demand

Exhibit 86: Light Sections Demand in UK (kt) and Prices (£/t)



Source: ISSB, Platts, Hatch

Exhibit 87: Light Sections Supply in UK (kt)



Source: ISSB, Hatch

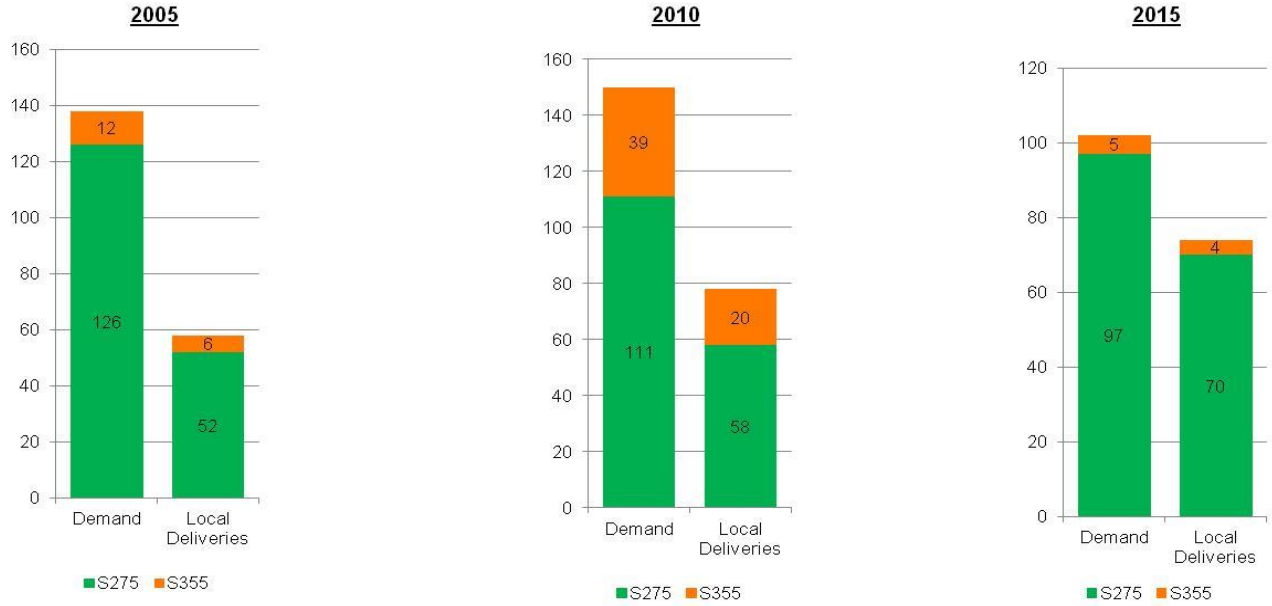
Light sections are hot-rolled products rolled from billets. They are exclusively used in construction applications such as commercial buildings, warehouses, transmission towers.

Prior to the 2008 crisis, demand for light sections was relatively stable, with fluctuations and volatility that are not atypical for products that are dependent on construction markets. Since the 2008 crisis, demand has fallen by nearly 50%. The main reason for this is due to shifts in demand for higher-gauge sections, as construction has moved to wider-span structures.

There are three producers of light sections in the UK – Celsa, Caparo and Bromford Iron and Steel.

Although demand has declined, the share of UK production has increased and the increase has consequently eroded imports.

Exhibit 88: Light Sections Demand Breakdown vs. Local Deliveries (kt)



The UK market demands two main grades – S275 and S355. Both these grades can be produced in the UK and there are no technical barriers for the incumbent producers – Celsa, Caparo and Bromford. Caparo and Bromford do not have captive steel-making facilities, but there are no supply challenges to source billets in these grades.

Capability Summary

Attributes	Gaps	Reasons	
		Commercial	Technical
Share of imports	Imports account for about 27% of the demand	• There is sufficient capacity in UK to meet demand • Imports from Spain, Turkey and France have better cost competitiveness compared with the UK	• No technical barriers identified

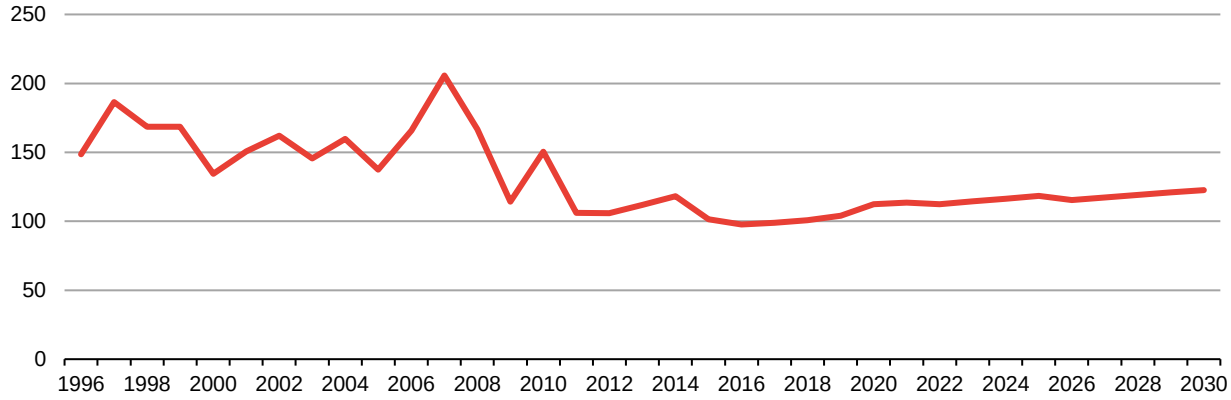
Overall, despite the precipitous fall in demand, UK producers have defended a high market share and their capabilities are well aligned to customers' requirements. If cost competitiveness can be improved, there could be some upsides to increasing the share of UK producers.

Light Sections – Demand Forecast

Demand Outlook

Demand is expected to grow at 1.3% p.a. to 123 kt from 101 kt between 2015 and 2030 This works to additional demand of 22 kt (+22%) over the forecast period. There are no major structural shifts expected from the typical grades used currently, such as S275 or S355.

Exhibit 89: Forecast Demand for Light Sections (kt)



Source: Hatch

Sector Outlook

The sector outlook that will underpin the demand forecasts for light sections is:

- Industrial construction: Growth is likely to be weak for the next 3–5 years due to the uncertainty from the EU exit negotiations. In all likelihood, the next few years may not be able to arrest the trends which have held back large-scale industrial construction, such as financing off the balance sheet as opposed to borrowing to support large investments. Growth could start accelerating from 2022 onwards as the effect of the broader and inclusive industrial strategy starts to deliver results.
- Commercial construction: Retail will continue to be slow and anaemic because of weak consumer spending and changes in consumer shopping behaviour. Some commercial construction could be spurred when the government's industrial strategy starts to deliver results.
- Public non-housing commercial: The major sectors for construction spend – school and health – are unlikely to be supported by increases in spending from the budget. There is some improvement in spending on university-related construction in the period 2015–2017, but it is unclear whether this represents a sustainable increase over the long term.
- Infrastructure: After many years of anaemic growth in infrastructure spend, there appears to be a steady and solid growth path, building on the strong trends seen since 2010. These factors will drive the baseline growth in light sections demand. Significant

growth in demand is likely to accrue to the UK from 2020 onwards, driven by two major infrastructure projects – HS2 and Hinkley Point C nuclear power plant. According to the government Infrastructure Project Pipeline estimates of steel requirements, these two projects could require 32 kt of light sections between 2020 and 2025.

Opportunities

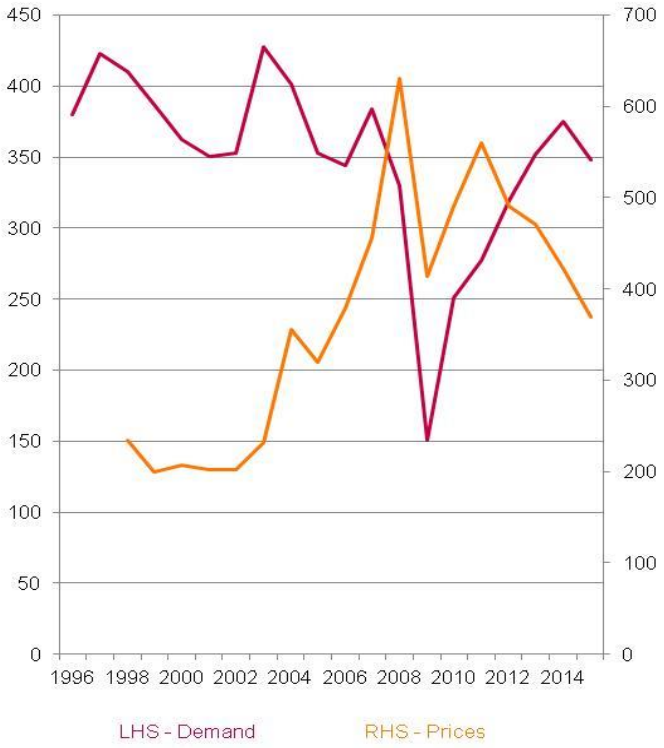
The key opportunities for light sections producers are to serve the organic growth in demand. The current market share is quite high and there may be some marginal gains that can be made from increasing share. In addition, there are issues involving steel procurement in public and infrastructure projects. Steel produced in the UK can be at a disadvantage to imported steel. The government has introduced steel-specific procurement guidance to take account of social and environmental factors, but that the nature and duration of contracts may take some time for the full effects to be felt.

Uncertainties and Risks

The uncertainty surrounding EU exit negotiations and outcomes could worsen the demand outlook for industrial construction, which accounts for the largest share of demand. The longer such negotiations take, the more uncertainty could be induced. Some of the risks can be partially mitigated by increasing demand from infrastructure construction.

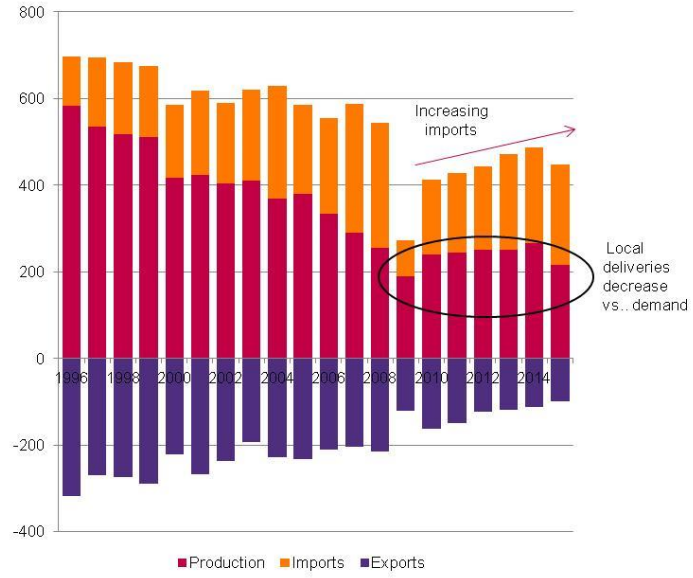
Medium Sections – Historical Demand

Exhibit 90: Medium Sections Demand in UK (kt) and Prices (£/t)



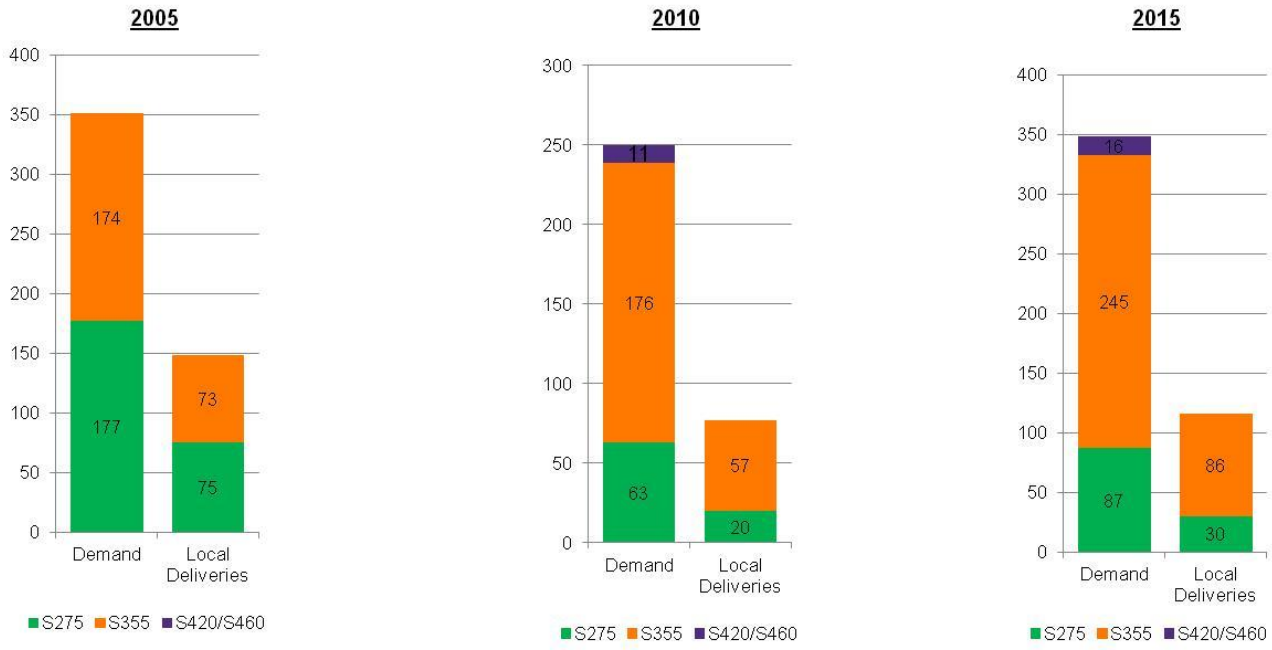
Source: ISSB, Platts, Hatch

Exhibit 91: Medium Sections Supply in UK (kt)



Source: ISSB, Hatch

Exhibit 92: Medium Sections Demand Breakdown vs. Local Deliveries (kt)



S420/S460 are usually M grades – thermo mechanically rolled

Source: Hatch

Medium sections, similar to light sections, are hot-rolled products rolled from billets. They are exclusively used in construction applications such as commercial buildings, warehouses, transmission towers. The capital cost of a medium-section mill is considerably higher than a light-section mill and very often they are integrated to steel-making facilities. There are few medium-section mills that operate an independent re-roller.

Trends for medium sections demand show two distinct phases. Prior to the crisis, trends display fluctuations and volatility that are not atypical for products that are dependent on construction markets. In 2009, demand collapsed by nearly 60%. Since then, demand has recovered from the declines in 2009 but is still considerably lower than in the pre-2005 period. During the recovery period, there have been two new developments in the market:

- Shift to demand for higher-strength grades of steel. These grades offer a higher strength-to-weight ratio and consequently demand falls in terms of volume, but there are higher value accruals.
- Substitution of medium sections by cold-formed sections fabricated from cold-rolled or hot-dip galvanised steel.

British Steel and Caparo produce medium sections in the UK. British Steel's mill, which is located in Scunthorpe, is used for rolling medium sections and rails.

Production of medium sections has contracted by nearly two-thirds since 1996. This is because of reduction of exports to the Middle East, Asia and North Africa, where new mills have been commissioned to serve local demand. Additionally, there were closures of two mills in the UK, namely Shelton Steel Works and Scunthorpe section mill. Local deliveries from the UK have steadily declined from about two-thirds to one-third of the demand since 1996. In the past few years, imports have increased their market share of the UK demand.

In the medium sections market, S355 is the typical default grade, having migrated from S275. There are no technical barriers for UK producers to supply these grades. However, it cannot supply thermomechanically rolled (M) grades S420/S460, which need installation of normalising furnaces for heat treatment. M grades are supplied by imports, but it is about 5% of the demand.

Capability Summary

		Reasons	
Attributes	**Gaps**	**Commercial**	**Technical**
Share of imports	Low share of local deliveries in demand	• There is sufficient capacity in UK to meet demand • Imports from ArcelorMittal's mills in Spain and France have better cost competitiveness compared with the UK • More aggressive price competition from imports • British Steel facility is also used for production of rails which offer higher value add	
Grades Range	Unable to supply full range of grades		• Both British Steel and Caparo do not have the technical capability to produce M grades

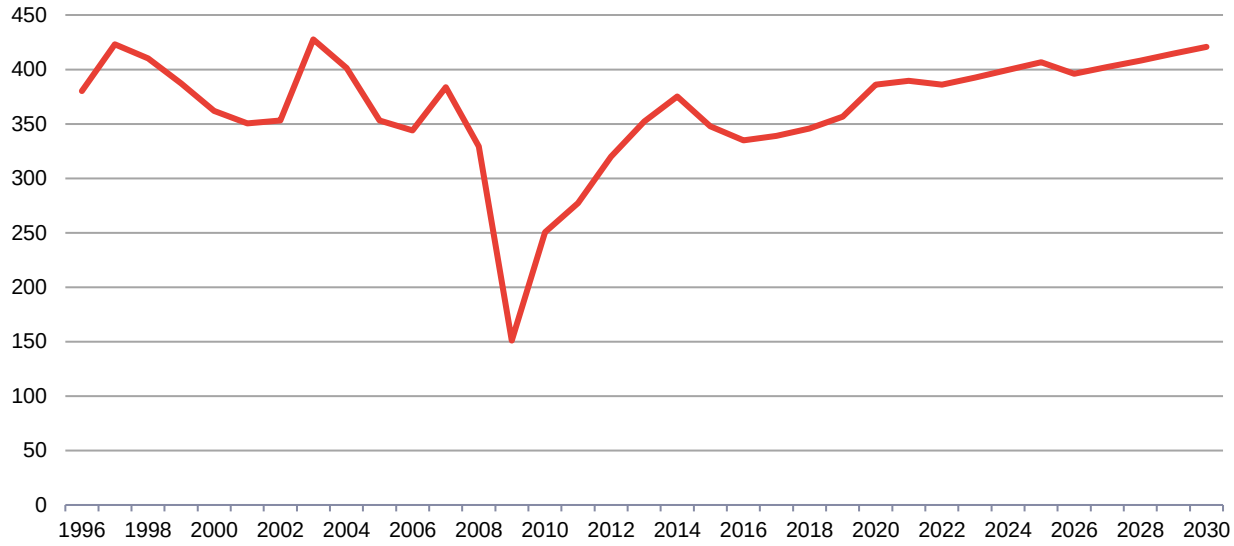
There is considerable room for improvement for market share in medium sections for UK producers if they can resolve the issues around cost competitiveness and improvement in their grade range capability.

Medium Sections – Demand Forecast

Demand Outlook

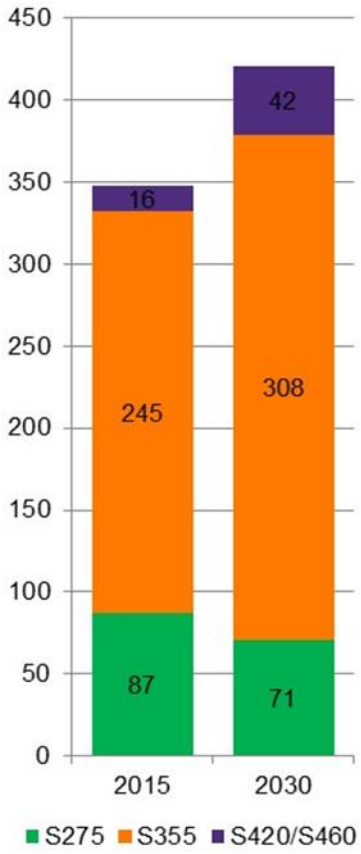
Demand is expected to grow at 1.3% p.a. to 421 kt from 348 kt between 2015 and 2030. This amounts to an additional demand of 73 kt (+21%) over the forecast period. Further shifts to higher-strength S355 and S420/S460 can be expected. Currently Eurocode 3 (steel structure design) norms limit the use of strengths up to S460. However, changes in Eurocode norms in future could allow use of steel strengths up to S700.

Exhibit 93: Forecast Demand for Medium Sections (kt)



Source: Hatch

Exhibit 94: Grade Shifts for Medium Sections Demand (kt)



Source: Hatch

Sector Outlook

The sector outlook which will underpin the demand forecasts for medium sections is:

- Industrial construction: Growth is likely to be weak for the next 3–5 years due to the uncertainty from the EU exit negotiations. In all likelihood, the next few years may not be able to arrest the trends which have held back large-scale industrial construction, such as financing off the balance sheet as opposed to borrowing to support large investments. Growth could start accelerating from 2022 onwards as the effect of the broader and inclusive industrial strategy starts to deliver results.
- Commercial construction: Retail will continue to be slow and anaemic because of weak consumer spending and changes in consumer shopping behaviour. Some commercial construction could be spurred when the government's industrial strategy starts to deliver results.
- Public non-housing commercial: The major sectors for construction spend – school and health – are unlikely to be supported by increases in spending from the budget. There is some improvement in spending on university-related construction in the period 2015–2017, but it is unclear whether this represents a sustainable increase over the long term.
- Infrastructure: After many years of anaemic growth in infrastructure, spend appears to be on a steady and solid growth path, building on the strong trends seen since 2010.

These factors will drive the baseline growth in medium sections demand. Significant growth in demand is likely to accrue to the UK from 2020 onwards, driven by two major infrastructure projects – HS2 and Hinkley Point C nuclear power plant. According to the government Infrastructure Project Pipeline estimates of steel requirements, these two projects could require 118 kt of medium sections between 2020 and 2025.

Opportunities

The key opportunities for medium sections producers are to serve the organic growth in demand and to erode the high share of import. Together, the opportunity for the UK is estimated to be +305 kt (c. £131m). The current market share is only 36%, so there is potential for significant gains to be made by eroding imports. The interview responses suggest that customers will continue to seek supplier diversification and on that basis it may not be possible for the UK to capture the full value of this opportunity. Despite this challenge, the opportunity in medium is a reasonably attractive one.

The UK could work on the following issues to improve its competitive positioning in the market:

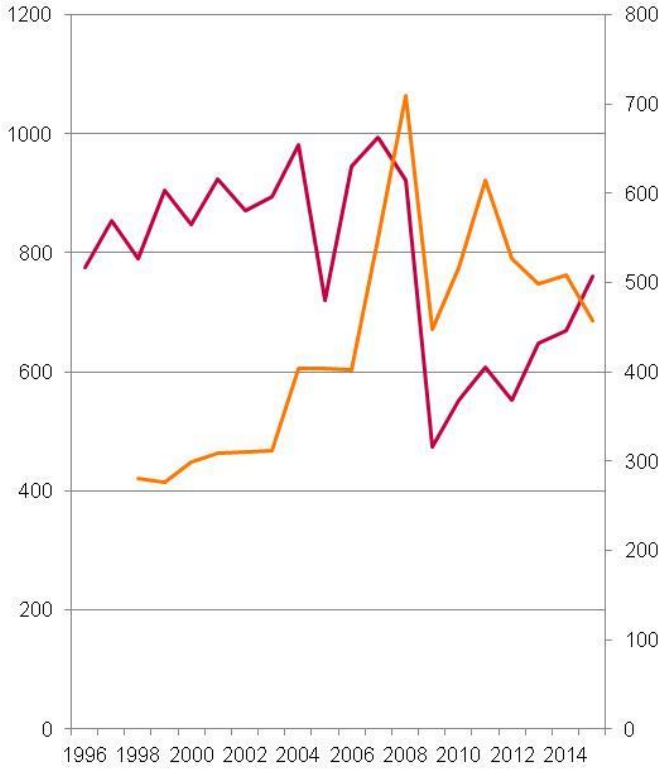
- Improving cost competitiveness of steel production of which business rates is one of the many factors.
- Enhancing product mix to include higher-strength grades up to S700 and invest in normalising furnace for thermomechanically rolled grades
- Steel Procurement in Public and Infrastructure Projects: The government has introduced steel-specific procurement guidance to take account of social and environmental factors, but that the nature and duration of contracts may take some time for the full effects to be felt.

Uncertainties and Risks

The uncertainty surrounding EU exit negotiations and outcomes could worsen the demand outlook for industrial construction, which accounts for the largest share of demand. The longer such negotiations take, the more uncertainty could be induced. Some of the risks can be partially mitigated by increasing demand from infrastructure construction.

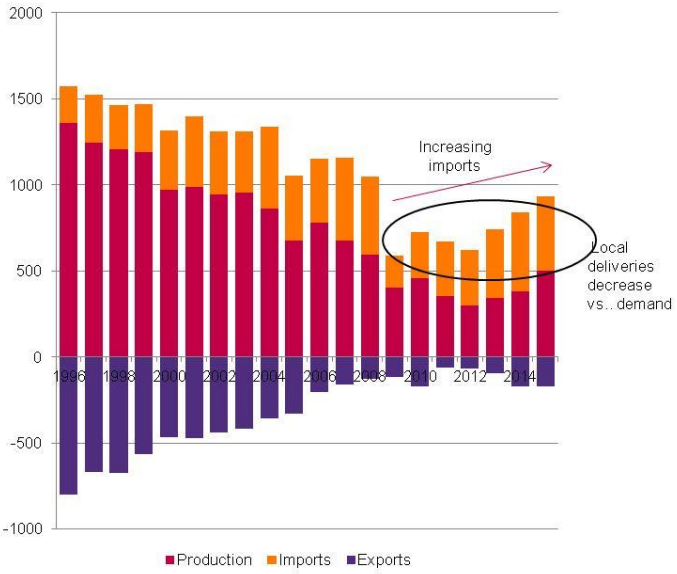
Heavy Sections – Historical Demand

Exhibit 95: Heavy Sections Demand in UK (kt) and Prices (£/t)



Source: ISSB, Platts, Hatch

Exhibit 96: Heavy Sections Supply in UK (kt)



Source: ISSB, Hatch

Heavy sections are hot-rolled products rolled from blooms or beam blanks. They are exclusively used in construction applications such as commercial buildings, warehouses, bridges, airports, stadiums. The capital cost of a heavy-section mill is considerably higher than a light- or medium-sections mill and almost always integrated to steel-making

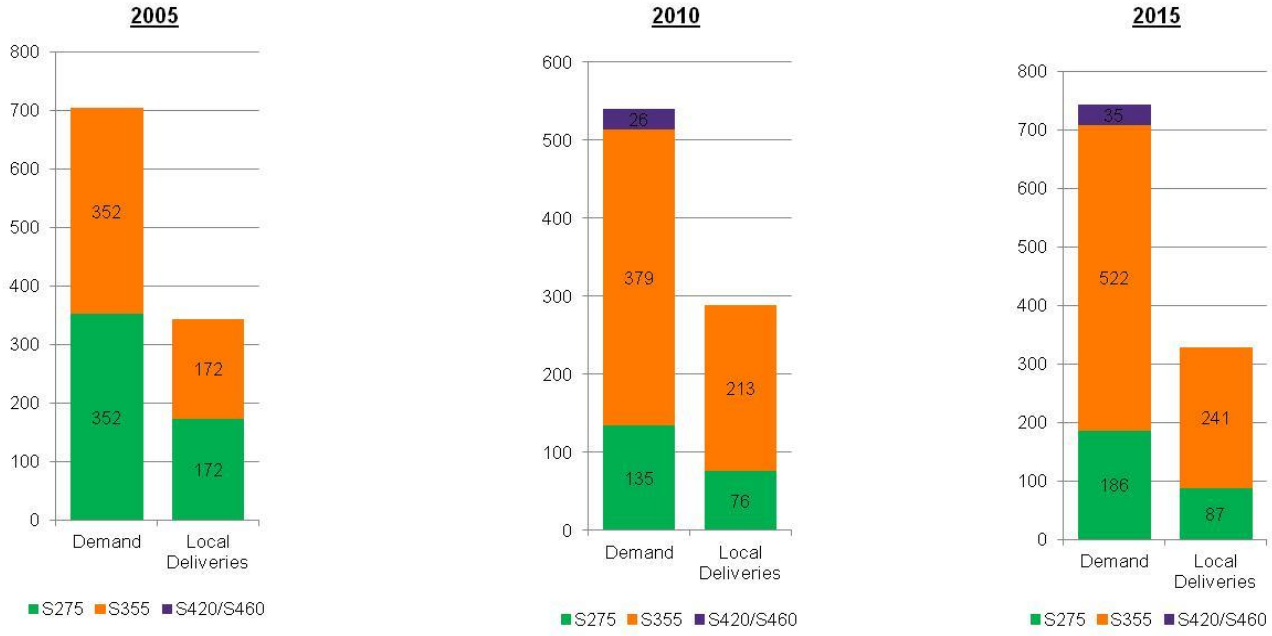
facilities. In cases where it does not have integrated steel making, it is exclusively supplied by the feedstock from a dedicated offsite facility.

Trends for heavy sections demand, quite similar to medium sections, show two distinct phases. Prior to the crisis, trends display fluctuations and volatility that are not atypical for products that are dependent on construction markets. In 2009, demand collapsed by nearly 50%. Since then, demand has recovered from the declines in 2009 but is still considerably lower than in pre-2005 period. During the recovery period, there has been a shift to demand for higher-strength grades of steel. These grades offer a higher-strength-to-weight ratio and consequently demand falls in terms of volume, but there are higher value accruals

British Steel is the only producer of heavy sections in the UK. British Steel's mill is located in Teesside and it is supplied its feedstock in the form of slabs from Scunthorpe. There are cost disadvantages of this asset configuration because there are additional costs to transport the slabs and to reheat it prior to rolling. Its competitors in the EU have single-site facilities and produce sections from beam blanks, thereby offering a cost advantage.

Production of heavy sections has contracted by nearly two-thirds since 1996. This is because of a reduction of exports to the Middle East, North Africa and Asia, where new mills have been commissioned to serve local demand. Additionally, there was the closure of Scunthorpe sections mill. Local deliveries from the UK have steadily declined from about two-thirds to one-third of the demand since 1996. In the past few years, imports have increased their market share of the UK demand.

Exhibit 97: Heavy Sections Demand Breakdown vs. Local Deliveries (kt)



S420/S460 are usually M grades – thermo mechanically rolled

Source: Hatch

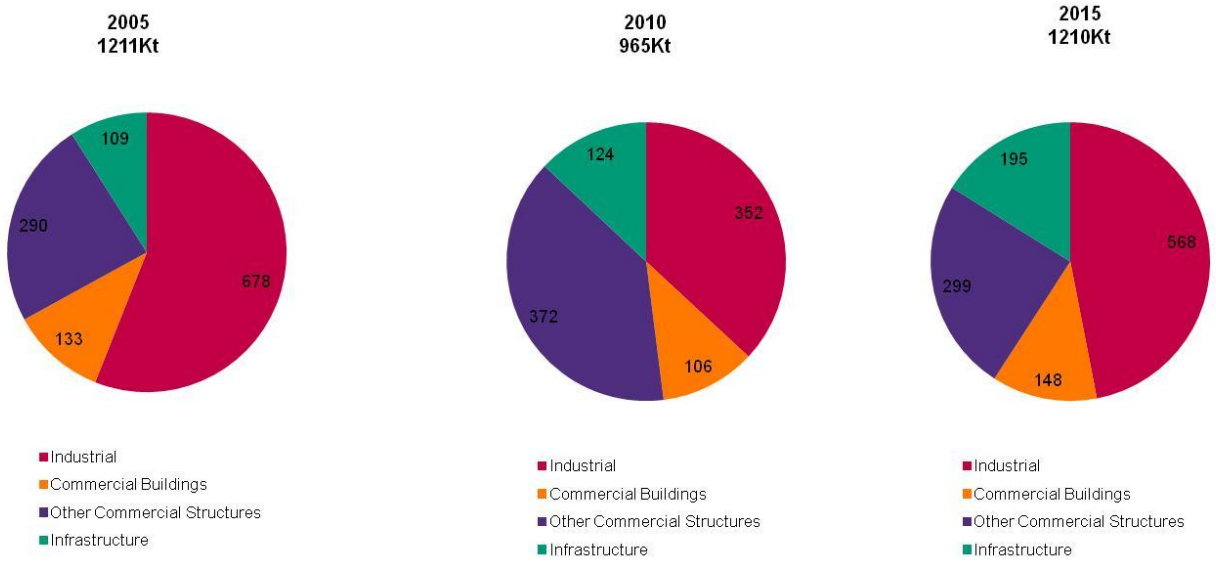
In the heavy sections market, S355 is the typical default grade, having migrated from S275. The above exhibit suggests that there are no technical barriers for the UK to supply S275 and S355 grades. However, it cannot supply S420/S460 thermomechanically rolled

(M) grades, which need installation of normalising furnaces for heat treatment. M grades are supplied by imports, but it is about 5% of the demand.

Capability Summary

		Reasons	
Attributes	**Gaps**	**Commercial**	**Technical**
Share of imports	Low share of local deliveries in demand	• There is sufficient capacity in the UK to meet demand. British Steel has a capacity of 1.05 Mt • Imports from ArcelorMittal's mills in Spain and Luxembourg and Celsa in Spain have better cost competitiveness compared with UK • More aggressive price competition from imports • Competitors have responded aggressively to demand decline in the EU and are servicing the UK market with more imperial size sections campaign • Cost disadvantage of British Steel on account of asset configuration and production process	
Grades Range	Unable to supply full range of grades		• Both British Steel and Caparo do not have the technical capability to produce M grades

Exhibit 98: Heavy Sections Demand Breakdown vs. Local Deliveries (kt)



Source: BCSA, ONS, Hatch

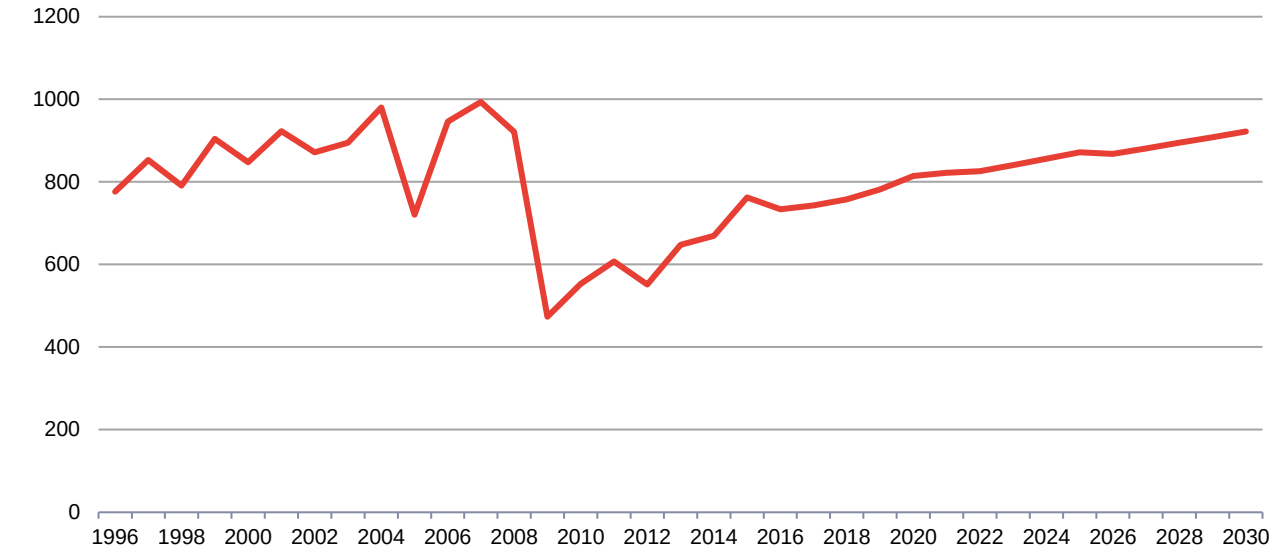
Industrial construction, commercial construction and infrastructure construction spend are the key drivers for sections (light, medium and heavy) demand. Of this, industrial construction is the predominant driver. In the past five years, increase in infrastructure construction has been a more important driver for growth, mainly reflecting the increase in power-sector spend.

Heavy Sections – Demand Forecast

Demand Outlook

Demand is expected to grow at 1.3% p.a. to 922 kt from 762 kt between 2015 and 2030. This works out to an additional demand of 160 kt (+21%) over the forecast period. Further shifts to higher strength ~ S355 and S420/S460 can be expected. Currently, Eurocode 3 (steel structure design) norms limit the use of strengths up to S460. However, changes in Eurocode norms in the future could allow use of steel strengths up to S700.

Exhibit 99: Forecast Demand for Heavy Sections (kt)



Source: Hatch

Exhibit 100: Grade Shifts for Heavy Sections Demand (kt)

Source: Hatch

Sector Outlook

The sector outlook which will underpin the demand forecasts for heavy sections is:

- Industrial construction: Growth is likely to be weak for the next 3–5 years due to the uncertainty from the EU exit negotiations. In all likelihood, the next few years may not be able to arrest the trends which have held back large-scale industrial construction, such as financing off the balance sheet as opposed to borrowing to support large investments. Growth could start accelerating from 2022 onwards, as the effect of the broader and inclusive industrial strategy starts to bear results.
- Commercial construction: Retail will continue to be slow and anaemic because of weak consumer spending and changes in consumer shopping behaviour. Some commercial construction could be spurred when the government's industrial strategy starts to deliver results.
- Public non-housing commercial: The major sectors for construction spend – school and health – are unlikely to be supported by increases in spending from the budget. There is some improvement in spending on university-related construction in the period 2015-2017, but it is unclear whether this represents a sustainable increase over the long term.
- Infrastructure: After many years of anaemic growth in infrastructure, spend appears to be on a steady and solid growth path, building on the strong trends seen since 2010. These factors will drive the baseline growth in heavy sections demand. Significant growth in demand is likely to accrue to the UK from 2020 onwards, driven by two major infrastructure projects – HS2 and Hinkley Point C nuclear power plant. According to the government Infrastructure Project Pipeline estimates of steel requirements, these two projects could require 118 kt of heavy sections between 2020 and 2025.

Opportunities

The key opportunities for heavy sections producers are to serve the organic growth in demand and to erode the high share of imports. Together, the opportunity for the UK is estimated to be +594 kt (c. £279 million). The current market quite share is only 43%, so there is potential for significant gains to be made by eroding imports. The interview responses suggest that customers will continue to seek supplier diversification and on that basis it may not be possible for the UK to capture the full value of this opportunity. Despite this challenge, the opportunity in heavy sections is a reasonably attractive one.

The UK could work on the following issues to improve its competitive positioning in the market:

- Improving cost competitiveness of steel production on account of logistics costs from Scunthorpe to Teesside and business rates, which is an industry-wide factor.
- Improving cost competitiveness from a process standpoint and shift production of semis to beam blanks.
- Enhancing product mix to include higher strength grades up to S700 and invest in normalising furnace for thermomechanically rolled grades.
- Steel Procurement in Public and Infrastructure Projects: The government has introduced steel-specific procurement guidance to take account of social and environmental factors, but that the nature and duration of contracts may take some time for the full effects to be felt.

Uncertainties and Risks

The uncertainty surrounding EU exit negotiations and outcomes could worsen the demand outlook for industrial construction which accounts for the largest share of demand. The longer such negotiations take, the more uncertainty could be induced. Some of the risks can be partially mitigated by increasing demand from infrastructure construction.

Sections – Sector View

Competitiveness

One of the most notable influences on sections within the UK market is how competitive UK producers can be on cost.[123] Like rebar, this is invariably seen to be the result of high costs of production relative to imports from countries such as Turkey, China, Ukraine and other parts of Europe.

Producers, consumers and stockholders again noted that much of the challenge was driven by the higher energy prices within the UK relative to other countries.[124] One producer stated that energy prices are a key issue worth £10 million to £15 million a year to the company, which takes away valuable cash flow from investment. Another producer cited that even after assistance from government, the compensation package only helped address half the disparity in energy costs between UK and continental energy prices.

Alongside this, higher business rates were also cited by producers as adding to costs.[125] One producer stated that business rates are approximately £15 million a year, whereas a comparably sized Dutch steel producer would only pay €1 million.

In addition, the major European competitor is operating a lower-cost steel-making route utilising scrap, beam blank casting and hot connect facilities. This process configuration provides a greater degree of operating flexibility, higher yield, lower thermal losses and greater labour productivity.

Views on customer service were varied. Several interviewees stated that they were content with the level of service they were provided with,[126] while others stated that producer lead times versus stockholders meant the latter was often used more.[127] One industry body stated that there is a lack of willingness to deal with small order sizes. If an order is not of a suitable size for the steel producer, it may take up to 18 months to get that order processed. A producer stated that small orders are not feasible because of economic reasons. Other interviewees stated that there were previously issues with customer service and security of supply but these have improved more recently.

[123] 5 interviewees stated this, representing 19% of the 26 interviewees where sections are a relevant product. This includes the UK's two sections producers, a stockholder and consumer.
[124] 5 interviewees stated this, representing 19% of the 26 interviewees where sections are a relevant product. This includes the UK's two sections producers, a stockholder and consumer.
[125] 3 interviewees stated this, representing 11% of the 26 interviewees where sections are a relevant product. This includes the UK's two sections producers and a consumer.
[126] 5 interviewees stated this, representing 19% of the 26 interviewees where sections are a relevant product. This includes contractors and fabricators.
[127] 5 interviewees stated this, representing 19% of the 26 interviewees where sections are a relevant product. This includes contractors and fabricators.

Capability & Capacity

In addition to cost limitations, the UK's competitiveness is also limited by capability gaps, with the UK unable to meet the full demand and some grade requirements particularly across medium and heavy sections[128] (e.g. thermomechanically rolled grades and 460 grade). One contractor stated that there is more and more demand for different grades of steel and it is in the industry's best interest to ensure these grades are available directly from the mill.

Some concerns were also raised about the UK's competitiveness in terms of innovation and technological change, with consumers noting the lack of innovation and development of unique grades[129] and a stockholder highlighting that specifications from the older UK mills meant that length and quality were not as reliable when compared with the sections they could import from international mills. A contractor stated that there is no innovation, with producers very much reactive (they are producing steel sections out of habit and nobody necessarily looks for changes or improvements). A large fabricator felt that UK producers were not as innovative as European counterparts, while another tier 1 contractor stated that the UK offers a large range of products, but there have been no changes in specifications.

Supply Chains

These limits on competitiveness are further exacerbated by the fragmentation of the supply chain within the UK with a number of producers and consumers noting that there is little engagement across what was perceived to be an overly sophisticated supply chain.[130] The result is that there is often limited engagement with the end customer and increasing engagement with stockists (one stockholder noted that 65% of the steel distributed in the UK comes from independent stockholders, not mills, a figure that was only 35% 5–10 years ago).

This has two negative implications. The first is that the producer loses contact with the real needs of the user. [131] **The second is that in order to manage supply risks, stockholders will import steel which in turn increases competition and reduces demand** – particularly with a number of stockholders noting that international producers had more capability, better quality and lower prices.

If producers were able to work more closely with end users – for example, design engineers – then they would have a better understanding of what UK construction looks like as well as influence design decisions around the use of steel, which could lead to more innovation.

One contractor felt that producers are reacting slowly to users' needs and they need to better engage with their markets to get a better understanding of consumers and their requirements, while another contractor highlighted that the lack of engagement between producer and end user meant producers and stockholders dictate the type of steel they

[128] 7 interviewees stated this, representing 27% of the 26 interviewees where sections are a relevant product. This includes contractors and fabricators.
[129] 7 interviewees stated this, representing 27% of the 26 interviewees where sections are a relevant product. This includes an industry body, contractors and fabricators.
[130] 13 interviewees stated this, representing 50% of the 26 interviewees where sections are a relevant product. This includes producers, an industry body, contractors and fabricators.
[131] 3 interviewees stated this, representing 11% of the 26 interviewees where sections are a relevant product. This includes contractors and a stockholder.

use. The mills make the steel and sell on to the stockholder, so there is no choice in the matter. It basically depends on what the producers want to sell.

One industry body stated that better engagement can lead to innovation, which will help add value and overcome issues of lower margins. This point was reiterated by a stockholder who felt that producers needed to work more closely with end users to get a better understanding of their needs. The stockholder provided an example of them working closely with a large contractor's design team, and inviting them to their facility to share information on the products required. Another large contractor stated that they have no relationship with producers, only with fabricators. However, they would like to be more engaged with producers and believed that this would help them both become more competitive.

To overcome the fragmentation in the supply chain, one large fabricator stated that they are implementing an enterprise resource planning system to help them better engage with steel producers electronically, which would help speed up some of the process and remove some of the complexity of the fragmented supply chain.

Markets

Like rebar and rails, there may also be some opportunities to further support the UK sections market through procurement, particularly for large public housing or infrastructure schemes.[132] Not least because the successful international contractors tend to default to local suppliers in their home markets.[133] One industry body stated that if you use a UK contractor you are likely to get UK-made steel, whereas if you use a foreign contractor you are much more likely to get foreign steel. For example, an industry body and contractor highlighted the example of bridges in the UK. Lots of projects in continental Europe will use concrete bridges, and contractors from these areas will stick to their design trends.

Therefore, UK steel could be supported through a focus on increased transparency on reporting material sourcing as well as ensuring that procurement takes into account the wider socioeconomic impacts of UK sourcing. One producer felt the government's industrial strategy would provide a good opportunity to emphasise local sourcing.

When asked about future changes in technical specifications to sections, there were not considered to be major deviations.[134] One contractor emphasised this by saying that there is not much time on-site to think about new processes and innovations because of the pressure for construction projects to be delivered as quickly as possible.

Several respondents did note a potential increase in strength in the type of steel used,[135] for example a move from 355 to 460 grade. One contractor did contradict this, stating that they were not convinced by the move to 460 grade sections because buildings are designed on strength, but also have to account for serviceability, where the lower grades

[132] 6 interviewees stated this, representing 23% of the 26 interviewees where sections are a relevant product. This includes producers, an industry body and contractors.
[133] 3 interviewees stated this, representing 11% of the 26 interviewees where sections are a relevant product. This includes an industry body and contractors.
[134] 3 interviewees stated this, representing 11% of the 26 interviewees where sections are a relevant product. This includes an industry body and contractors.
[135] 5 interviewees stated this, representing 19% of the 26 interviewees where sections are a relevant product. This includes a producer, fabricators and consumers.

are just as practical. They also highlighted that only the really large contractors have the know-how in-house to use these higher grades.

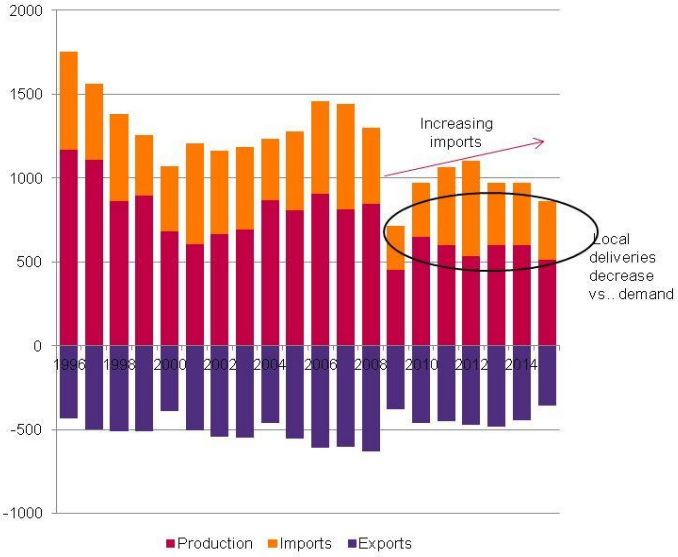
j.) Plates

Plates – Historical Demand

Exhibit 101: Plates Demand in UK (kt) and Prices (£/t)

Source: ISSB, Platts, Hatch

Exhibit 102: Plates Supply in UK (kt)



Source: ISSB, Hatch

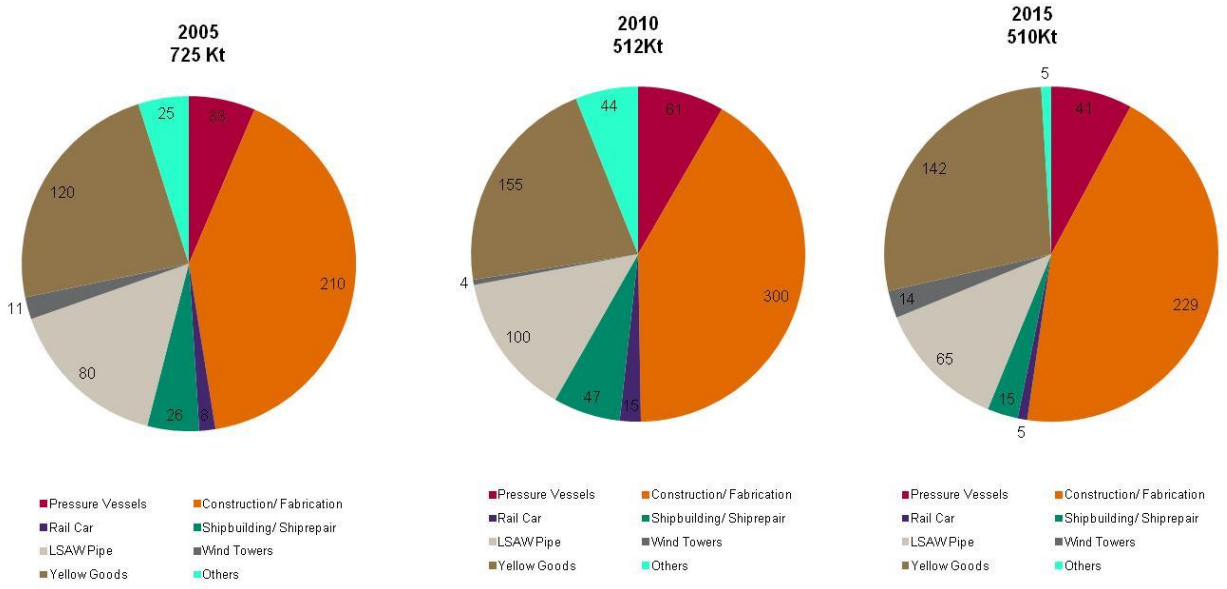
Plates are hot-rolled products rolled from slabs. They are produced in reversing plate mills, Steckel mills or cut to length in a hot-strip mill. For this analysis, we will focus on plates from reversing plate mills which are most relevant to the UK. Plate markets are more regional and global in nature as compared with the more commodity-driven markets of rebars, hot rolled coils or merchant bars. Global investments cycles shape the demand trends and demand can be very cyclical, as has been observed in the past.

UK plate demand has declined by nearly 60% over the past 20 years from over 1,300 kt in 1996 to 511 kt in 2015. These trends show the precipitous decline in capital equipment and heavy industry manufacturing that has been apparent across many sectors in the UK, such as shipbuilding, power generation equipment, mining and earthmoving equipment, pressure vessels, and line pipe production. Fifty per cent of the decline occurred by 2003. Between 2003 and 2008, there was an increase in demand due to a surge in global investments in capital equipment. Since the collapse in 2009, demand recovery has not been sufficiently robust to match levels seen in pre-crisis years.

Currently, there are two producers of plates in UK – Liberty Dalzell and Metinvest Spartan. Two plate mills have been shut down in the UK – a reversing plate mill owned by Tata Steel in 2015 and a coiled plate mill previously owned by Corus in 2003 – and both of these were located in Scunthorpe.

The UK demand is supplied predominantly by imports, with local deliveries accounting for about 25% of demand. Imports are mainly from EU countries such as Germany, Austria, Spain, Sweden, and to a lesser degree Ukraine and China. Exports have been the main reason for sustaining UK production of plates, which has increased from around 50% of production in 2000 to over 75% in 2015. UK exports plates mainly to other EU countries. With Liberty's recent acquisition of Dalzell plate mill, it could be expected that there would be a higher share of UK-produced plates as the asset ramps up production.

Exhibit 103: Plates Demand Breakdown vs. Local Deliveries (kt)

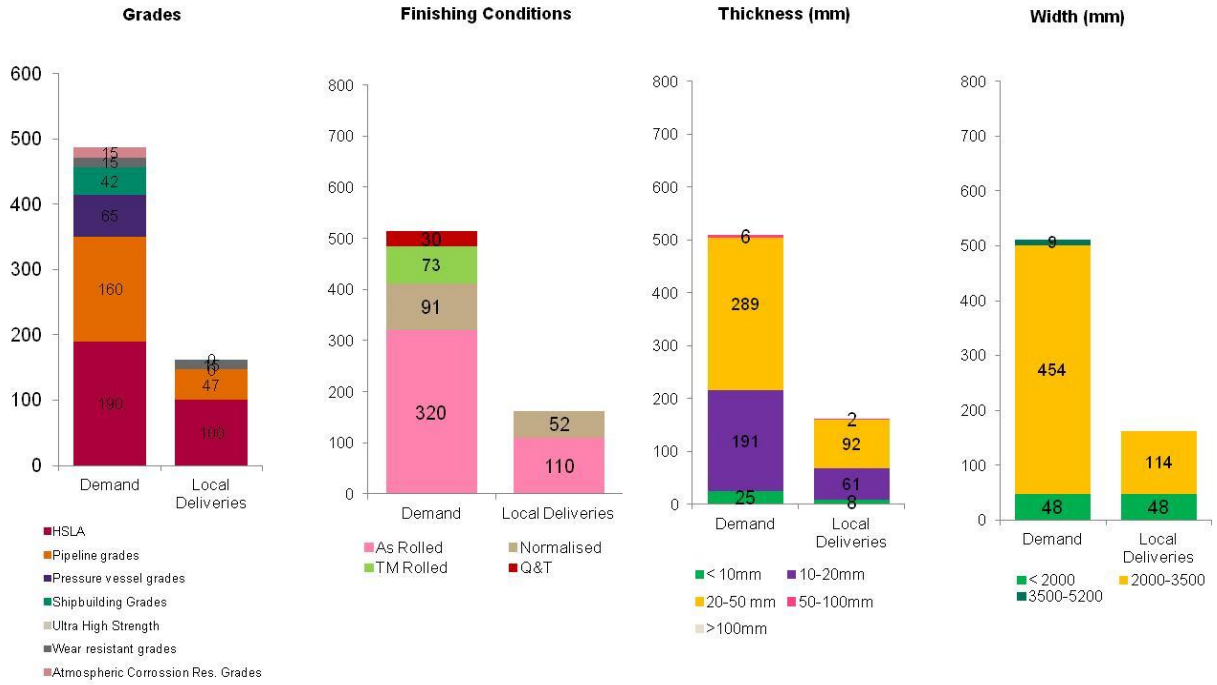


Source: Hatch

Three sectors drive plate demand in the UK – construction, pipes and yellow goods. Given the decline in heavy industry manufacturing, construction dominates the sector splits. In

many other developed countries, construction is a much less dominant sector. In the past decade, construction and yellow goods have been the more resilient sectors when plate demand declined by 30%. The decline in pipe production and pressure vessels are aligned to trends in falling oil & gas production in the UK and investments in process industries.

Exhibit 104: Plates Demand Breakdown vs. Local Deliveries (kt)



Source: Hatch

The current demand and supply breakdown by capability presents a slightly optimistic picture. This is in large part because of the plate mill in Scunthorpe, which was still operating in 2015. After factoring the closure, there are significant capability gaps in the plate industry.

- With the closure of Scunthorpe, there are no producers that can supply pipeline grades, ultra-high strength, wear-resistant, pressure vessel grades and shipbuilding grades. In particular, the challenges emanate from a lack of captive steel-making facilities in Dalzell and Spartan. Both these mills have to depend on purchased slabs. Almost all modern plate mills globally have their own steel-making facilities, which gives them controls on the steel-making process and mitigates away any slab procurement risks. This is a huge disadvantage for UK plate producers, as many OEMs prefer to certify preferred suppliers on the basis of consistent source of steel, which inevitably implies that steel making needs to be in the control of the plate mills. It is extremely challenging commercially to secure a consistent source of slabs in the required specifications, volumes and delivery windows to meet sophisticated demands from plate customers.
- There are some capability gaps on widths. While Dalzell can produce up to 3000mm-wide plate, Spartan is limited to 2100mm width. Most modern plate mills globally can roll up to 5000mm-wide plate and current product development pipeline suggests that demand will increasingly shift towards wider plates.

Capability Summary

Attributes	Gaps	Reasons	
		Commercial	Technical
Capacity	Insufficient capacity in the UK		• Both Dalzell and Spartan depend on purchased slabs. Given the mix of technical specs and sectors, it is not clear whether the two producers can produce sufficient volumes for the UK market
Grades	Pipeline, Pressure Vessel Grade, Ultra High Strength, Wear Resistance, Shipbuilding		• Pipeline grades (X52, X60, X65, X70) have been challenging for Tata Steel in the past • Hartlepool pipe mill has in the past imported plates from Europe
Finishing	Thermomechanical Rolling Q & T		• Dalzell has a TMR facility. Mainly lack of ability to produce pipeline grades, shipbuilding and some HSLA grades • Liberty has Q&T facilities in Clydebridge. Tata Steel previously sold Q&T under 'Abrazo', 'RQT' brand, up to 900MPa YS. Limited or no capabilities to plates above 900MPa. • Spartan has Q&T facility but there is little visibility on which sector it services
Width	2000–3500mm		• Spartan mill is limited to 2100mm only

The plate industry in the UK needs some significant uplift in capabilities, which range from captive steel making, casting, finishing and heat treatment to width capabilities. These are necessary for the industry at the very least to bring its capabilities level with its competitors and position itself as a supplier of choice to customers in the UK.

Plates – Demand Forecast

The demand for plate demand is forecast to grow at 1.2% p.a. to 615 kt in 2030 from 511 kt in 2015. The total increase in demand is +104 kt (20%) over the forecast period. The overall changes in technical requirements will be similar to global trends in plate requirements:

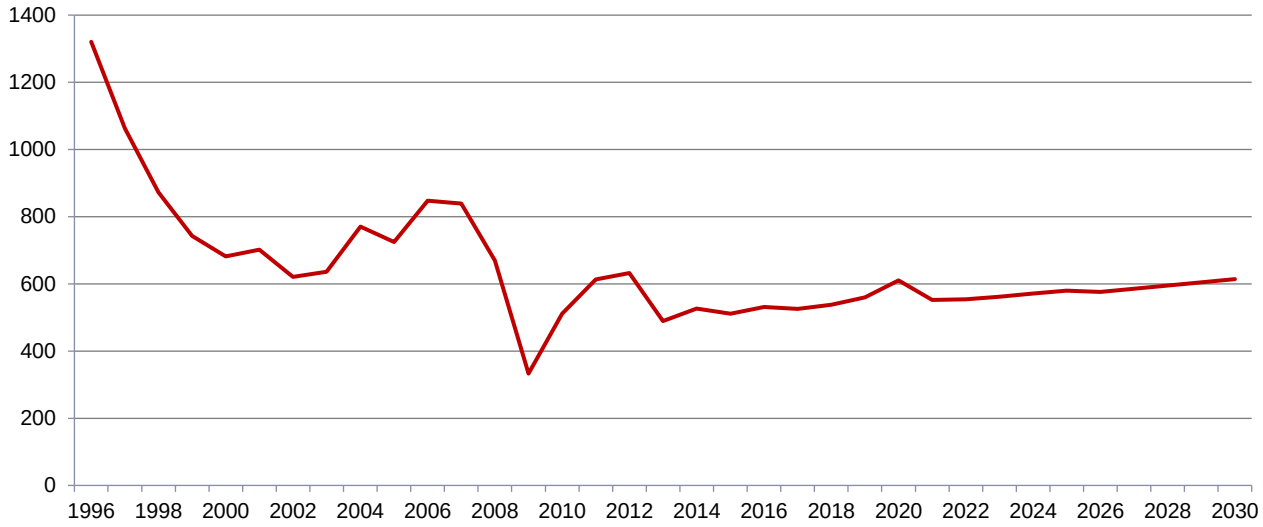
a) Pipeline grades: Increase in use of X80 grades.

b) Shifts in general structural grades to high-strength normalised grades.

c) Increasing use of wider width material >3000mm width and tending towards 4500–5000mm-wide plate.

d) Thicker and higher strength plates for offshore, pressure vessels and power plant applications.

Exhibit 105: Forecast Demand for Plate (kt)

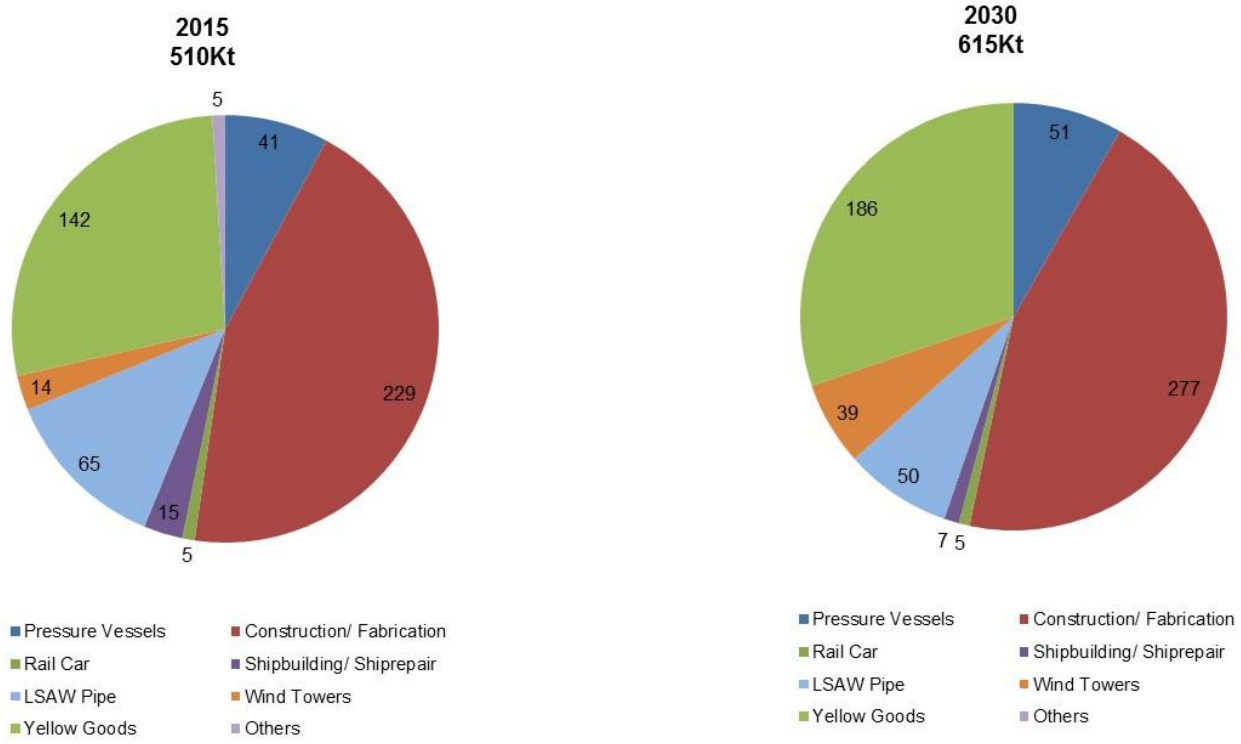


Source: Hatch

Sector Outlook

The demand outlook for plates is underpinned by the outlook characteristics of the main consuming sectors:

Exhibit 106: Sector Breakdown for Plate Demand (kt)



Source: Hatch

Pipes: Production of longitudinal-submerged arc-welded pipes will be impacted by reducing oil & gas production. But production could be supported by export demand, specifically with the strong demand for line pipes in the US. Overall, we expect some reduction in production levels of pipes from 65 kt p.a. in 2015 to 50 kt p.a.

Construction: These trends will be similar to those of medium and heavy sections. It will be shaped by changes in industrial construction, commercial (private and public) construction and infrastructure construction. A key boost to growth can be expected from infrastructure construction, but the growth may be weighed due to weak outlook for industrial construction. Overall, we expect plates in the construction sector to grow at 1.3% p.a. until 2030.

Wind Towers: A review of various position papers indicates that investment in power-generation capacity expansion is still likely to continue on a strong expansionary path from 14 GW in 2015 to 34 GW in 2030. The UK government has reaffirmed its strong policy support to continue the investments in building additional capacity – both onshore and offshore. Apart from this, two other trends could be expected to influence demand:

- Increasing capacity per tower, implying increasing weight per tower and shifts to thicker, wider and higher-strength plates.
- Increasing local fabrication of wind towers in the UK and consequently more plate consumption in the UK.

Yellow Goods: Manufacturing more linked to global trends in investments in mining, power generation and less on the changes in the UK and EU. After a continuous decline of five years in mining CAPEX, some increases in CAPEX were seen in 2016. The increase is mainly for equipment replacements, and this will be the main driver until 2020. There is an overhang of surplus equipment which could take 2–5 years to flush out. Global power generation investments (all fuels and renewables) are forecast to grow by 60% by 2030 and this will propel demand growth for yellow goods production globally and in the UK.

Opportunities

The total opportunity for the UK industry to address is the large gap on account of imports and the total organic growth in demand. In all, the opportunity size is +460 kt (+£253 million).

There are significant challenges which need to be met to address this size of opportunity, especially with the varied requirements of different sectors:

a) The gaps in technical requirements are well documented and they include limitations on grades, finishing conditions, width and thickness range. Most of the modern plate mills built in the past 10 years or so have these capabilities. These capabilities extend upstream to steel making and casting because many of the specifications demanded in the above-mentioned sectors require clean, low-sulphur steel, including casting of very thick slabs in vertical casters. Addressing these challenges will help the UK enhance its capabilities and the product mix range.

b) Control of steel making through captive or offsite sources, which is an essential part of developing capabilities.

c) Steel Procurement in Public and Infrastructure Projects: The government has introduced steel-specific procurement guidance to take account of social and environmental factors, but that the nature and duration of contracts may take some time for the full effects to be felt.

Uncertainties and Risks

The uncertainty surrounding EU exit negotiations and outcomes could worsen the demand outlook for industrial construction, which accounts for the largest share of demand. The longer such negotiations take, the more uncertainty could be induced. Some of the risks can be partially mitigated by increasing demand from infrastructure construction. Over and above this, given the nature of investments in the individual sectors like yellow goods and power generation, there are uncertainties regarding the precise timing and they are hugely influenced by government policy making.

Plates – Sector View

Capability & Capacity

A number of challenges in relation to UK capability and capacity were identified.[136]
The incumbent plate mills do not have steel-making facilities and depend on purchased slabs. The quality of slabs required for high-value plate production is also not readily available to purchase on the open market. Across the international market, almost all

[136] 12 interviewees stated this, representing 39% of the 31 interviewees where plate is a relevant product. This includes a producer, industry bodies and consumers.

producers have their own captive steel making and this is part of their competitive advantage.

Given the mix of technical requirements, there is evidence that these producers are unable to service the complete requirements of the UK market. This includes insufficient capabilities for certain pipeline grades (X52, X60, X65, X70), pressure vessel grades, ultra-high strength, wear resistance and shipbuilding. A further challenge arising out of the need to purchase slabs and the lack of availability of high-quality slabs for purchase is that it is very difficult to output new higher strength and quality products and as such there is limited ability to move up the value chain.

This lack of capability is perhaps best evidenced by the closure of Scunthorpe plate mill as its plate production route was incapable of closing the existing capability gaps. It should also be noted that these capability gaps are partly a result of mill capability (particularly in relation to mill widths) and partly are the result of continuous casting machine capability.

Alongside this capability gap there is also a lack of capabilities in finishing facilities such as thermomechanical rolling, normalising and Q&T. The result of this is that the UK products have to use more alloys to achieve the same properties, something that in turn drives a higher cost.

For example, in the construction sector, one contractor stated that their plates come from a UK producer and elsewhere in Europe, with this decision driven by capacity and availability. They stated that they used to procure from Scunthorpe, but that this site was now closed, causing serious supply issues for them. Another contractor stated that they have to go to Germany for their large, long and heavy plates as the capability is not here in the UK. One structural fabricator stated that plates are all supplied by non-UK based suppliers as this product is simply not available in the UK. They did note that a UK producer does produce them, but stated they had no established relationship with them, so instead they purchase from Ukraine, Russia and other EU countries.

In the nuclear sector, a contractor stated that they currently source their plate requirements from Belgium and France. Their plate material for containment vessels needs to be greater than 3m in width, 6–12m in length and 10cm thick. This capability is not available in the UK.

One opportunity identified by producers and consumers was around the renewable energy market, particularly the offshore wind market.[137] Currently, because it cannot provide the width of plate required, the UK provides a limited amount into the construction of offshore towers, which use about 350 tonnes per tower at 90m high and 5–6m in diameter. It is a market that is likely to increase the use of higher-quality grades as it moves towards larger towers.[138] However, there have recently been some positive moves towards improving the UK capability in this sector, with investment made in steel tower production.

For example, one producer stated that the strategy for plate will be to invest downstream and look at opportunities such as offshore wind structures. They stated that the UK does

[137] 7 interviewees stated this, representing 23% of the 31 interviewees where plate is a relevant product. This includes a producer and consumers.
[138] 5 interviewees stated this, representing 16% of the 31 interviewees where plate is a relevant product. This includes an industry body and consumers.

have the capability in plates to supply offshore contracts, but government auctions and subsequent contracts have chosen foreign suppliers who will use plate sourced from their own supply chains. Another interviewee in the renewable energy sector stated that there is a need for other suppliers who provide more varied sizes and provide price competition. The UK can only produce a plate width of 3.85m which creates restrictions for the turbines, where the bigger turbines require plates with a 4.2m width.

Throughout the stakeholder consultations it is evident that there is a stated desire to buy UK-produced plate where possible.[139] For example, one structural fabricator stated that they have a policy to buy British where possible, but decisions are dependent on the ready availability of the right size and grades of steel. A construction contractor stated that they would like to use more steel sourced from the UK; however, they would need to build stronger, long-term relationships to ensure the supplier will accommodate their orders. Another contractor stated that there is a strong desire to buy British from an emotional and business perspective. One large fabricator stated that they have preference to buy from UK producers, but capacity is not there and at one time 100% of their plates were procured from outside of the UK. One interviewee in the renewable energy sector stated that they would like to see a UK model that works. They would like to use UK suppliers to reduce transport costs and lead times.

Markets

Alongside this, a number of those interviewed noted the opportunity for government to support this investment by providing longer-term certainty (beyond 2025) about the future of wind power.[140] This was cited as something other European countries have done in order to help encourage further private sector investment. This was also stated as an issue in the nuclear industry, where clear government policy is needed to deliver new build and support the industry in exports. One nuclear industry body stated that if the government is not proactive then the industry will decline.

One renewable energy industry body stated that there needs to be more certainty around the UK's future commitment to the industry, as it is affecting investment decisions. When an organisation is looking to develop a site, the political commitment in other countries means they will choose to locate elsewhere in continental Europe. The industry also needs to have discussions about what happens beyond 2025, but they cannot do this if they do not have enough certainty of the pipeline to see what demand will look like in future.

It was noted by both consumers and other wider stakeholders in the renewable energy sector that substantial investment will be required if the UK is to truly compete with the existing European producers. Several respondents also felt there was too much focus on cost during government procurement, with opportunity to source more from British contractors who are more likely to source materials domestically compared with foreign contractors, who will likely use their own established material providers in their local markets.[141] This was reinforced by one contractor who stated that, when bidding for

[139] 11 interviewees stated this, representing 35% of the 31 interviewees where plate is a relevant product. This includes consumers and a stockholder.
[140] 6 interviewees stated this, representing 19% of the 31 interviewees where plate is a relevant product. This includes a producer, industry body and consumers.
[141] 5 interviewees stated this, representing 16% of the 31 interviewees where plate is a relevant product. This includes a producer, industry body and consumers.

renewable energy plants, foreign competition will often package with their own supply chains.

A construction contractor stated that government procurement rules need to be better policed, with more support for UK suppliers. Another contractor stated that the UK needs to keep more work 'in-house'. For example, in Italy and Germany they design their own projects, which often lead to them using their own supply chains to complete their work. The UK does not seem to want to do this. One structural fabricator in the construction industry stated that they were experiencing more requests for steel plates for domestic use.

Competitiveness

An additional challenge facing UK producers relates to customer service, with three consumers citing that producers have a poor response time and are unable to supply product at short notice.[142] It would appear that customer service issues are further compounded when the producer is dealing with smaller orders.[143] For example, one aerospace tier 1 supplier stated that it is necessary to have good relationships with suppliers when dealing with such small volumes and to overcome peaks and troughs in demand. A construction industry body stated that if an order did not meet the producer's minimum order, it may take up to 18 months to get the order processed. Another interviewee in the renewable energy sector stated that their projects have a relatively small impact on the UK steel market, and due to this small footprint, they find it difficult to get volume-driven discounts from UK producers.

It is a challenge that consumers believe could be partly met through better preparation and management but also through more collaboration and more integration between producers and stockholders. Although one respondent did note that unless the UK market could introduce a game-changing improvement, there would be little benefit in changing the current process.

One plate producer stated that there is opportunity to provide more education around what can be done with plate, as customers generally do not know. They also stated that there is opportunity to provide more directly to customers. At present their customer breakdown is approximately two-thirds stockholder and a third direct. Stockholders can make £40–50 a tonne even when they are just cutting and selling.

There is a desire for producers to engage more with their consumers.[144] One construction stockholder stated that they would like to get closer to steel producers. A construction industry body stated that there is a need for more collaboration, and a more effective stock and distribution service from producers. One construction stockholder stated that producers should work closer with their consumers. In particular, they should work with design engineers so they get a better idea of what the construction industry looks like. They provided an example of where they work closely with a large contractor, invite them to their facilities and work with their design team to give them a better idea of

[142] 6 interviewees stated this, representing 19% of the 31 interviewees where plate is a relevant product. This includes an industry body and consumers.
[143] 3 interviewees stated this, representing 10% of the 31 interviewees where plate is a relevant product. This includes a construction industry body, an aerospace tier 1 and a company in the renewable energy industry.
[144] 5 interviewees stated this, representing 16% of the 31 interviewees where plate is a relevant product. This includes a construction industry body, stockholders and contractors.

the supply chain. One contractor felt that the UK needs a more industry-facing approach, like Germany, to better promote the steel industry. A large contractor stated that one UK-based mill has always been very good in terms of customer service; however, they have noticed a shift in the past 12 months.

Contradicting those respondents that felt more could be done with customer service, an interviewee in the renewable energy sector did praise one UK producer of plate as being much more engaged in the market compared with other producers.

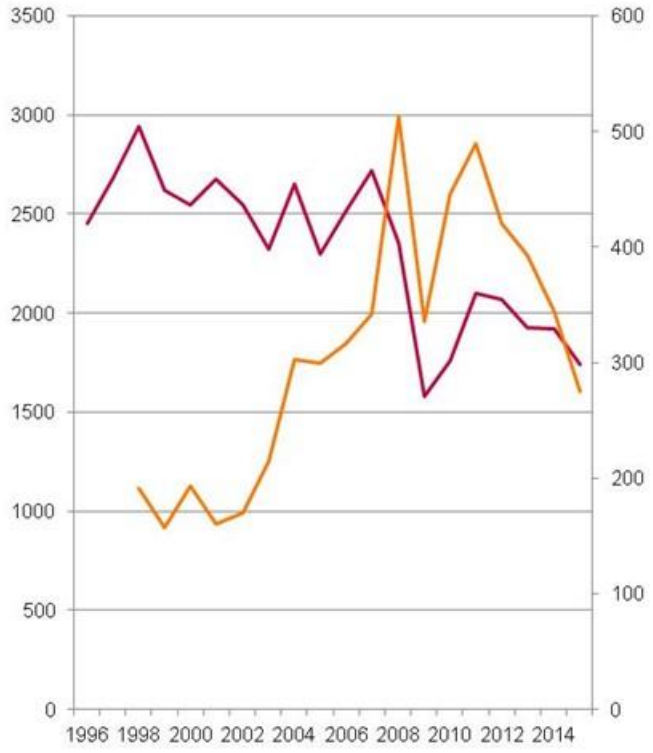
Supply Chains

To overcome the fragmentation in the supply chain, one large fabricator stated that they are implementing an enterprise resource planning system to help them better engage with steel producers electronically, which would help speed up some of the process and remove some of the complexity of the fragmented supply chain.

k.) Hot Rolled Coils

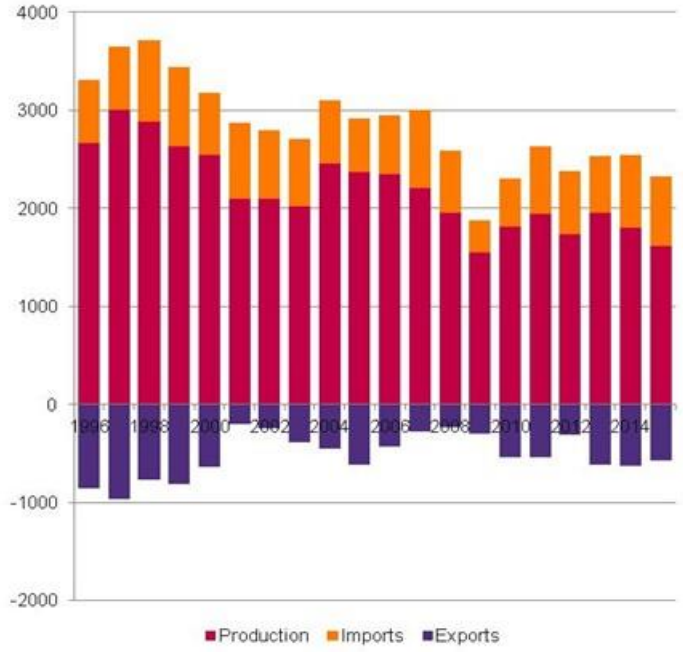
Hot Rolled Coils – Historical Demand

Exhibit 107: Hot Rolled Coils Demand in UK (kt) and Prices (£/t)



Source: ISSB, Platts, Hatch

Exhibit 108: Hot Rolled Coils Supply in UK (kt)



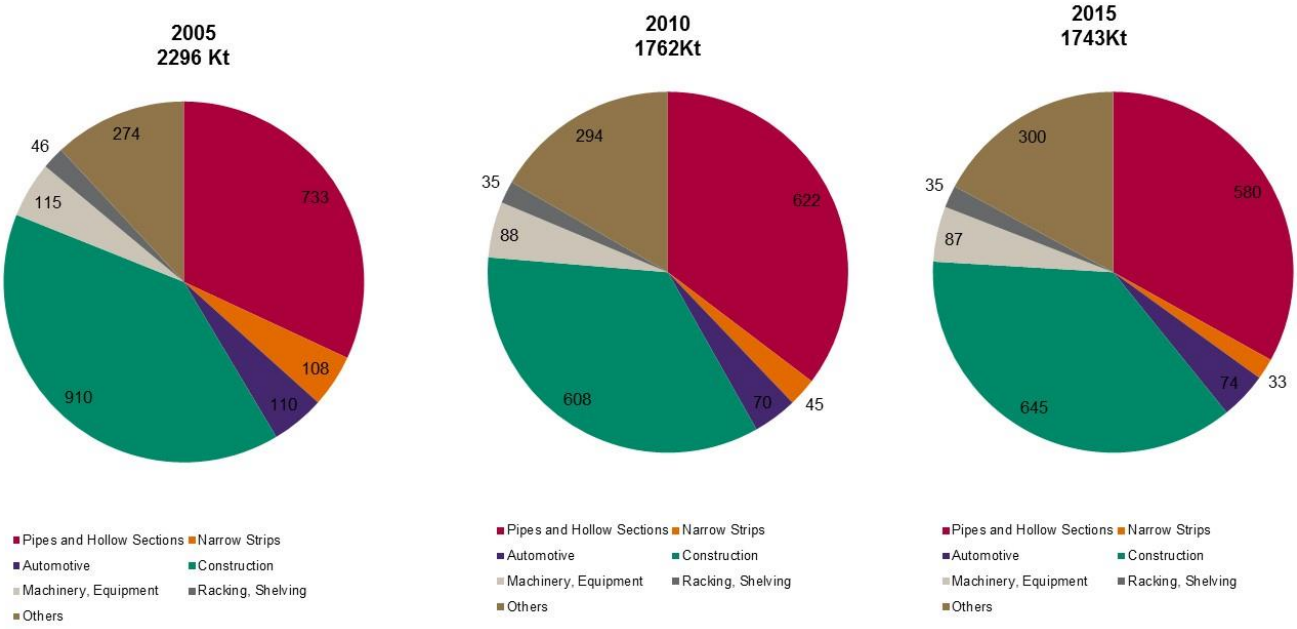
Hot rolled coil is the largest finished steel product by volume in any flat products market globally. Although a large part of hot rolled coil is viewed as commodity product, there are numerous value-adding options on grades, widths and finishing. These value-added options, when considered alongside commodity products, provide an interesting product mix from a capability standpoint. In most large integrated flat products facility, it is hot rolled coil volumes which 'make or break' the economics of the plant.

Relative to other finished steel products, demand and supply of hot rolled coils has not seen sharp changes and volatility. In the past five years, demand has been stable at around 1.8–2 Mt. A large part of the demand stability is due to shift in demand from cold rolled steel to hot rolled, specifically for applications which do not have critical requirements for surfaces and flatness.

Hot rolled coil is produced by two producers in the UK – Tata Steel in Port Talbot and Liberty. Tata Steel's hot rolled coil mill in Llanwern is currently not operational.

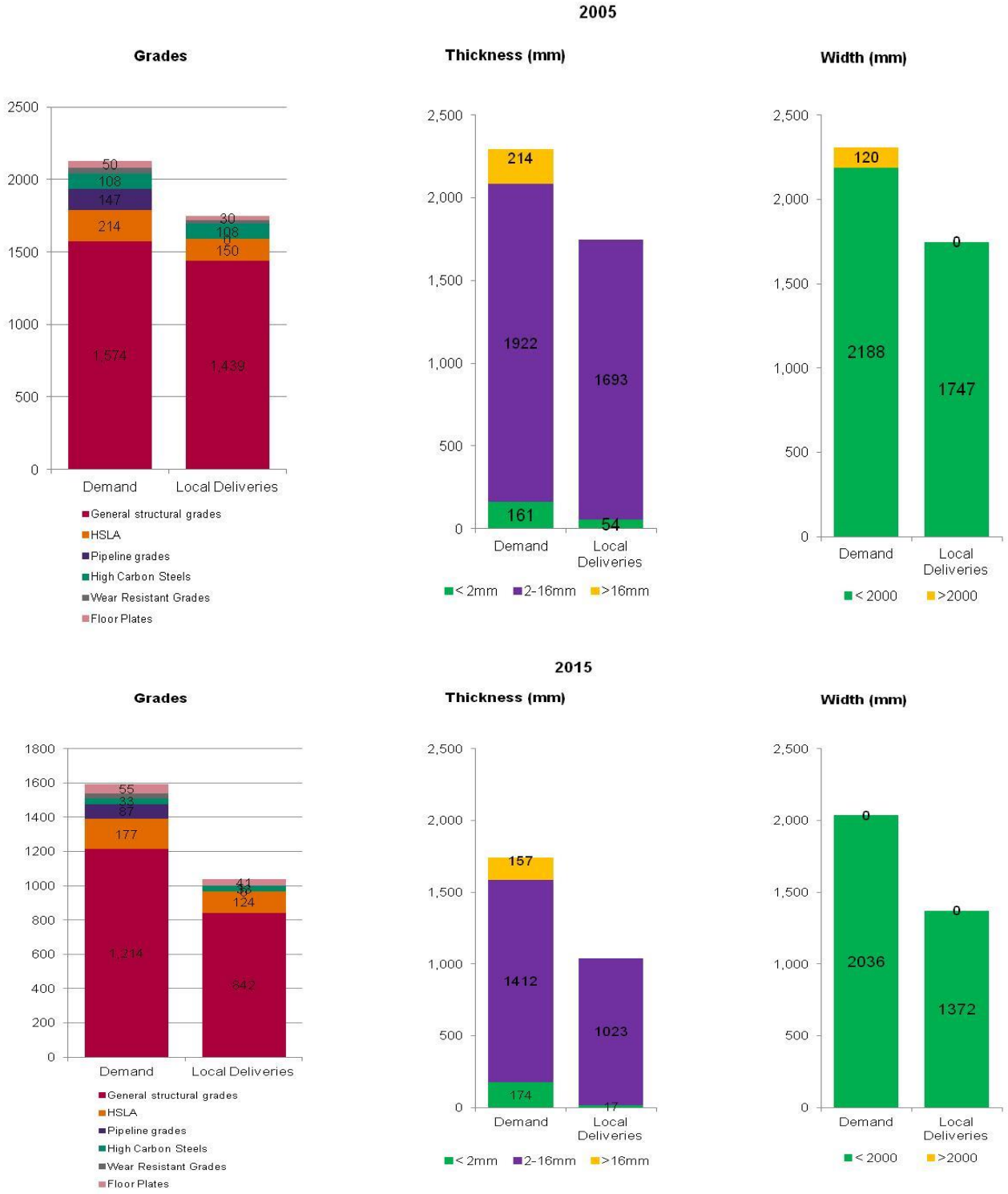
Local deliveries account for about 65–70% of the demand. Most of the imports are from the EU, Russia, China and Turkey. Exports constitute a third of the UK's production and they are primarily destined for the EU and US.

Exhibit 109: Hot Rolled Coils Demand Sector Breakdown in UK (kt)



Source: Hatch

Exhibit 110: HRC Demand Breakdown vs. Local Deliveries (kt) – 2015



Source: Hatch

From the above exhibits, the main highlights of technical capabilities in hot rolled coil demand are:

- Shifts to higher share of thinner gauge <2.0mm from 6% in 2005 to 10% of demand in 2015.

- There are some capability gaps on production of coils >16mm thickness.
- UK production appears to have reduced supplies in thickness less than 2mm in particular, leaving uncaptured value in thickness less than 1.8mm.
- In pipeline grades, there are pockets of capability gaps such as X70 or grades for applications in low-temperature environments.
- Supply of non-commodity grades by UK producers is consistently at 10%. Despite the pressure of the industry to move up the value chain, UK producers have not been very successful in increasing this share.

Capability Summary

		Reasons	
Attributes	**Gaps**	**Commercial**	**Technical**
Grades	Pipeline Grades		• Pipeline grades up to X65 can be produced at Port Talbot. However, grades X70 and all grades for applications in low-temperature environments (e.g. North Sea) have been challenging for Tata Steel in the past
	Wear Resistant Grades		• Some wear-resistant grades were produced in the past but appear to have been discontinued by Port Talbot
	Automotive Grades		• HS grades for chassis imported from Tat Steel IJmuiden. These grades are evolving to AHS grades • Port Talbot has developed and trialled HS for wheel rims. There are opportunities to stabilise and expand production

In hot rolled coil there are numerous uncaptured value opportunities for the UK that appear to be smaller in volumes compared with the commodity grades. But these opportunities for value-add must be pursued to secure higher value and volumes, given that there is still some room for UK producers to increase market share.

Hot Rolled Coils – Demand Forecast

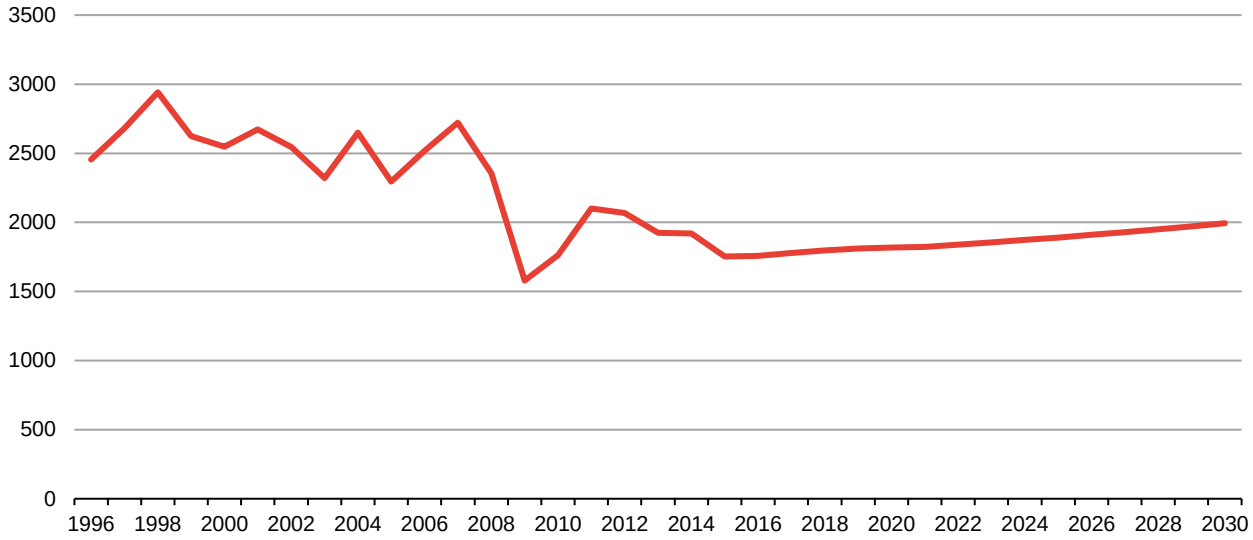
Demand Outlook

Hot rolled coil demand is forecast to grow from to 1,993 kt from 1,754 kt between 2015 and 2030 at a rate of 0.9% p.a. The total increase in the demand during the forecast

period is +239 kt (+14%). The overall changes in technical requirements for hot rolled coils are likely to be:

- Pipeline grades: Increase in use of X80 grades.
- Shifts in general structural grades to high-strength normalised grades in hollow sections.
- Increasing use of thinner-gauge hot rolled coil tending towards 1.3–1.5mm

Exhibit 111: Forecast Demand for HRC (kt) (values changed in the chart)



Source: Hatch

Sector Outlook

The following sector outlook will underpin the demand outlook for hot rolled coils.

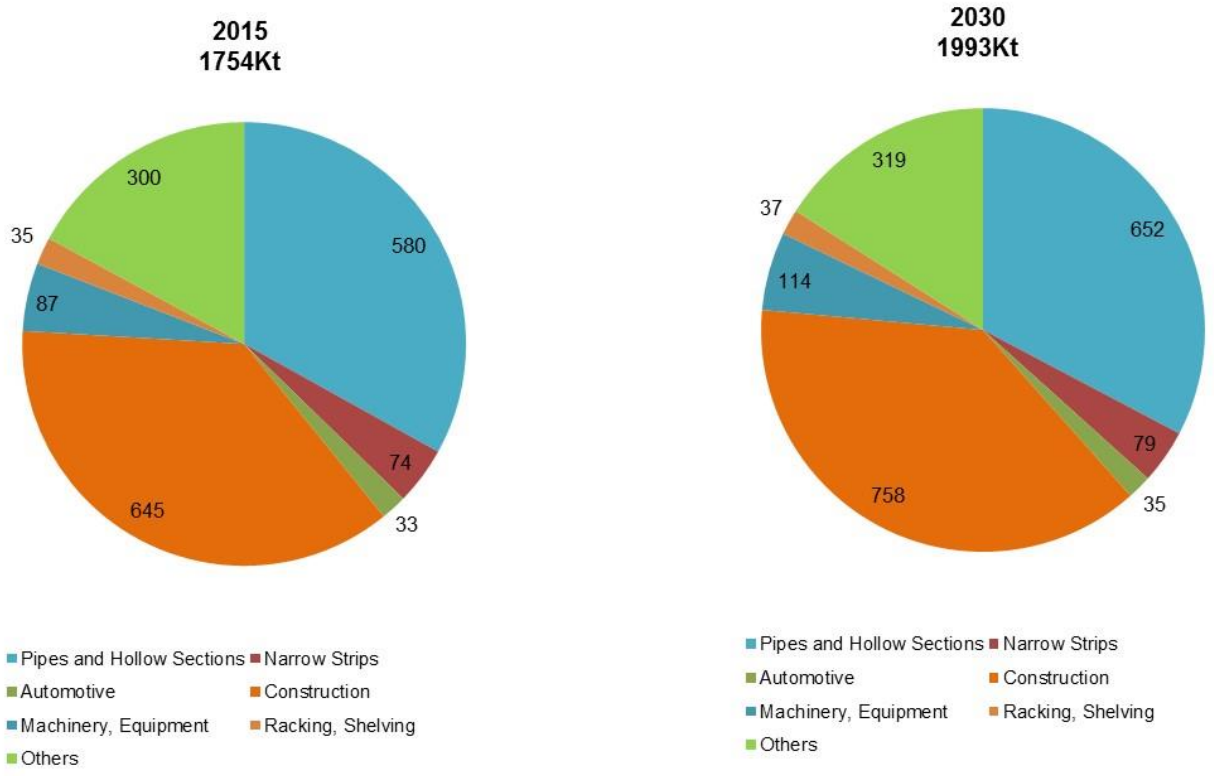
Construction: Within construction, subsectors such as industrial and commercial (private and public) construction will drive and shape the demand. Put together, the growth in these subsectors is expected to grow at 1.2 % p.a. until 2030.

- Industrial construction: Growth is likely to be weak for the next 3–5 years due to the uncertainty from the EU exit negotiations. In all likelihood, the next few years may not be able to arrest the trends that have held back large-scale industrial construction, such as financing off the balance sheet as opposed to borrowing to support large investments. Growth could start accelerating from 2022 onwards as the effect of the broader and inclusive industrial strategy starts to deliver results.
- Commercial construction: Retail will continue to be slow and anaemic because of weak consumer spending and changes in consumer shopping behaviour. Some commercial construction could be spurred when the government's industrial strategy starts to deliver results.
- Public non-housing commercial: The major sectors for construction spend – school and health – are unlikely to be supported by increases in spending from the budget. There is some improvement in spending on university-related construction in the period

2015–2017, but it is unclear whether this represents a sustainable increase over the long term.

- Automotive: According to SMMT, vehicle production in the UK is forecast to grow to 2.13 million units by 2030 from 1.75 million in 2015. The EU has set a binding target to reduce greenhouse gas emissions by 40% from its 1990 levels by the year 2030. The EU has not finalised the CO_2 emissions target for passenger vehicles and commercial vehicles; however, the indications of the range of emissions targets under discussion suggest that it is likely to tend towards 42–55 CO_2 g/km. Compared with the current levels of 123 g/km in 2013, this represents a very steep reduction of 61%. This implies that vehicle mass reduction is a critical component to achieve the emissions target among other options, such as increasing power train efficiency and rolling resistance. There are no anticipated changes in steel intensity per vehicle up to 2020 as some of the changes to vehicle mass are already being addressed by OEMs. This is also consistent with the development cycle of 5–7 years for each model and interview responses from OEMs. Any anticipated changes in steel requirements from a demand forecasting standpoint will be effective beyond 2020. A review of position papers by UK Advanced Propulsion Centre and WorldAutoSteel suggests that vehicle masses may need to be reduced by a further 17% by 2030 to align with targeted CO_2 emissions. This implies a shift to higher-strength grades, particularly to HS and AHS grade, reduction in demand volumes, but a shift to higher values. In addition, the local content in vehicle production is not expected to increase significantly from the current 40% as there is little evidence to support a big change in supply chains reshoring back to the UK.
- Pipe and hollow sections: The bulk of the change in hot rolled coil demand for pipes will be shaped by changes in construction spend. A key development could be much more accelerated shifts to higher-strength grades up to S700 in hollow section when the anticipated changes in Eurocode norms are likely to occur.
- Machinery sector presents a weak outlook at least until 2022, as the weak trends seen pre-EU exit continue. This sector is heavily dependent on exports to the EU and as such it is much more vulnerable to the outcome of EU exit negotiations.

Exhibit 112: Sector Breakdown for HRC Demand (kt)



Source: Hatch

Opportunities

The total opportunity for the UK industry to address is the total organic growth in demand and the share of imports. In all, the opportunity size is +953 t (+£440 million).

There are no capacity constraints in relation to the size of the opportunity. There are barriers and challenges that need to be addressed regarding the size of the opportunity, especially with the varied requirements of different sectors:

- Improving cost competitiveness of steel production. Business rates are one of the many factors relating to this.
- Enhancing product mix to include higher-strength grades up to S700, wear-resistant grades and pipeline grades up to X70 and low-temperature use grades.
- Automotive grades: This is a huge strategic area that needs investments in modifications and capability enhancements, which cascade from steel making, secondary metallurgy, hot rolling, cold rolling and coating.
- Investments in product development and innovation.
- Steel Procurement in Public and Infrastructure Projects: The government has introduced steel-specific procurement guidance to take account of social and environmental factors, but that the nature and duration of contracts may take some time for the full effects to be felt.

Uncertainties and Risks

The uncertainties on industrial and commercial construction and automotive production on account of the EU exit negotiation weigh down the outlook of hot rolled coils.

Hot Rolled Coils – Sector View

Capability & Capacity

There are a number of capability gaps that are significantly impacting on the UK ability to respond to market opportunities.[145] For example, there is uncaptured value in construction for thickness <1.8mm, and in pipeline grades the UK is unable to produce X70 grades and all grades for applications in low-temperature environments, as well as wear-resistant grades and high-strength and advanced high-strength automotive grades. This is a result of limited mill-rolling and slab-casting capability for a consistent sustainable market offering.

One large OEM stated that most of the steel they use in the UK is provided by the UK with the exception of certain grades which come from Belgium or Holland.

One large OEM did state that they experience capacity constraints with UK suppliers so they have to also purchase from European steel producers. The UK's inability to meet all the needs of the automotive industry was highlighted by an industry body who stated that approximately 41% of automotive components can be provided by the UK. In the construction industry, one interviewee also stated that there are certain grades and sizes that they have to source from abroad.

Supply Chains

This capability gap also points to the need to find and engage with more downstream users and the different supply chains that exist around these[146] – this was seen by one producer as particularly important because ultimately hot rolled coils is a commodity that is turned into other products. It is for this reason that producers and consumers saw local deliveries accounting for such a high proportion of the market share, or put another way, because it is a low-value raw material it is less likely to be transported significant distances; a point that underlines the critical importance of production costs in the UK's competitiveness in relation to hot rolled coils.

In light of this, if the UK is to maximise its opportunities with hot rolled coils, it needs to engage more broadly and deeply with the supply chain across different downstream opportunities.[147] This is not easy because – as noted by many producers and consumers – supply chains within the UK are highly fragmented[148] and for many of the OEMs,

[145] 10 interviewees stated this, representing 53% of the 19 interviewees where hot rolled coils is a relevant product. This includes a producer, two industry bodies, 5 OEMs and other consumers.
[146] 4 interviewees stated this, representing 21% of the 19 interviewees where hot rolled coils are a relevant product. This includes a producer and three OEMs.
[147] 4 interviewees stated this, representing 21% of the 19 interviewees where hot rolled coils are a relevant product. This includes a producer and three OEMs.
[148] 3 interviewees stated this, representing 16% of the 19 interviewees where hot rolled coils are a relevant product. This includes three OEMs.

procurement decisions are made on a global and European-wide basis (something that was very apparent through the automotive OEMs consulted as part of this study).[149]

This in particular was seen as a challenge specific to the supply of product into the automotive sector, with OEMs increasingly making international decisions about the nature and shape of the supply chain. One large OEM stated that steel is procured on a European basis, where steel producers will then supply from their most appropriate facility.

Several interviewees in the construction sector also expressed a need for more engagement with producers.[150] One construction stockholder stated that they currently have limited contact with steel producers but expressed a desire to get closer.

Competitiveness

Several interviewees felt that there was little innovation and development of new products occurring.[151] One large OEM stated that the steel industry is old and well established and continues to do what it has always done with little innovation, while another large OEM stated that producers do not tend to adapt to the changing needs of consumers. Another automotive interviewee stated that UK producers are not as progressive as they were 10–15 years ago in developing new products.

A number of interviewees also raised issues around customer service. Several stated that there is a lack of willingness of mills to deal with small orders.[152] One tier 1 automotive supplier raised customer service issues with a large UK producer in terms of damaged/poor quality products being provided and also missing deadlines, despite being provided with long lead times. A construction contractor stated that UK suppliers have a poor response speed and are unable to supply the product at short notice. Another construction contractor stated that a UK producer has typically always been good at customer service, but that they have noticed a shift from this in the past 12 months and there is room for improvement.

A number of interviewees expressed preference to buy British where possible[153] with one construction stockholder stating that lead times were better than having to import.

A small number of respondents raised competitiveness as an issue for UK producers with the perception that energy costs in particular impacting UK producer competitiveness.[154] One construction contractor stated that the UK steel industry could compete with Europe if support was provided to reduce business rates and energy costs.

[149] A construction industry body and stockholder stated this.
[150] A construction industry body and stockholder stated this.
[151] 3 interviewees stated this, representing 16% of the 19 interviewees where hot rolled coils are a relevant product. This includes two large OEMs and a tier 1 supplier.
[152] 3 interviewees stated this, representing 16% of the 19 interviewees where hot rolled coils are a relevant product. This includes an industry body, a tier 1 supplier and an OEM.
[153] 4 interviewees stated this, representing 21% of the 19 interviewees where hot rolled coils are a relevant product. This includes an automotive tier 1 supplier and several construction contractors.
[154] 7 interviewees stated this, representing 37% of the 19 interviewees where hot rolled coils are a relevant product. This includes an industry body, and several OEMs.

Markets

The challenge arising from this lack of capability is exacerbated by a range of other market factors. This includes increased demand in certain sectors – like oil & gas and automotive – for higher-strength grades or higher levels of performance. For example, when many of the car manufacturers moved away from galvanneal to galvanised products, it left small uneconomical volumes of galvanneal at different production plants with the result that rational commercial decisions were made to consolidate production in a single European facility. It also includes reduced levels of investment by producers as earnings have reduced.

Emissions targets in the automotive sector have seen a push for lightweighting and higher-strength steels, but also the threat from aluminium and composites that could substitute use of steel.[155] For example, an automotive industry body stated that CO_2 emissions are a challenge. This leads to lightweight vehicles and decreased size of power trains, as well as seeing a switch to other materials, e.g. aluminium, alloys, plastics. A large OEM stated that the changes in one OEM's steel usage will depend largely on requirements for weight reductions in their vehicles, with usage of high-strength steels likely to increase. One large OEM stated that CO_2 emissions continue to drive the need for efficiency in power train, but also to reduce weight in the vehicle. Material choice is based on the need to balance weight reduction and the price the market will pay for mainstream products.

One producer felt that the competition between aluminium and steel is partially about steel getting its voice heard. They believed that the extent of the issue is also dependent on the size of the vehicle, with the possibility of substitution to aluminium in larger vehicles, and steel likely to remain the primary material for smaller vehicles.

Another producer stated that aluminium and composite materials have been given a lot of attention as a means of lowering CO_2 emissions. However, with the drive towards zero-emission vehicles, the push towards aluminium and composites should reduce as steel has a cost and strength advantage.

Several interviewees did feel there was likely to always be a place for steel. Another large OEM stated that they have already moved to lighter-weight steels and have looked at plastics, but there is a perception with consumers that this is flimsy, so they stopped this. Another OEM stated that they have used aluminium to overcome CO_2 emissions targets through weight reduction, but the introduction of electrification may reduce the requirement for aluminium going forward. One automotive tier 1 supplier stated that they had tried plastics with the aim of reducing weight, but always ended up going back to steel. Another OEM stated that aluminium has many advantages, but steel is strong which has benefits in terms of public liability for vehicles of public use.

One stockholder did contradict this trend by stating that there is a misconception that automotive OEMs use only high-strength steels, as they use a lot of commodity products as well.

One interviewee did express concern over the UK's ability to compete in these higher grade steels. A tier 1 supplier stated that steel is going to become more high strength but the thickness will decrease to get weights down. They stated that one of the

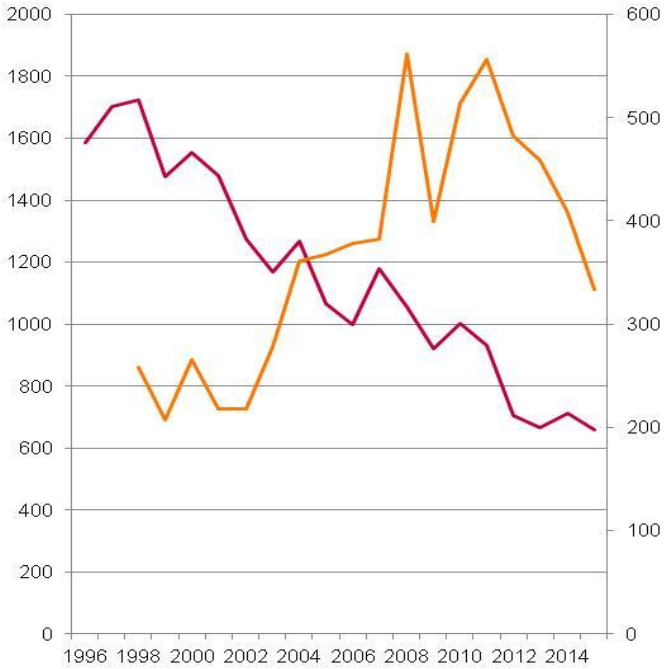
[155] 7 interviewees stated this, representing 37% of the 19 interviewees where hot rolled coils are a relevant product. This includes an industry body, and several OEMs.

UK-based producers is miles behind development in these grades compared with other European competitors. They will struggle to catch up.

l.) Cold Rolled Coils

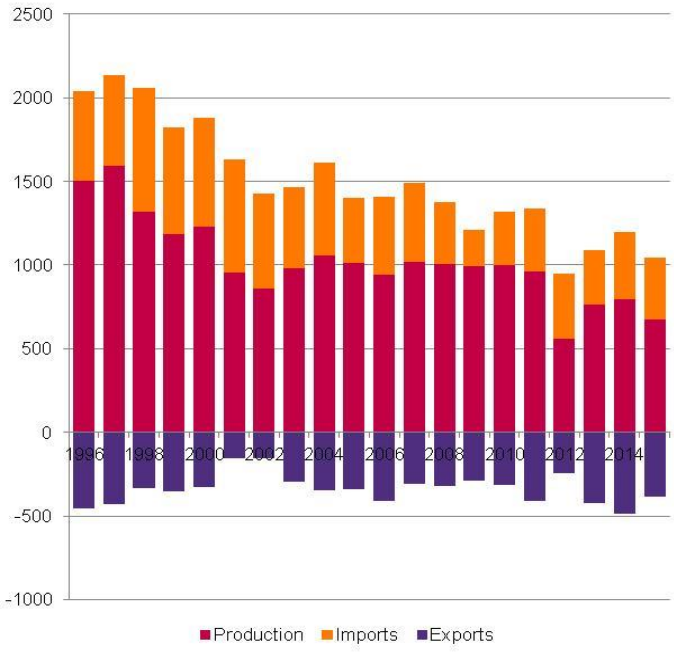
Cold Rolled Coils – Historical Demand

Exhibit 113: CRC Demand in UK (kt) and Prices (£/t)



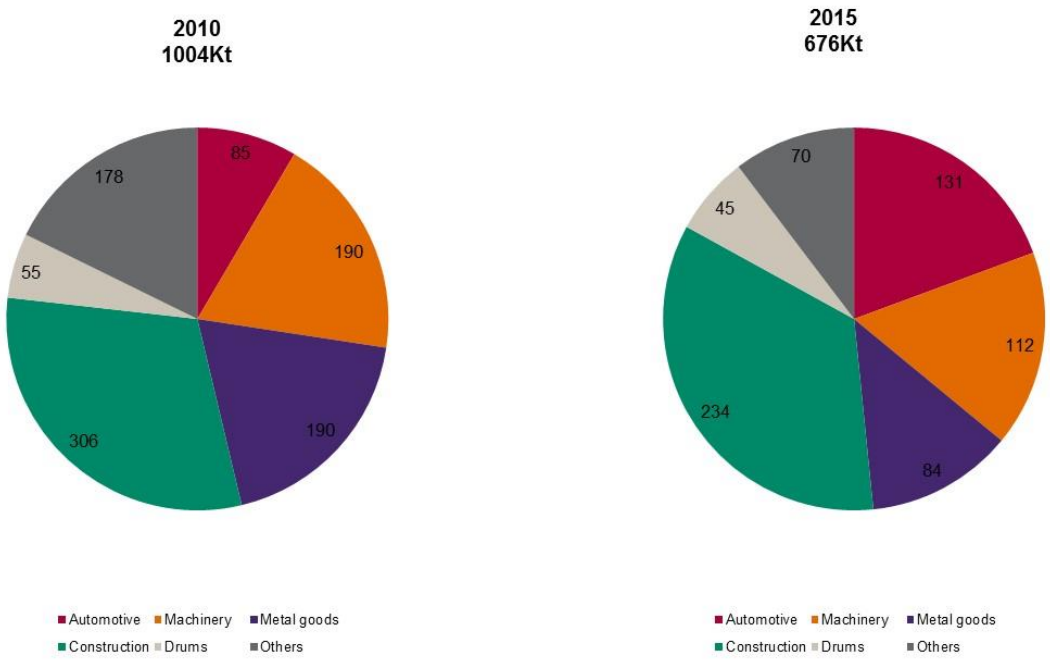
Source: ISSB, Platts, Hatch

Exhibit 114: CRC Supply in UK (kt)



Source: ISSB, Hatch

Exhibit 115: CRC Demand Breakdown in UK (kt)



Source: Hatch

Cold rolled coils are rolled from hot rolled coils. The rolling is done to reduce thickness, usually below 2mm, which normally cannot be achieved in a hot-rolling mill. This improves the physical properties of the steel, such as tolerances, flatness and surface characteristics. Cold rolled is consumed as a disparate product and also as a feedstock for downstream coated products, such as hot dipped galvanised, tinplate, electrogalvanised, organic coated sheets.

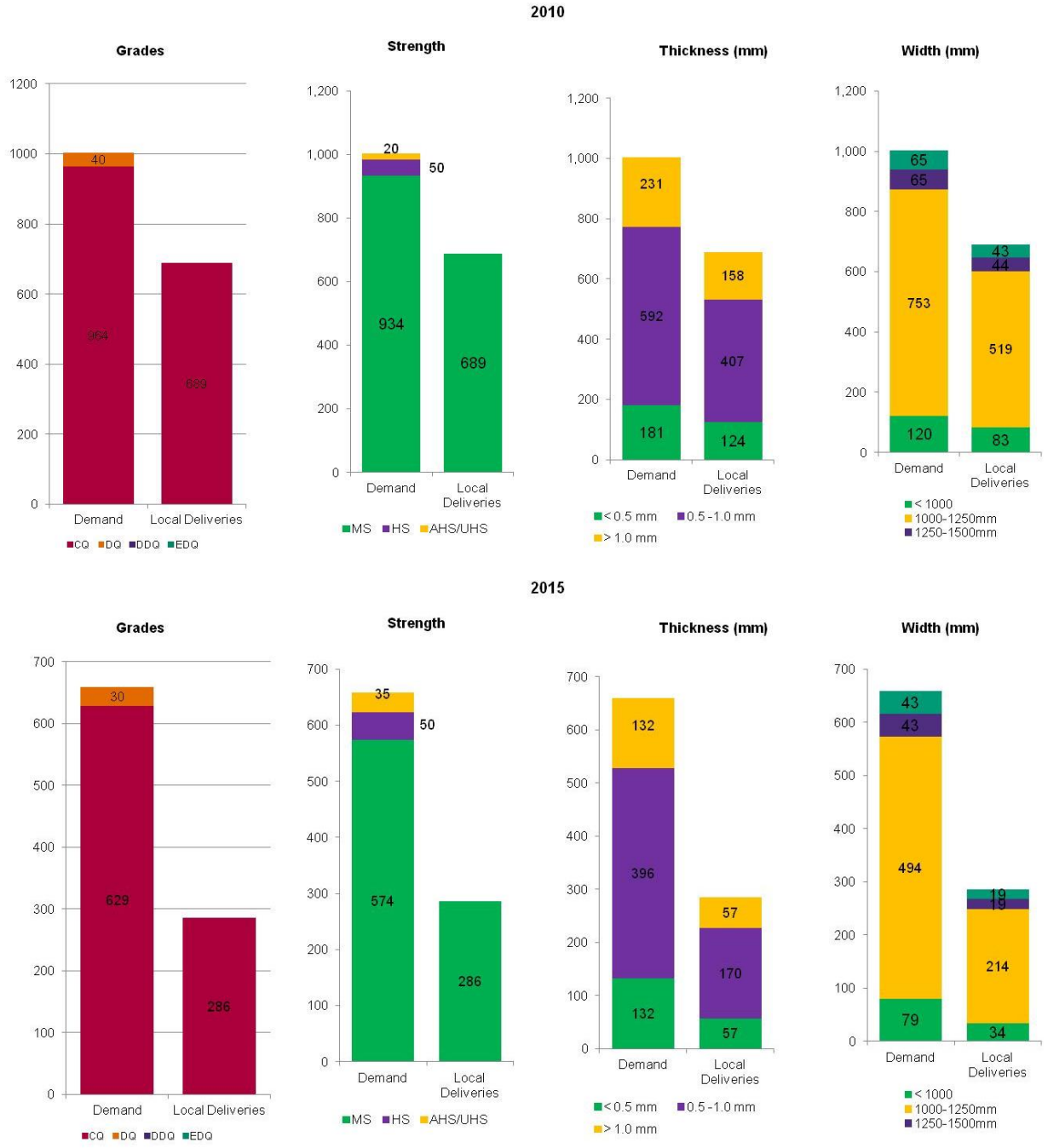
In most developed economies, cold rolled coil demand has witnessed a long-term decline due to migration to coated products or thin-gauge hot rolled coils. Improvements in technology and processes now allow thin-gauge hot rolled to substitute cold rolled in applications where the physical properties are not critical, such as in furniture, metal goods and construction.

In UK, the direction of demand reflects the trends in developed economies and contraction of the metal goods and machinery sectors. As a consequence, construction and automotive are now among the largest consuming sectors, driven by the increase in construction spend and the growth in auto production in the past five years. In the automotive sector, there is potential to increase demand if local content in auto production can be increased from the current levels of about 40%.

Cold rolled coil is produced at Tata Steel's Port Talbot facility. The other cold-rolling facility at Llanwern is currently not operational.

Local deliveries account for about 50% of demand. The imports of cold rolled coils are primarily from Russia, China, Germany and Tata IJmuiden.

Exhibit 116: CRC Demand Breakdown vs. Local Deliveries (kt)



Source: Hatch

Over the past decade, the main highlights of technical capabilities in cold rolled coil demand are:

- Gradual shifts to a higher share of thinner gauge <0.5mm from 18% in 2010 to 20% of demand in 2015. The UK's production in this thickness range has reduced by 50%.
- Increasing share of HS and AHS steels from 8% of demand to 13% of demand. The UK does not produce any of these value-added grades which are consumed in the automotive sector.

Capability Summary

Attributes	Gaps	Reasons	
		Commercial	Technical
Grades	High Strength Grades for Automotive Sector		Over the past decade the main highlights of technical capabilities in CRC demand are: • Gradual shifts to higher share of thinner gauge <0.5mm from 18% in 2010 to 20% of demand in 2015. The UK's production in this thickness range has reduced by 50% • Increasing share of HS and AHS steels from 8% of demand to 13% of demand. The UK does not produce any of these value-added grades which are consumed in the automotive sector

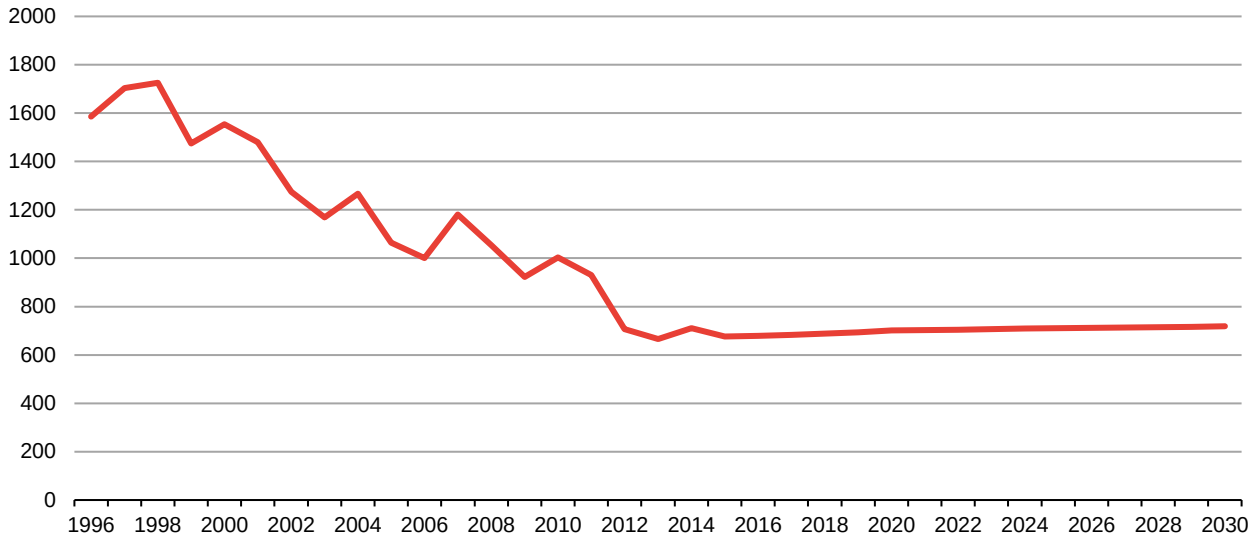
Cold Rolled Coils – Demand Forecast

Demand Outlook

Cold rolled coil demand is forecast to grow at a modest 0.4% p.a. to 719 kt from 676 kt between 2015 and 2030. The overall changes in technical specifications will be:

- Construction applications: Downgauging and shifts to lower thickness and substitution by thin-gauge hot rolled coils.
- Automotive applications: Perceptible, sharp increase in AHS and UHS will be required to meet the 2030 emissions target.

Exhibit 117: Forecast Demand for CRC (kt)



Source: Hatch

Sector Outlook

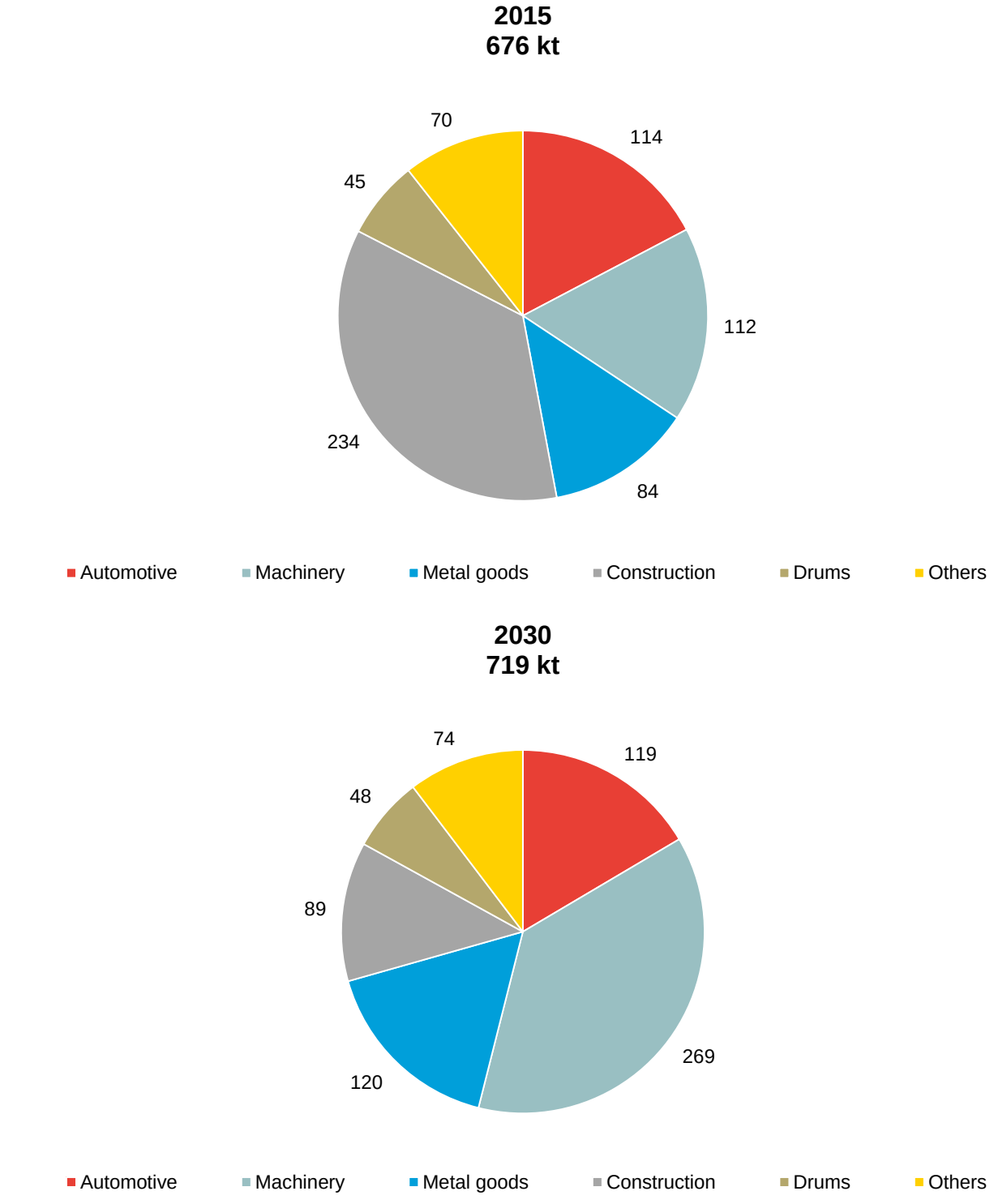
The following sector outlook will drive and shape the outlook for cold rolled coil demand:

- Construction spend across all subsectors is expected to grow at 1.3% p.a. Much of the modest outlook on construction is due to industrial and commercial subsectors, due to its dependency on macroeconomic and business climates which are not expected to be strong until at least 2022. The support for construction growth comes mainly from the fiscal support provided for infrastructure construction due to the government's decision to increase capital spending and support the economy.

- Automotive: According to SMMT, vehicle production in the UK is forecast to grow to 2.13 million units by 2030 from 1.75 million in 2015. The EU has set a binding target to reduce greenhouse gas emissions by 40% from its 1990 levels by the year 2030. The EU has not finalised the CO_2 emissions target for passenger vehicles and commercial vehicles. However, the indications of the range of emissions targets under discussion suggest that it is likely to tend towards 42–55 CO_2 g/km. Compared with the current levels of 123 g/km in 2013, this represents a very steep reduction of 61%. This implies that vehicle mass reduction is a critical component to achieving the emissions target, among other options such as increasing power train efficiency and rolling resistance. There are no anticipated changes in steel intensity per vehicle up to 2020, as some of the changes to vehicle mass are already being addressed by OEMs. This is also consistent with the development cycle of 5–7 years for each model and interview responses from OEMs. Any anticipated changes in steel requirements from a demand forecasting standpoint will be effective beyond 2020. A review of position papers by the UK Advanced Propulsion Centre and WorldAutoSteel suggests that vehicle masses may need to be reduced by a further 17% by 2030 to align it with targeted CO_2 emissions. This implies a shift to higher-strength grades particularly to HS and AHS grade, reduction in demand volumes, but a shift to higher values. In addition, the local content in vehicle production is not expected to increase significantly from the current 40% as there is little evidence to support a big change in supply chains reshoring back to the UK.

- The machinery sector presents a weak outlook until at least 2022, as the weak trends seen pre-EU exit continue. This sector is heavily dependent on exports to the EU and as such it is much more vulnerable to the outcome of EU exit negotiations.

Exhibit 118: Sector Breakdown for CRC Demand (kt)



Source: Hatch

Opportunities

The total opportunity for the UK industry to address is the total organic growth in demand and the share of imports, which is currently 50% of demand. In all, the opportunity size is +433 kt (+£223 million). There are no capacity constraints in relation to the size of the opportunity. There are barriers and challenges that need to be addressed regarding the size of the opportunity, especially with the varied requirements of different sectors.

- Improving cost competitiveness of steel production. Business rates are one of the many factors relating to this.
- Automotive grades: This is huge strategic area that needs investments in modifications and capability enhancements, which cascade from steel making, secondary metallurgy, hot rolling, cold rolling and coating.

Uncertainties and Risks

The uncertainties on industrial and commercial construction and automotive production on account of the EU exit negotiation weigh down the outlook of cold rolled coil.

Cold Rolled Coils – Sector View

Capability & Capacity

The capability of the UK in relation to cold rolled coil is one of its biggest limiting factors, particularly in relation to automotive grades which have seen rising imports from Europe.[156] One large OEM stated that most of the steel they use in the UK is provided by the UK, with the exception of certain grades which come from Belgium or Holland. Another large OEM did state that there are sometimes capacity constraints in the UK, so they have to also purchase from European steel producers. The UK's inability to meet all the needs of the automotive industry was highlighted by an industry body who stated that approximately 41% of automotive components can be provided by the UK.

Competitiveness

The view of many consumers was that UK producers have struggled to invest in research and development both as a result of increasing cost pressures but also because investment in the plant has been decided by an international parent company with a choice of European plants to invest in that can produce higher value grades. This is seen through both the relative share of capital investment between the UK and European plants and through the commercialising of new research and development activity at the European plant. While these are rational business decisions based on the optimisation of the individual business, the result is that the UK has not been able to offer to market new grades quick enough to meet customer demand. For example, one large OEM stated that the steel industry is old and well established and continues to do what it has always done with little innovation. Another large OEM stated that producers do not tend to adapt to the changing needs of consumers.

A number of consumers, including OEMs and throughout the supply chain, noted the need for continual innovation,[157] although some did question whether the UK would now be able

[156] 4 interviewees stated this, representing 36% of the 11 interviewees where cold rolled coils are a relevant product. This includes an industry body and three OEMs.
[157] 6 interviewees stated this, representing 55% of the 11 interviewees where cold rolled coils are a relevant product. This includes a producer.

to catch the competition. Alongside this, productivity data would indicate that a step change requiring significant investment is needed. However, one consumer in the construction section did point to the value of effective research and development activity, noting that as a developer they had invested in building two prototypes using a cold rolled light-gauge steel. Although their consumption is currently low, if successful, the developer expected to see steel content in buildings increase 10-fold.

Production costs are a huge vulnerability, with energy costs and business rates two areas where UK producers struggle to compete with Europe. There are also gaps with European producers around liquid steel costs, despite one producer having dropped their costs over the past 4–5 years.

This further underlines the challenge noted above in relation to a lack of capability, as it means that the UK is simply unable to compete. Alongside capabilities, a number of the OEMs also noted the higher price of UK steel – which they saw as being driven by higher energy[158] and logistics costs.[159] One large OEM stated that road transport is not a viable option going forward because of its prohibitive cost.

Several issues were raised regarding customer service. In particular, several interviewees stated that there is a lack of willingness of mills to deal with small orders.[160] One tier 1 automotive supplier raised customer service issues with a large UK producer in terms of damaged/poor quality products being provided and also missing deadlines, despite being provided long lead times.

Supply Chains

One of the particular challenges specific to the supply of product into the automotive sectors is that increasingly the OEMs are making international decisions about the nature and shape of the supply chain.[161] One large OEM stated that steel is procured on a European basis, where steel producers will then supply from their most appropriate facility.

Markets

Emissions targets in the automotive sector have seen a push for lightweighting and higher-strength steels, but also a threat from aluminium and composites that could substitute use of steel.[162] For example, an automotive industry body stated that CO_2 emissions are a challenge. This leads to lightweight vehicles and decreased size of power trains, as well as seeing a switch to other materials, e.g. aluminium, alloys, plastics. A large OEM stated that the changes in one OEM's steel usage will depend largely on requirements for weight reductions in their vehicles, with usage of high-strength steels likely to increase. One large OEM stated that CO_2 emissions continue to drive the need for efficiency in power train, but also to reduce weight in the vehicle. Material choice is based

[158] 6 interviewees stated this, representing 55% of the 11 interviewees where cold rolled coils are a relevant product. This includes a producer.
[159] 2 interviewees stated this, representing 18% of the 11 interviewees where cold rolled coils are a relevant product. This includes 2 OEMs.
[160] 4 interviewees stated this, representing 36% of the 11 interviewees where cold rolled coils are a relevant product. This includes 4 OEMs.
[161] 4 interviewees stated this, representing 36% of the 11 interviewees where cold rolled coils are a relevant product. This includes 4 OEMs.
[162] 7 interviewees stated this, representing 37% of the 19 interviewees where hot rolled coils are a relevant product. This includes an industry body, and automotive OEMs.

on the need to balance weight reduction and the price the market will pay for mainstream products.

Several interviewees did feel there was always likely to be a place for steel. Another large OEM stated that they have already moved to lighter-weight steels and have looked at plastics, but there is a perception with consumers that this is flimsy, so they stopped this. Another OEM stated that they have used aluminium to overcome CO_2 emissions targets through weight reduction, but the introduction of electrification may reduce the requirement for aluminium going forward. One automotive tier 1 supplier stated that they had tried plastics with the aim of reducing weight, but always ended up going back to steel. Another OEM stated that aluminium has many advantages, but steel is strong which has benefits in terms of public liability for vehicles of public use.

A producer stated that aluminium and composite materials have been given a lot of attention as a means of lowering CO_2 emissions. However, with the drive towards zero-emission vehicles, the push towards aluminium and composites should reduce as steel has a cost and strength advantage.

One interviewee did express concern over the UK's ability to compete in these higher-grade steels. A tier 1 supplier stated that steel is going to become more high strength but the thickness will decrease to get weights down. They stated that one of the UK-based producers is miles behind development in these grades compared with other European competitors. They will struggle to catch up.

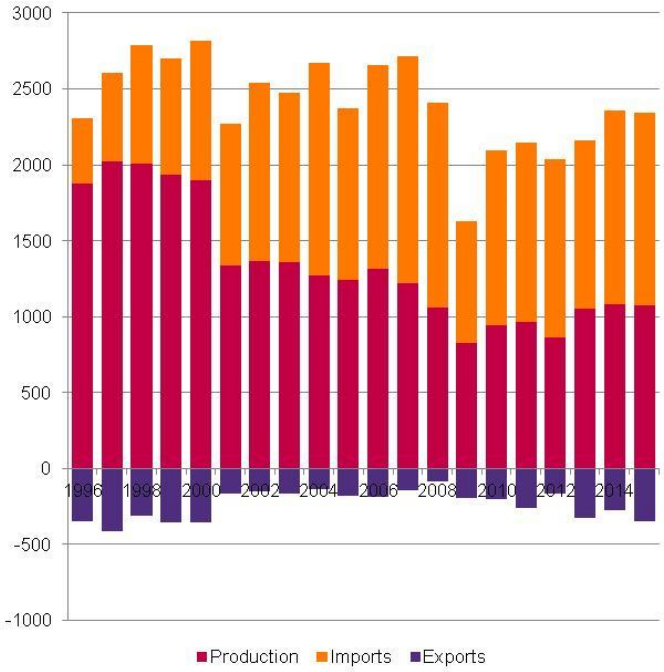
m.) Coated Products

Coated Products – Historical Demand

Exhibit 119: Coated Products Demand in UK (kt) and Prices (£/t)

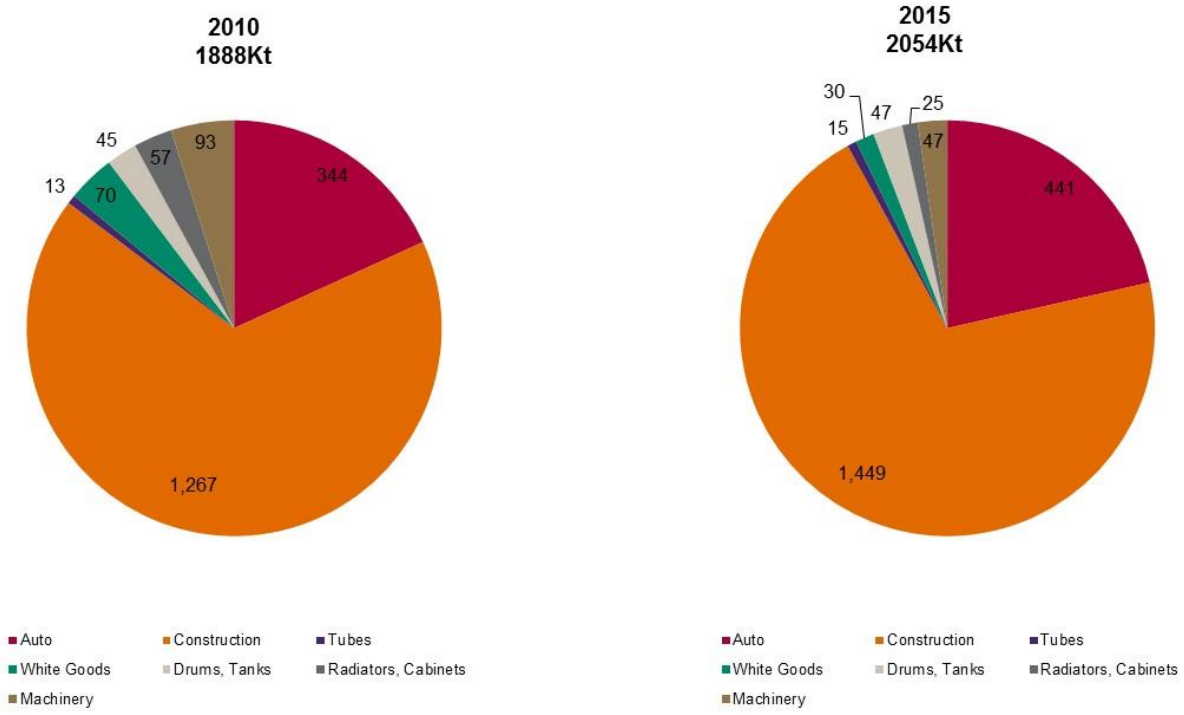
Source: ISSB, Platts, Hatch

Exhibit 120: Coated Products Supply in UK (kt) and Prices (£/t)



Source: ISSB, Hatch

Exhibit 121: Coated Products Demand Breakdown in UK (kt)



Source: Hatch

Coated products are among the few finished steel products that have not seen sharp demand decline, as seen in merchant bars, engineering steel, wire rods, stainless or seamless tube.

Prior to the crisis, trends display fluctuations and volatility which are not atypical for products that are dependent on construction markets. In 2009, demand collapsed by nearly 40%. Since then, demand has recovered from the decline in 2009 but is still considerably lower than in the pre-2005 period.

The following factors have shaped the demand trends for coated products:

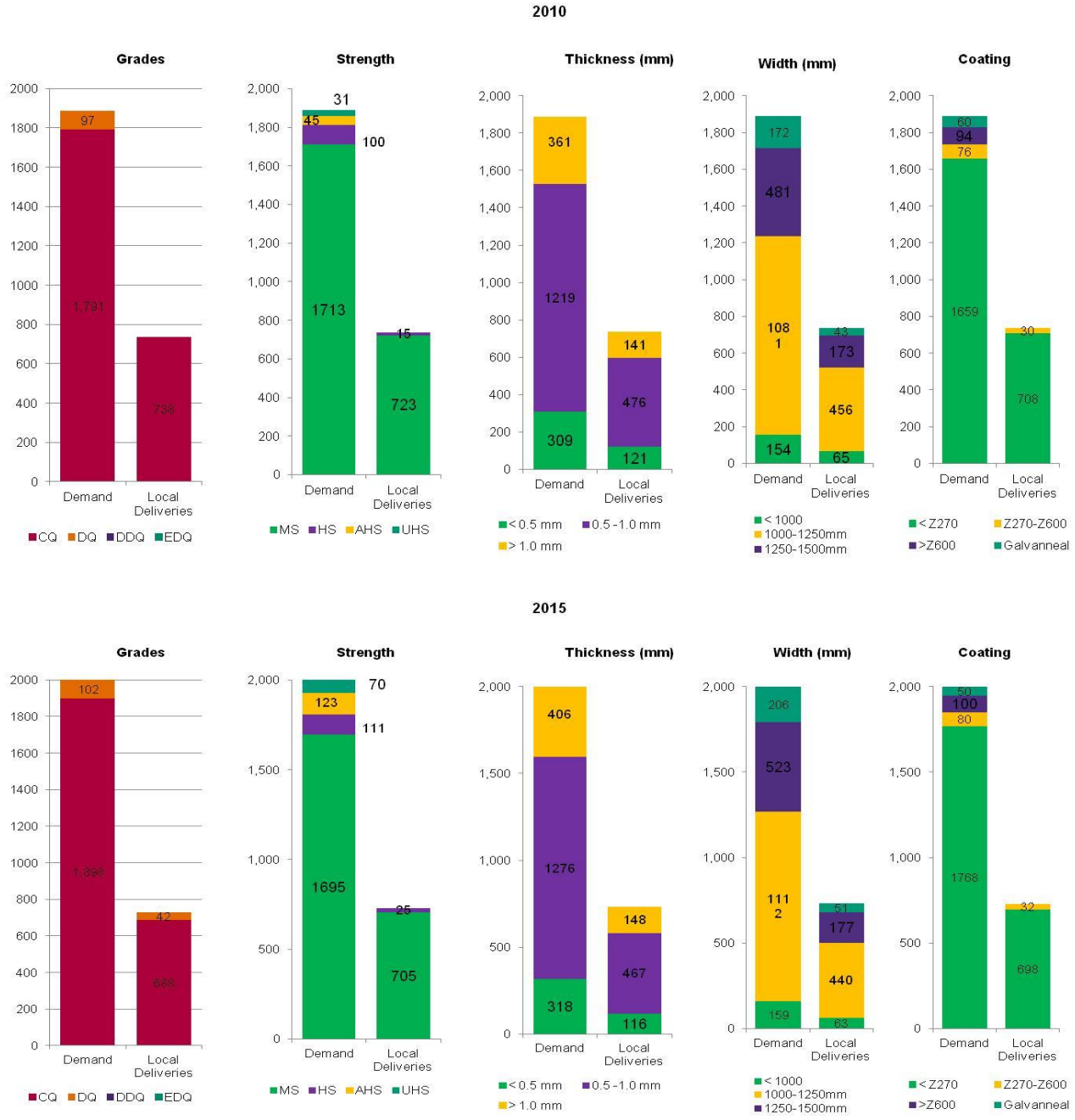
- Migration of cold rolled demand to coated products, which has helped sustain demand.
- Shift to demand for higher-strength grades of steel in automotive. These grades offer a higher strength-to-weight ratio and consequently demand falls in terms of volume, but there are higher value accruals.

Coated products demand will be determined by construction and automotive sectors. There is potential to increase automotive sector demand if localisation of auto components can be increased in the UK. The other sectors such white goods, machinery, radiators, tanks have almost been made irrelevant and this is because of the weak presence of these sectors in the UK.

Coated products are produced at Tata Steel's coating lines in Llanwern and Shotton. The coating facility in Shotton is dedicated to supporting the colour coating lines at the same site.

Local deliveries serve 30–35% of the UK demand. Imports serve the balance demand and they are mainly from Tata IJmuiden and Belgium, Germany, France, Italy, South Korea and China. There is a capacity deficit of 1 Mt in the UK – estimated to be worth £0.5 billion. This represents a clear and significantly large opportunity for the UK steel industry to seek more value in the current environment. In particular, this should be of immediate interest, because there are no technical barriers, similar to automotive steel, which could deter investments.

Exhibit 122: Coated Demand Breakdown vs. Local Deliveries (kt)



Source: Hatch

Over the past decade the main highlights of technical capabilities in coated products are:

- Gradual increase of thinner-gauge material <0.5mm. There is likely to be more demand for material of closer to 0.35–0.4mm.
- Increasing share of HS and AHS steels from 8% of demand to 13% of demand. UK does not produce any of these value-added grades that are consumed in automotive sector.
- Typically, most coating line can coat zinc up to Z600. There is demand for coatings >Z600, galvanneal (used in auto BIW applications) and zinc-magnesium coated

sheets. Put together, they constitute about 10% of the demand. These are an important part of a producer's capability mix for reasons of differentiation, higher value and broad product mix offer to customers.

Capability Summary

		Reasons	
Attributes	**Gaps**	**Commercial**	**Technical**
Capacity	Unable to meet about 65% of UK demand		• Capacity gap of up to 1.0 Mt p.a.
Grades	High Strength Grades for Automotive Sector		• Tata Steel Port Talbot does not have any capabilities for these grades. These grades are imported from Tata IJmuiden and from ArcelorMittal plants in Europe • There have been trial production runs for HS grades but these have not been stabilised and commercialised
Coating	Gaps for Z600 and above		• It needs some modifications in the existing coating lines. Only ArcelorMittal and Wupperman have high coating capabilities
	Galvanneal (GA)		• GA used to be produced in Llanwern but it migrated to Tata Belgium. No GA produced at Shotton
	Zn-Mg		• Produced by Tata in IJmuiden. ArcelorMittal, Thyssen, SSAB. Used mainly for automotive and some construction applications to increase service life

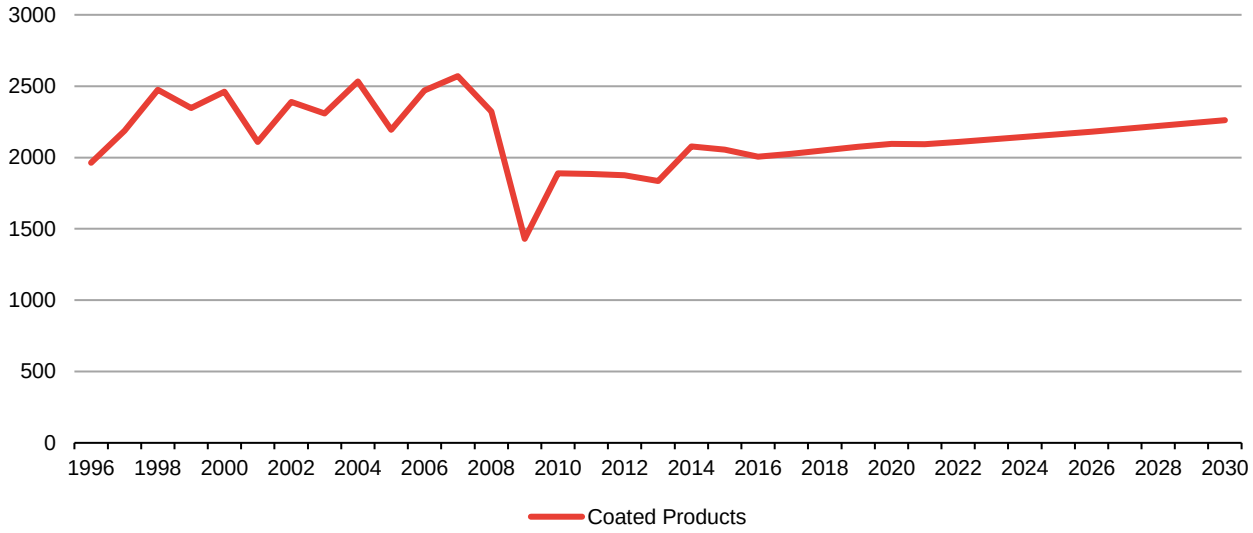
Coated Products – Demand Forecast

Demand Outlook

Coated products demand forecast to grow at 0.6% p.a. to 2,261 kt from 2,054 kt between 2015 and 2030 The lower growth rates are not an indication of lack of growth but a cumulative effect of shift of higher-value, high-strength and lower-gauge steels in response to the evolving needs of the automotive and construction sectors. The overall changes in technical specifications will be:

- Construction applications: Downgauging and shifts to lower thickness.
- Automotive applications: Perceptible, sharp increase in AHS and UHS will be required to meet the 2030 emissions target.

Exhibit 123: Forecast Demand for Coated Products (kt)



Source: Hatch

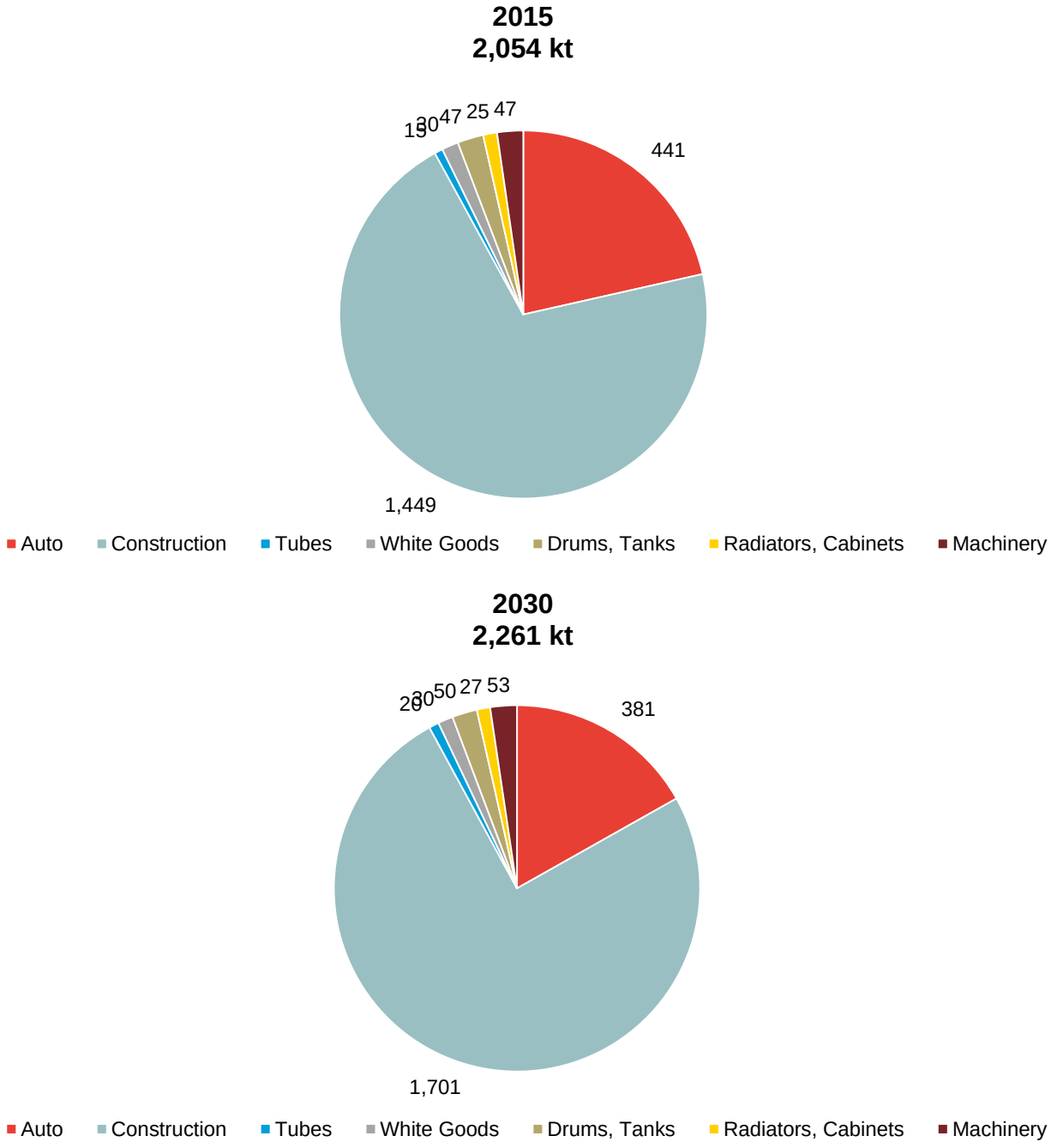
Sector Outlook

The following sector outlook will drive and shape the outlook for coated products demand:

- Construction spend across all subsectors is expected to grow at 1.3% p.a. Much of the modest outlook on construction is due to industrial and commercial subsectors, due to their dependency on the macroeconomic and business climate, which is not expected to be strong at least until 2022. The support for construction growth comes mainly from the fiscal support provided for infrastructure construction due to the government's decision to increase capital spending and support the economy.
- Automotive: According to SMMT, vehicle production in the UK is forecast to grow to 2.13 million units by 2030 from 1.75 million in 2015. The EU has set a binding target to reduce greenhouse gas emissions by 40% from its 1990 levels by the year 2030. The EU has not finalised the CO_2 emissions target for passenger vehicles and commercial vehicles. However, the indications of the range of emissions targets under discussion suggest that it is likely to tend towards 42–55 CO_2 g/km. Compared with the current levels of 123 g/km in 2013, this represents a very steep reduction of 61%. This implies that vehicle mass reduction is a critical component to achieving the emissions target, among other options such as increasing power train efficiency and rolling resistance. There are no anticipated changes in steel intensity per vehicle up to 2020 as some of the changes to vehicle mass are already being addressed by OEMs. This is also consistent with the development cycle of 5–7 years for each model and interview responses from OEMs. Any anticipated changes in steel requirements from a demand forecasting standpoint will be effective beyond 2020. A review of position papers by UK Advanced Propulsion Centre and WorldAutoSteel suggests that vehicle masses may need to be reduced by a further 15% by 2030 to align them with targeted CO_2 emissions. This implies a shift to higher-strength grades, particularly to HS and AHS

grade, reduction in demand volumes, but a shift to higher values. In addition, the local content in vehicle production is not expected to increase significantly from the current 40% as there is little evidence to support a big change in supply chains reshoring back to UK.

Exhibit 124: Sector Breakdown for Coated Products Demand (kt)



Source: Hatch

Opportunities

The total opportunity for the UK industry to address is the total organic growth in demand (207 kt) and the opportunity to displace imports (1,323 kt). In all, the opportunity size is +1,530 kt (+£867 million). There are capacity and technical constraints in relation to the

size of the opportunity. There are barriers and challenges that need to be addressed regarding the size of the opportunity, especially with the varied requirements of different sectors.

- Automotive grades: This is huge strategic area that needs investments in modifications and capability enhancements that cascade from steel making, secondary metallurgy, hot rolling, cold rolling and coating.
- Enhancing the capability of the cold-rolling mill to produce large volumes of thickness closer to 0.35–0.4mm.
- Augmenting coatings mix for zinc-magnesium, galvanneal and Z600 and above.
- Addressing capacity gap of 1.5 Mt in relation to the potential opportunity size.

Uncertainties and Risks

The uncertainties on industrial and commercial construction and automotive production on account of the EU exit negotiation weigh down the outlook of coated products.

Coated Products – Sector View

Capability & Capacity

Within the coated products market UK producers have several capability gaps.[163] These gaps are for a range of automotive grades (HS, AHS, UHS) as well as different coatings (such as Z600 and above, Zn-Mg and galvanneal). Many of these products are produced elsewhere in Europe by ArcelorMittal or Tata's IJmuiden plant. Historically, the UK did have capability for some of these products (e.g. galvanneal and HS) but the scale of change required to enhance the UK's capability to a level at which it can compete points to significant investment being needed.

This was expressed by a number of interviewees in the automotive sector. For example, one large OEM with a preference for galvanneal highlighted the UK's capability gap in this area. These specifications are mainly available to Honda from Japan, as the European market tends to focus on galvanised steel. They felt that one UK-based producer has underinvested, so the OEM cannot give them orders due to lack of confidence they would be of the quality required. Two other large OEMs stated that there are specifications that the UK does not provide, with these coming from Belgium or Holland instead. According to one automotive tier 1 supplier, there is a perception that UK producers have limited capability. One automotive tier 1 supplier, who imports all steel requirements, stated that they were not sure whether UK producers could meet their needs.

Several interviewees in the construction sector stated they had experienced capacity and capability issues with galvanised steel. One supplier of modular buildings in the construction industry stated that some struggle to source galvanised steel from the UK because the majority of this goes into the automotive sector, and there is no availability. An envelope contractor in the construction industry also stated that one UK producer has struggled to provide 1.5 grade galvanised steel, and had limited capacity since they closed one of their lines.

[163] 8 interviewees stated this, representing 40% of the 20 interviewees where coated products are a relevant product. This includes a producer, an industry body and 4 OEMs.

Like cold rolled coil, the view of many consumers was that the capability gap has arisen because UK producers have struggled to invest in research and development to the same level since c. 2005 as a result of cost pressures and a fall in earnings. This issue has then been exacerbated through a lack of commercialisation of new products within the UK. The result of this is that the UK has not been able to offer new grades to market.[164]

For example, one large OEM stated that the steel industry is old and well established and continues to do what it has always done with little innovation, while another large OEM stated that producers do not tend to adapt to the changing needs of consumers. A supplier of modular buildings in the construction sector stated that mills are producing what they have always produced, and do not adapt to client needs or where the market is. A fabricator in the construction sector stated that producers are 10 to 15 years behind in terms of digital automation and equipment and are unprepared for the next generation of products.

There are, however, examples where the UK can get it right and can drive real value. One consumer in particular highlighted that Tata Colorcoat is the 'best on the market' and its quality as well as customer service (it comes with a 40-year guarantee) means that they are willing to pay the higher price for the product – despite looking overseas for a cheaper alternative. Colorcoat is a particularly good example because both the research and commercialisation of the product was in the UK.

Alongside a lack of investment, this capability gap also points to a skills gap, particularly in relation to metallurgists and design engineers,[165] as it is these skills that will not only help develop new steel products but will help support their end-use application. One large OEM stated that there are no metallurgy degrees offered in the UK anymore and this technical capability has been hollowed out. The skills gap may be further exacerbated by offshoring of supply chains, which is particularly relevant to the automotive industry.

Competitiveness

It is a competitive position that is made weaker by higher production[166] and logistics costs.[167] Producers noted that energy costs, business rates and liquid steel costs were all areas where the UK struggled to compete with Europe. Logistically, land transport is also significantly more expensive than sea and with many of the UK sites landlocked they are at an even greater disadvantage. Another construction envelope contractor stated that the price of galvanised steel is increasing due to increases in the price of raw materials, such as iron ore, which are passed on to the consumer. In praise of the UK's competitiveness, one supplier of modular buildings in the construction sector stated that the galvanised steel they source from a UK producer is 20% cheaper than that of the other Swedish supplier

[164] 5 interviewees stated this, representing 25% of the 20 interviewees where coated products are a relevant product. This includes a producer, industry body, a large OEM, fabricator and a consumer.
[165] 3 interviewees stated this, representing 15% of the 20 interviewees where coated products are a relevant product. This includes an industry body, a large OEM and a consumer.
[166] 2 interviewees stated this, representing 10% of the 20 interviewees where coated products are a relevant product. This includes two OEMs.
[167] 3 interviewees stated this, representing 15% of the 20 interviewees where coated products are a relevant product. This includes an OEM and two tier 1 suppliers.

they use. They are aided by the fact they can deal directly with the producer and lock in prices for 12 months.

As with cold rolled coil, several issues were raised regarding customer service. Again, several interviewees stated that there is a lack of willingness of mills to deal with small orders,[168] with one automotive tier 1 supplier stating that mills are only interested in dealing directly with large organisations and stockholders. One automotive tier 1 supplier stated they had experienced issues in terms of damaged/poor quality products being provided and also missing deadlines, despite being provided long lead times. While an automotive OEM did state that the customer service from one UK producer is very good, they felt they have been more customer driven in the past. The respondent felt that they were able to deal with small orders and be more adaptable, whereas now they require aggregated orders.

Markets

It is also a competitive position that could be further weakened as the automotive sector continues to pursue lightweight vehicles driven by emissions targets (outside of the premium categories which have already migrated to aluminium). Therefore, while the future material choice is not determined, there is an opportunity for UK steel to promote and encourage the use of high-strength steel in the sector.

Emissions targets in the automotive sector have seen a push for lightweighting and higher-strength steels, but also a threat from aluminium and composites that could substitute use of steel.[169] For example, an automotive industry body stated that CO_2 emissions are a challenge. This leads to lightweight vehicles and a decreased size of power trains, as well as seeing a switch to other materials, e.g. aluminium, alloys, plastics. A large OEM stated that the changes in one OEM's steel usage will depend largely on requirements for weight reductions in their vehicles, with usage of high-strength steels likely to increase. One large OEM stated that CO_2 emissions continue to drive the need for efficiency in power train, but also to reducing weight in the vehicle. Material choice is based on the need to balance weight reduction and the price the market will pay for mainstream products.

Several interviewees did feel there was likely to always be a place for steel. Another large OEM stated that they have already moved to lighter-weight steels and have looked at plastics, but there is a perception with consumers that this is flimsy so they stopped this. Another OEM stated that they have used aluminium to overcome CO_2 emissions targets through weight reduction, but the introduction of electrification may reduce the requirement for aluminium going forward. One automotive tier 1 supplier stated that they had tried plastics in the aim of reducing weight, but always ended up going back to steel. Another OEM stated that aluminium has many advantages, but steel is strong which has benefits in terms of public liability for vehicles of public use.

A producer stated that aluminium and composite materials have been given a lot of attention as a means of lowering CO_2 emissions. However, with the drive towards zero-

[168] 3 interviewees stated this, representing 15% of the 20 interviewees where coated products are a relevant product. This includes an OEM and two tier 1 suppliers.
[169] 5 interviewees stated this, representing 25% of the 20 interviewees where coated products are a relevant product. This includes four large OEMs and an industry body.

emission vehicles, the push towards aluminium and composites should reduce as steel has a cost and strength advantage.

Another automotive BIW tier 1supplier stated that it is widely anticipated that there will be movement to more high-strength steels. In addition aluminium poses a threat to steel, and they are already supplying aluminium BIW to one OEM, but composite materials are not a threat at the moment. In addition, fuel tanks have already switched to plastic so substitution can take place.

One large contractor anticipated a shift away from steel to glass-reinforced plastic for signage, largely driven by steel being stolen for its higher scrap value. This was considered a big issue along the UK's rail network. In contrast, steel is becoming more prominent in street furniture over the past 10 years and is seen as the high-end option preferred by architects.

Supply Chains

Like the other products that predominantly supply the automotive sector, effectively managing the supply chain is also a challenge, not least because automotive OEMs increasingly see themselves as global/European companies and not bound to countries or supply chains.[170] One large OEM stated that steel is procured on a European basis, where steel producers will then supply from their most appropriate facility.

The result of this is that there is lesser dependence on the UK steel sector. The fragmentation of the supply chain within the UK also makes it harder for the producers to effectively engage (beyond the OEM) and really understand the changing need of the industry.[171] This lack of engagement further down the supply chain means there is little opportunity for innovation, according to one automotive tier 1 supplier. The fragmentation means that producers will never engage with a tier 1 supplier.

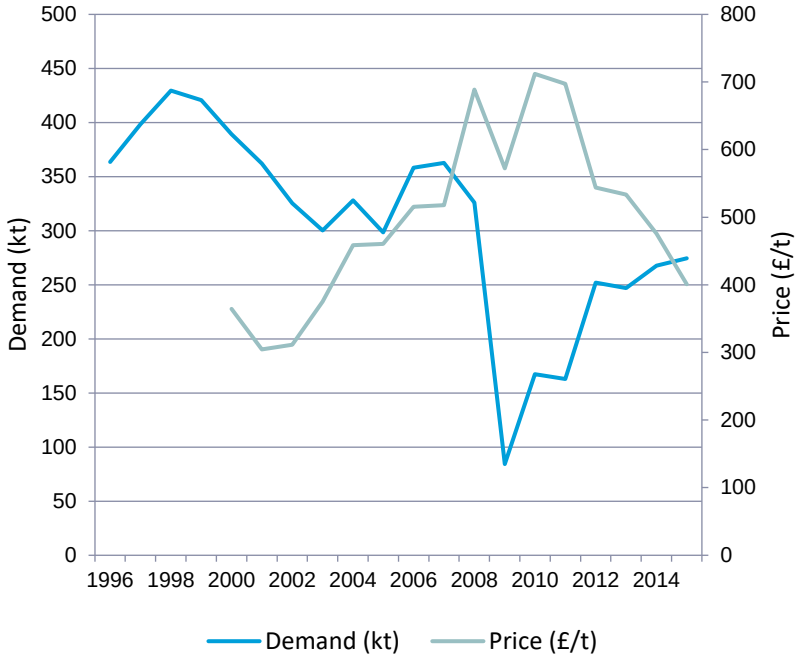
A supplier of modular buildings in the construction industry stated that producers are not engaged with industry and there is a need for more collaboration. If the supply chain was working more effectively, producers would be better placed to meet demand needs. They felt that the supply chain is at the mercy of steel producers. This was reinforced by an envelope materials supplier in the construction sector who stated that a large producer with facilities in the UK is too far removed from the construction industry and does not understand customer needs.

n.) Organically Coated Sheets (OCS)

OCS is produced from coated products and can be treated as its consuming sector. However, given its importance in the construction sector in the UK and Tata Steel's strength in this product, the analysis has been separated out to understand the historical trends, forecasts and the future opportunities.

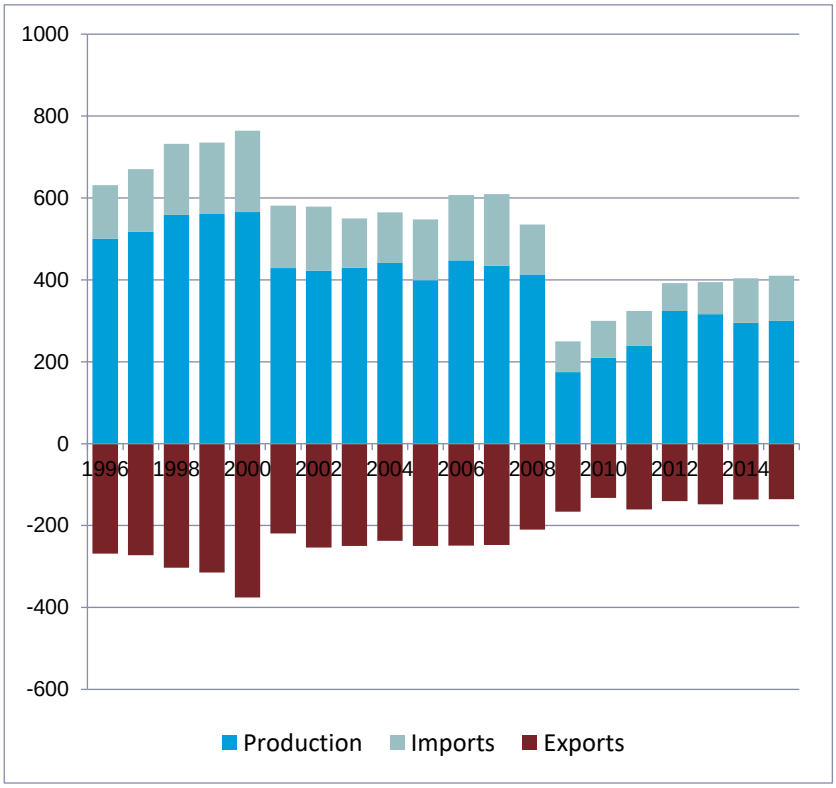
[170] 4 interviewees stated this, representing 20% of the 20 interviewees where coated products are a relevant product. This includes an industry body, a large OEM and two other consumers.
[171] 4 interviewees stated this, representing 20% of the 20 interviewees where coated products are a relevant product. This includes an industry body, a large OEM and two other consumers.

Exhibit 125: OCS Demand in UK (kt) and Prices (£/t)



Source: ISSB, Platts, Hatch

Exhibit 126: OCS Supply in UK (kt)

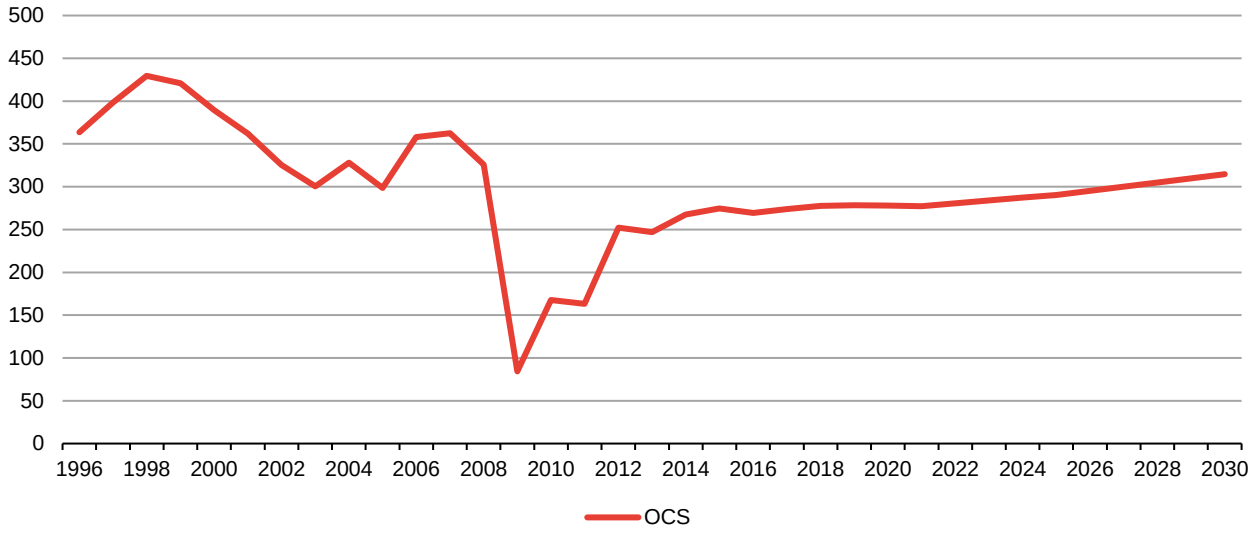


Source: ISSB, Hatch

OCS is consumed predominantly in construction applications in the UK. Demand has contracted by about 24% since 1996. Tata Steel in Shotton is the only producer of OCS in

the UK. Its share of the UK demand has fluctuated between 50% and 73% since 2010. There are no gaps or barriers on the technical capabilities in Tata Steel, relative to the market demands.

Exhibit 127: Forecast Demand for OCS (kt)



Demand outlook for OCS will be mainly driven by:

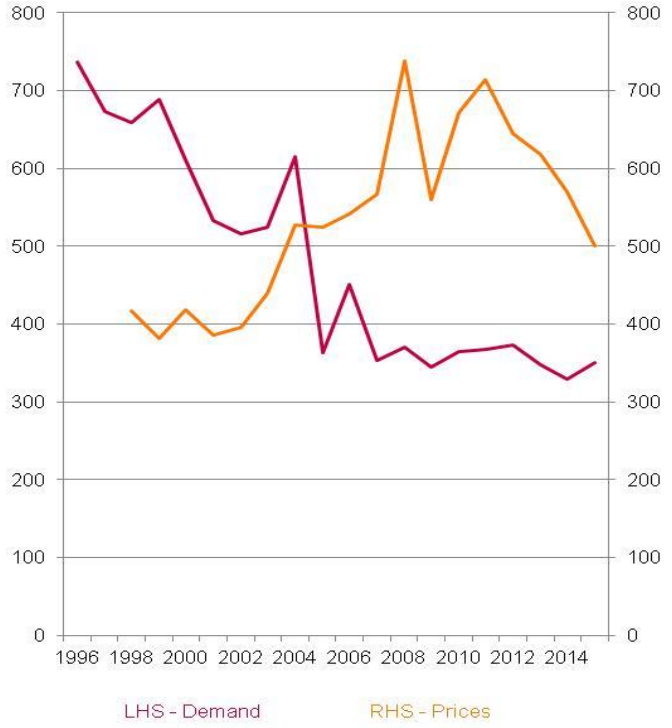
- Changes in spend in industrial, private commercial and public non-commercial construction;
- Downgauging: Similar to coated products in construction, some organic growth will be offset by shifts to lower thickness.

OCS demand is forecast to grow at 0.9% p.a. to 315 kt from 274 kt between 2015 and 2030. The total opportunity for the UK industry to address is the total organic growth in demand (41 kt) and the opportunity to displace imports (110 kt). In all, the opportunity size is +151 kt (+£91 million).

o.) Tinplate

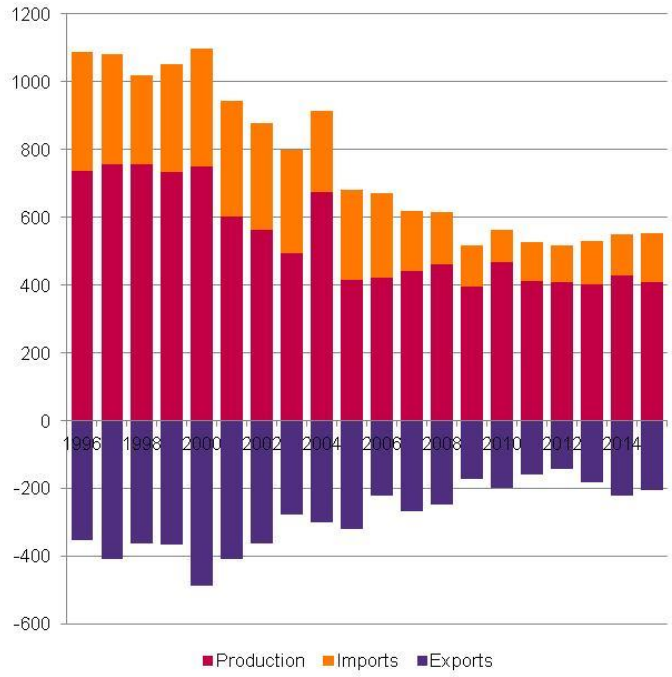
Tinplate – Historical Demand

Exhibit 128: Tinplate Demand in UK (kt) and Prices (£/t)



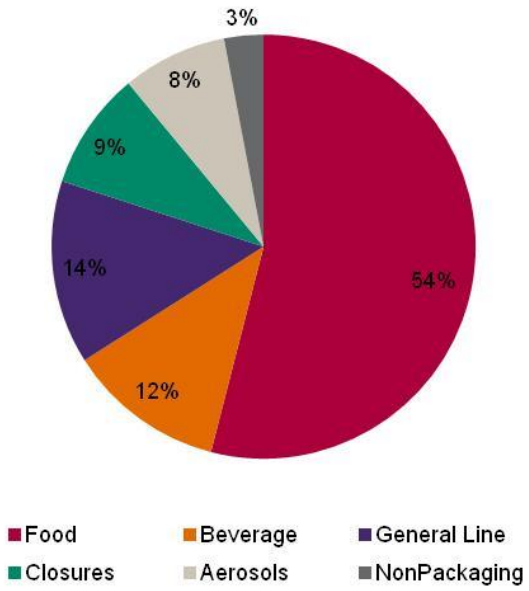
Source: ISSB, Platts, Hatch

Exhibit 129: Tinplate Supply in UK (kt)



Source: ISSB, Platts, Hatch

Exhibit 130: Tinplate Demand Breakdown in UK (kt)



Source: Hatch

Tinplate demand has declined by nearly 50% since 1996. However, demand in the UK has stabilised at 350–370 kt since 2011.

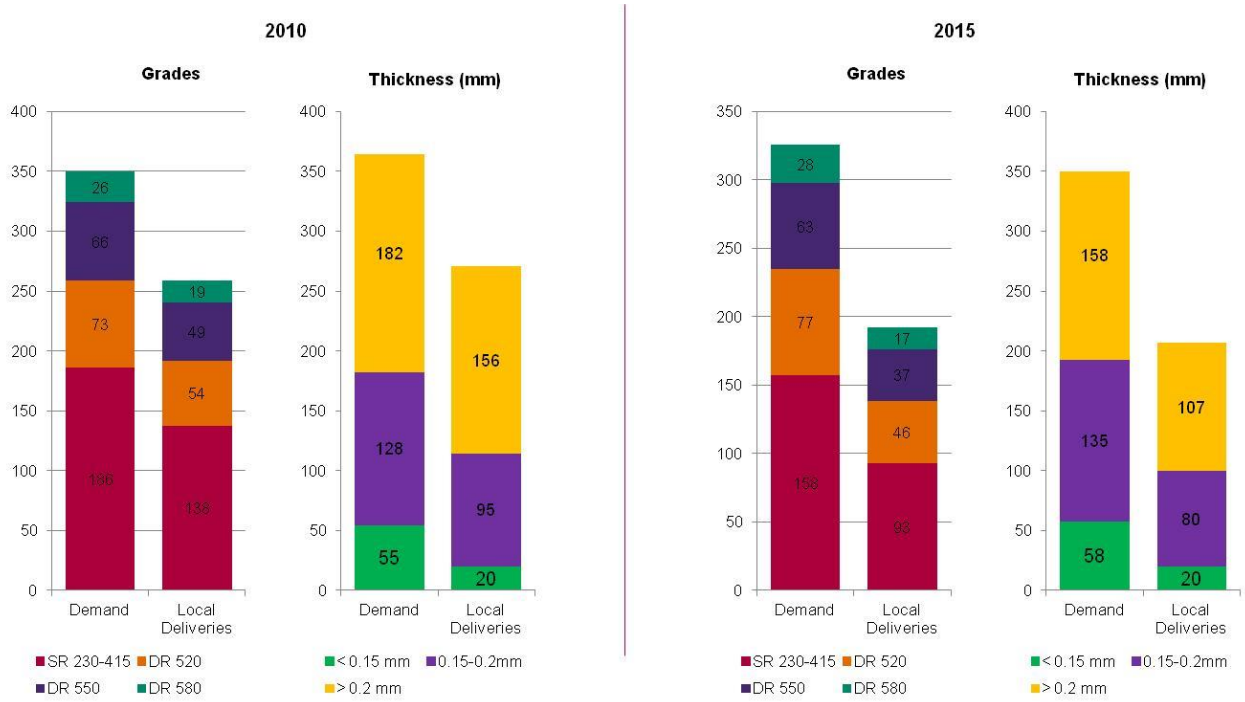
Over the past two decades, alternative packaging materials such as paper, aluminium, plastics and glass have continuously eroded the share of tinplate. These alternative materials have advantages over tinplate in areas like costs and marketability, such as content visibility, colour compatibility, appearance and shape flexibility. But tinplate has advantages such as recyclability, higher filling speeds and lower failure rates. Therefore, tinplate producers have had to respond to can makers' demand for downgauging in pursuit of lightweighting and a higher strength/weight ratio. As a consequence of these factors, demand volumes have declined and in turn there has been increasing demand for thinner-gauge and higher-strength steel. These big gains in alternative materials have largely been achieved.

Tata Steel is the only producer of tinplate in the UK and the coating line is located in Trostre. This is not atypical, because there are few tinplate lines in Europe and globally.

Local deliveries account for about 60% of demand, which has declined from 74% in 2011. Consequently, exports have increased as an alternative to home markets.

Food cans account for a 54% share of tinplate consumption and this is likely to remain consistent over the foreseeable future. The balance of 46% is accounted for by beverages, closures, aerosols, general line and some non-packaging applications.

Exhibit 131: Tinplate Breakdown vs. Local Deliveries (kt)



Source: Hatch

Tata Steel's stated capabilities in Trostre are reasonably comparable to ArcelorMittal and Rasselstein but there are some supplying thickness close to 0.13–0.15mm. As lightweighting pressures continue, can makers are increasingly likely to view this as a capability differentiator.

Capability Summary

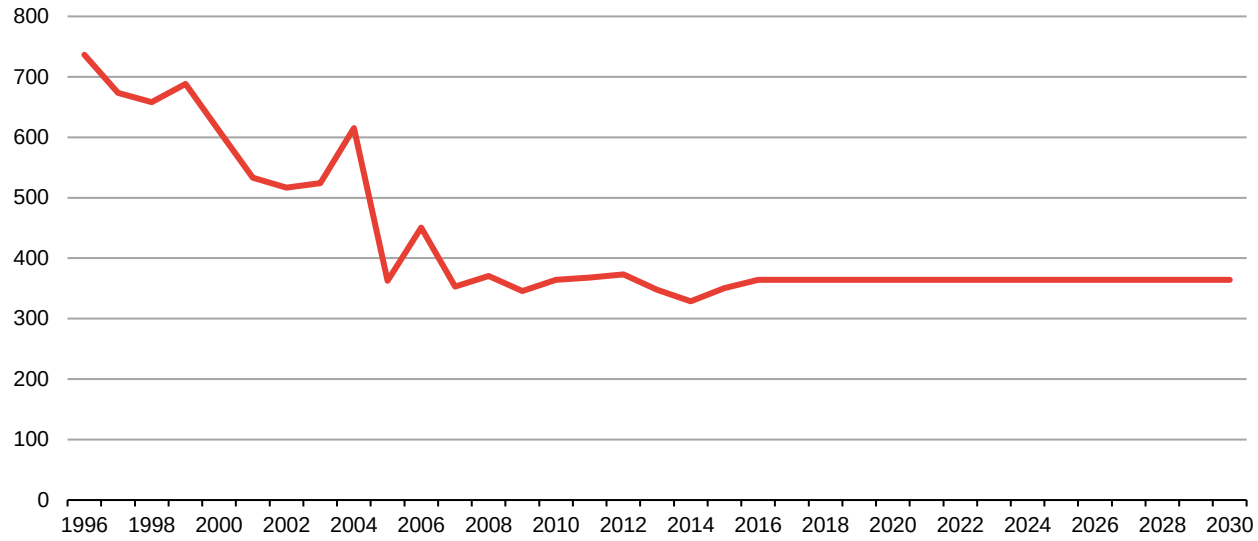
Attributes	Gaps	Reasons	
		Commercial	Technical
Thickness	Constraints in thickness closer to 0.13–0.15mm		• Underinvestment in the mill in automation, flatness control etc. needed to achieve these thicknesses
Product Development	Underinvestment in product development		• Reduced priority to invest in product development of high strength and ductile grade tinplates, polymer-coated tinplate

Tinplate – Demand Forecast

Demand Outlook

Tinplate demand is likely to remain unchanged over the next 15 years at around 364 kt. These trends are similar to those seen in the EU over the past few years. However, the industry needs to refocus on tinplate as it has historically been a technically capable supplier and, despite the smaller volumes, tinplate represents a high-value product.

Exhibit 132: Forecast Demand for Tinplate (kt)



Source: Hatch

Sector Outlook

Over the next 15 years, increasing population in the UK will be the main driver for an increase in demand. However, that increase is likely to be largely offset by downgrading. There are no major changes envisaged in substitution by alternative materials, recyclability, or major changes in urbanisation rates or changes in lifestyle and convenience food consumption. On that basis, we expect demand to remain flat at 364 kt p.a. However, there will be shifts of demand to lower thickness <0.15mm, particularly to 0.13mm, and shifts to higher-strength DR material.

Opportunities

The opportunity for the UK steel industry is to address the large share of imports, which is 157 kt (£114m). To address this opportunity, the barriers and challenges which need focus and solutions are:

- Thickness constraints, typically those tending to 0.13–0.15mm.
- Investments in product development of high-strength and ductile-grade tinplates, polymer-coated tinplate.

Uncertainties and Risks

The uncertainties on account of the EU exit negotiation weigh down the outlook of tinplate as can makers could scale back production in the UK.

Tinplate – Sector View

Markets

Tinplate is primarily used in consumer packaging where use of metal and steel has been declining for some time. There are no major changes envisaged in substitution by alternative materials, recyclability, or major changes in urbanisation rates or changes in

lifestyle and convenience food consumption.[172] One producer stated that they anticipated 75% of their current volume of work to continue.

One producer stated that not much has changed in terms of packaging, and steel retains a position that is always under threat. This producer felt they were in a strong position providing polymer coating compared with substitute processes, such as lacquering, because these alternatives have environmental concerns, whereas polymer coating does not.

Although aluminium has replaced tinplate in many areas, like beverage cans, there is still perceived to be a place for tinplate. One interviewee felt that this was partially down to poor marketing and a lack of understanding of the product. They stated that steel is the most recyclable material in the market and canned food not only reduces food waste but also stores the product at its highest nutritional value that can be packaged. The UK's sole tinplate producer believed there was opportunity to better market tinplate's positive qualities.

The US is a lucrative market for UK tinplate exports, with the highest price of steel in the world and poor-quality domestic manufactures compared with the UK product. The current volatility surrounding US trade policy was viewed as a threat to UK exports of tinplate.

One interviewee felt that there was a massive opportunity in the baby food sector, particularly in growing markets such as China, that competing producers are already exploring.

Supply Chains

The market is also changing with an increasingly small number of consumers and an increasingly international supply chain. Therefore, if the UK is to compete it needs to engage effectively with these international consumers and provide an 'attractive' offer. This should include a wider product offering, operational support services, customer service and supply chain agility (particularly short delivery times).

Capability & Capacity

The UK's capabilities in this product sector are broadly comparable to its European competitors, but it appears that there are gaps in supplying thickness <0.15mm. Tinplate capacity within the UK is also sufficient for the current market[173] and with large quantities exported it also competes well in European and North American markets.

One producer stated that there had been significant investment in new tinplate developments, including the development of a chromium-free passivation method to meet the new European REACH regulation for chemicals by September 2017. In addition to this, there has been ongoing low-weight coating optimisation for cost-effective corrosion protection and induction-flow brightening to deliver improved surface quality and enable lighter coating weights.

Competitiveness

In terms of UK competitiveness, liquid steel costs and high energy prices are stated as impacting on production costs[174], but the UK's sole tinplate producer stated that these

[172] Stated by the UK's sole tinplate producer.
[173] Stated by the UK's sole tinplate producer.
[174] Stated by the UK's sole tinplate producer.

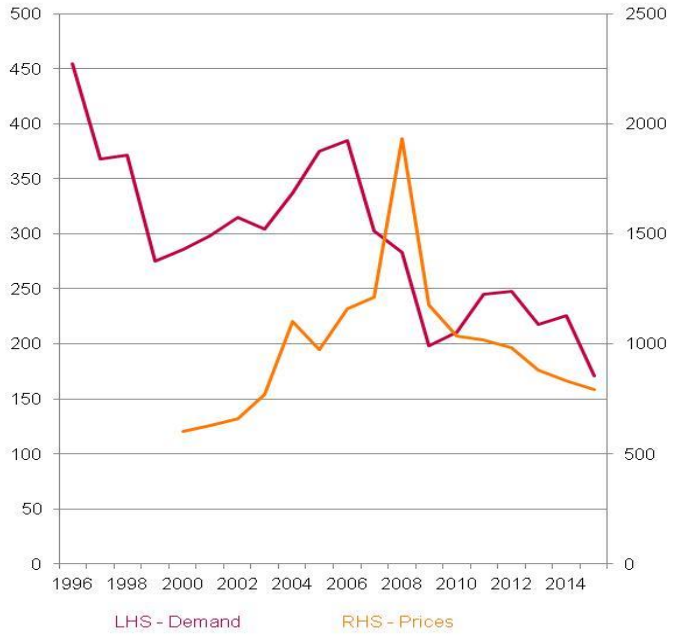
disadvantages are more associated with the initial hot rolled coil processes. The actual tinplate processing element is cost competitive with their other facilities in Holland and Belgium. One producer stated that energy is a huge vulnerability for them.

The geographical distribution of processing facilities within the UK also creates a structural disadvantage in logistics costs.[175] One producer stressed that the UK steel industry is so fragmented, the people who make the most money out of the industry are those transporting. The cost of transport within the UK is very expensive relative to travel by sea.

p.) Seamless Tubes

Seamless Tubes – Historical Demand

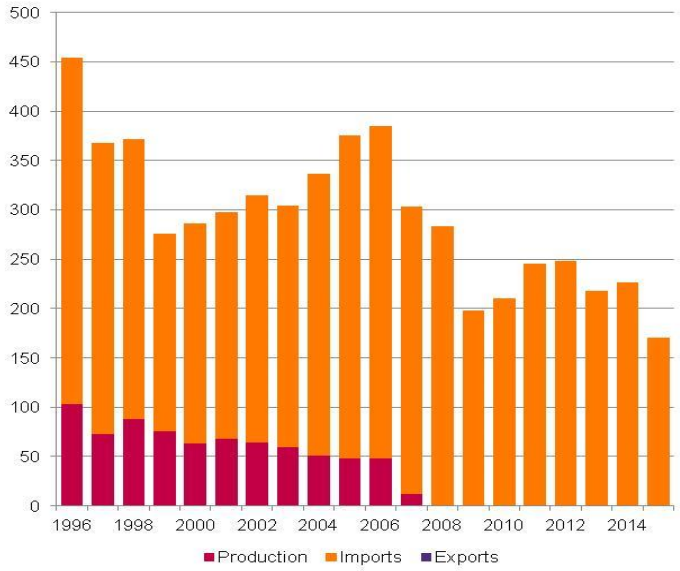
Exhibit 133: Seamless Tubes Demand in UK (kt) and Prices (£/t)



Source: ISSB, Platts, Hatch

[175] Stated by the UK's sole tinplate producer.

Exhibit 134: Seamless Tubes Supply in UK (kt)



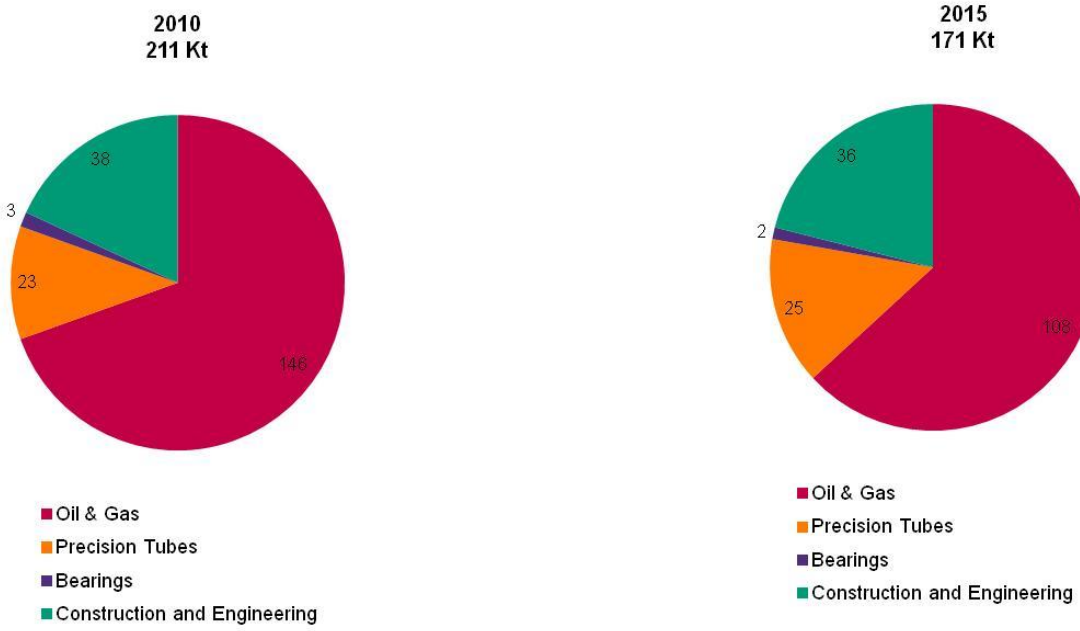
99

Source: ISSB, Hatch

The decline in seamless tube demand is aligned to the trends in oil & gas production in the UK. Oil production from the UKCS has been in steady decline since 1996. Gas production increased by 25% between 1999 and 2003, and this boosted seamless demand during the same period. After 2003, gas production has also been steadily contracting.

Historically, the UK has never been adequately supply sufficient for seamless tubes. With the closure of its only seamless tube mill, Desford Timken in 2008, demand is entirely serviced by imports.

Exhibit 135: Seamless Tubes Demand Breakdown in UK (kt)



Oil & Gas: OCTG, Line Pipes

Precision Tubes: Chemicals, Aerospace, Automotive, Oil & Gas
Source: Hatch

OCTG and line pipes for oil & gas applications are the major demand driver for seamless tubes. Demand from this sector has contracted by 26%, which is aligned to similar changes in oil & gas production in the UK during the same period.

Capability Summary

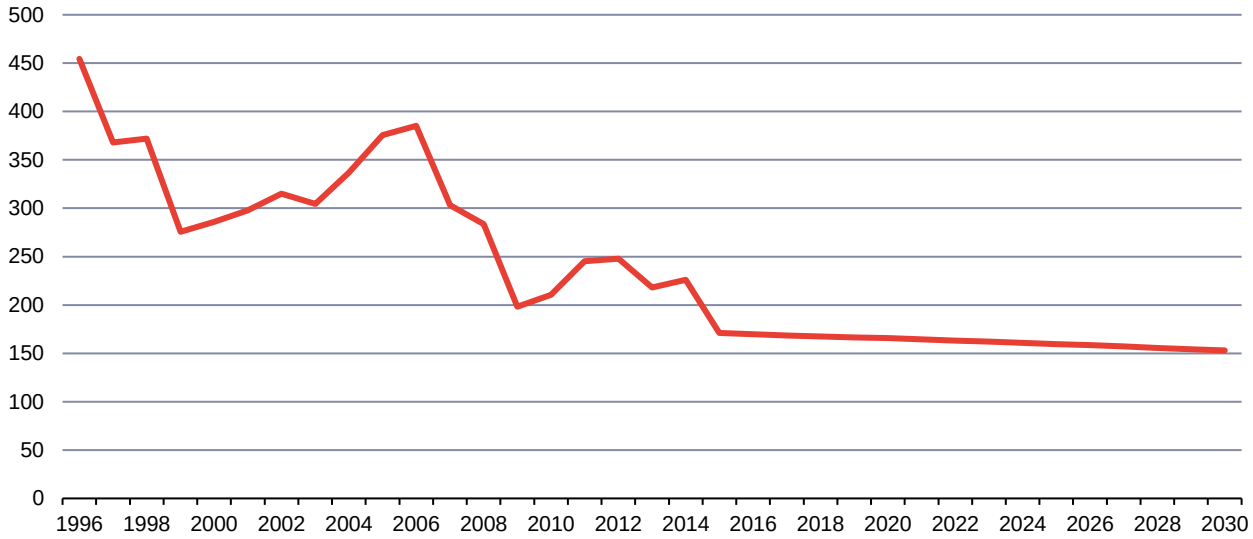
		Reasons	
Attributes	**Gaps**	**Commercial**	**Technical**
Capacity	Lack of capacity in the UK	• Demand size not large enough to justify the capital costs of an atypical configuration of EAF/Caster 500 kt p.a., tube mill of 350 kt p.a.	

Seamless Tubes – Demand Forecast

Demand Outlook

Seamless tube demand is forecast to decline by about 10% in the next 15 years. This is a continuation of the decline seen due to long-term contraction of oil & gas production.

Exhibit 136: Forecast Demand for Seamless Tubes (kt)



Source: Hatch

Sector Outlook

According to Oil & Gas UK, production of oil & gas in the UK is forecast to decline by a further 14% and 25% respectively by 2021. Currently, there is no visibility as to if and when shale gas production is expected to begin. It is also at the very early stages of development. Therefore, there are very little reliable estimates of shale reserves and it is expected that there will need to be further exploration and testing.

In light of this, demand is forecast to further contract, albeit marginally, to 153 kt in 2030. The growth in precision tube and construction and engineering tubes may not be sufficient to offset the decline in tubes for oil & gas applications.

Given this forecast growth, the overall demand is not sufficiently large enough to support a typically configured (EAF/Caster 500 kt p.a.) tube mill of minimum economic capacity of 350 kt p.a. Seamless tube is therefore likely to remain a marginal product in the UK.

At this point in time, there is no incentive to intervene in this product. However, this conclusion may need to be revisited if the shale gas market develops, as there is currently no visibility on when production could start in the UK.

Seamless Tubes – Sector View

Capability & Capacity

Given the lack of capability in the UK to make seamless tubes, all needs are imported. This was a view expressed by several interviewees.[176] Despite this, there was considered to be a fairly good domestic supply of tubes through stockholders to meet customer needs,[177] although one stockholder stated that there are circumstances where procurement cannot happen from the UK due to both availability and capability so they have to look elsewhere, e.g. Swedish steel. (GT, who producer in Sweden?)

Markets

There were a range of views expressed around developments in future technical specifications. Several felt that there would be little change in requirements going forward.[178] An oil & gas industry body stated that there may be changing grades for processing and pipelines, but the big volume requirements will be constant. Another industry body stated that there are not really any other materials that can replace steel so consumption is likely to stay constant in materials choices. In addition to this, they stated that all regulations in terms of leak prevention and ability to withstand high pressure also relate to steel. One tube stockholder and fabricator stated that there are opportunities to change materials to a certain extent. For example, they are looking to explore manufacturing stainless tube for the automotive sector. Another tube stockholder and fabricator stated that they are investing in hydraulic and mechanical tubing, which is a new market in modern robotics.

Two large oil & gas companies noted that there will need to be developments in grades as the industry moves into harsher environments. One stated that they expect increases in higher grade and heavier wall thickness for more challenging environments such as deep-water drilling. Seamless pipe for deep-water use was identified as one capability the UK lacks. They also stated that there could be an increase in the use of non-metallic pipe, but that use is limited today representing less than 5% of their pipe usage.

[176] 2 interviewees stated this, representing 20% of the 10 interviewees where seamless tubes are a relevant product. This includes an industry body and stockholder.
[177] 2 interviewees stated this, representing 20% of the 10 interviewees where seamless tubes are a relevant product. This includes an industry body and stockholder.
[178] 3 interviewees stated this, representing 30% of the 10 interviewees where seamless tubes are a relevant product. This includes two industry bodies and a contractor.

Shale gas was identified as an opportunity for greater exploration by several interviewees. Currently, there is no visibility as to if and when shale gas production is expected to begin. It is also at the very early stages of development. Therefore, there are no estimates of shale reserves and it is expected that there will need to be further exploration and testing. This was highlighted as an opportunity for greater exploration.[179]

One oil & gas industry body stated that the assumption is that shale gas will be a success and lead to a boost in activity. The amount of steel required to make the industry is unknown in terms of tonnage; however, it would need to support 12,500km of steel casing. It is now in its appraisal phase, after which there will be an evaluation of the gas properties and then the flow of gas, which will primarily occur in the North of England.

Competitiveness

Quality, reliability and pricing were considered key drivers in procurement decisions.[180] A small automotive accessories provider stated that they are happy with their supplier in terms of loyalty, pricing and quality. They previously had to procure steel from an Italian mill because the lower grade requirement better fitted their needs. A UK producer-owned stockholder and processor did not previously have this technology, but then adapted to meet their needs.

Supply Chains

No interviewees raised issues on supply chains regarding seamless tubes.

[179] 4 interviewees stated this, representing 40% of the 10 interviewees where seamless tubes are a relevant product. This includes two large oil & gas companies, a stockholder and an automotive accessories supplier.
[180] 4 interviewees stated this, representing 40% of the 10 interviewees where seamless tubes are a relevant product. This includes two large oil & gas companies, a stockholder and an automotive accessories supplier.

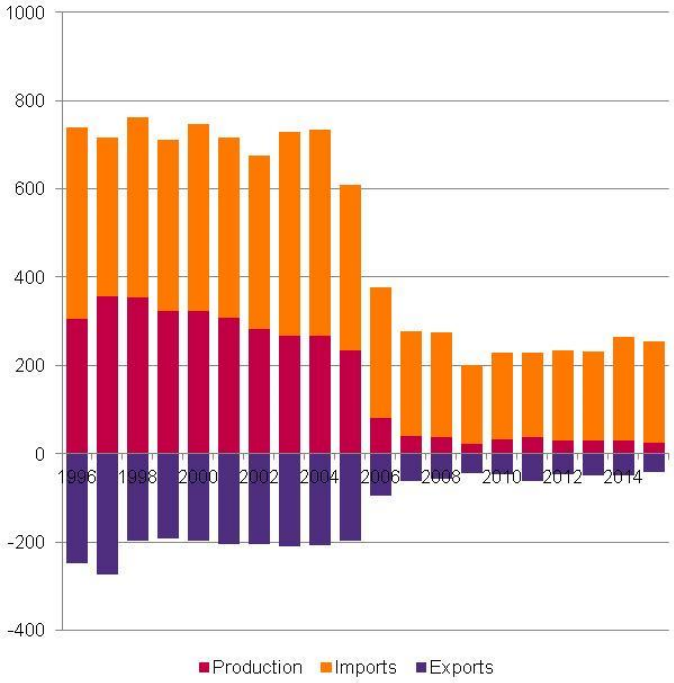
q.) Stainless Steel

Stainless Steel – Historical Demand

Exhibit 137: Stainless Steel Demand in UK (kt) and Prices (£/t)

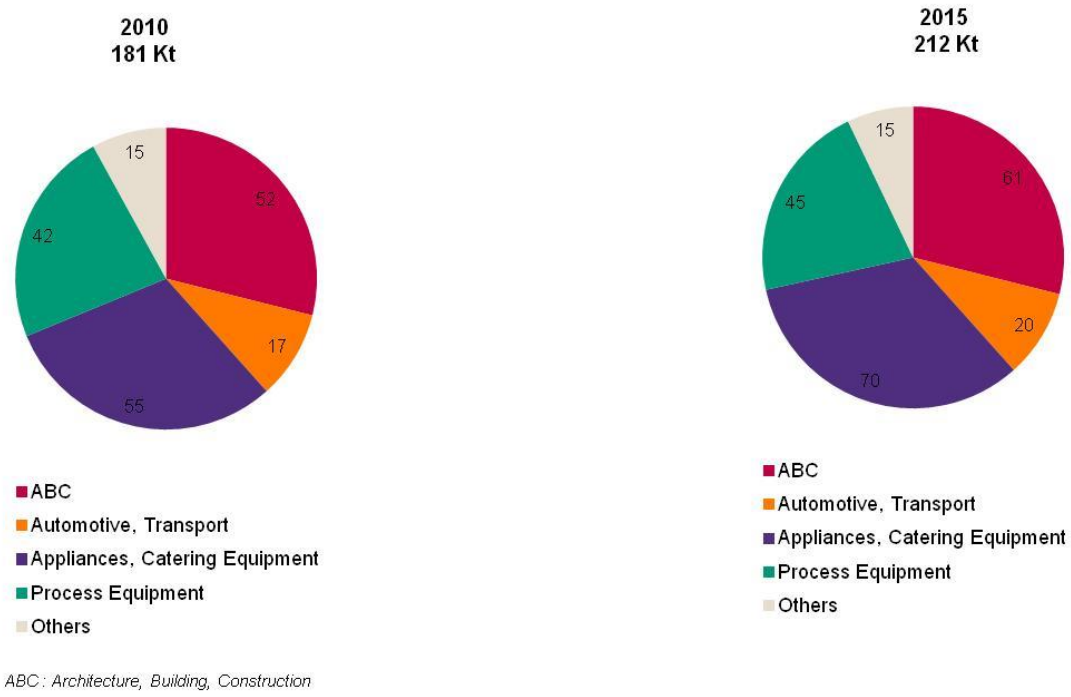
Source: ISSB, Platts, Hatch

Exhibit 138: Stainless Steel Supply in UK (kt)



Source: ISSB, Hatch
Note: Some of exports include local production as well exports of imported stainless steel

Exhibit 139: Stainless Steel Demand in UK (kt) and Prices (£/t)



Source: Hatch

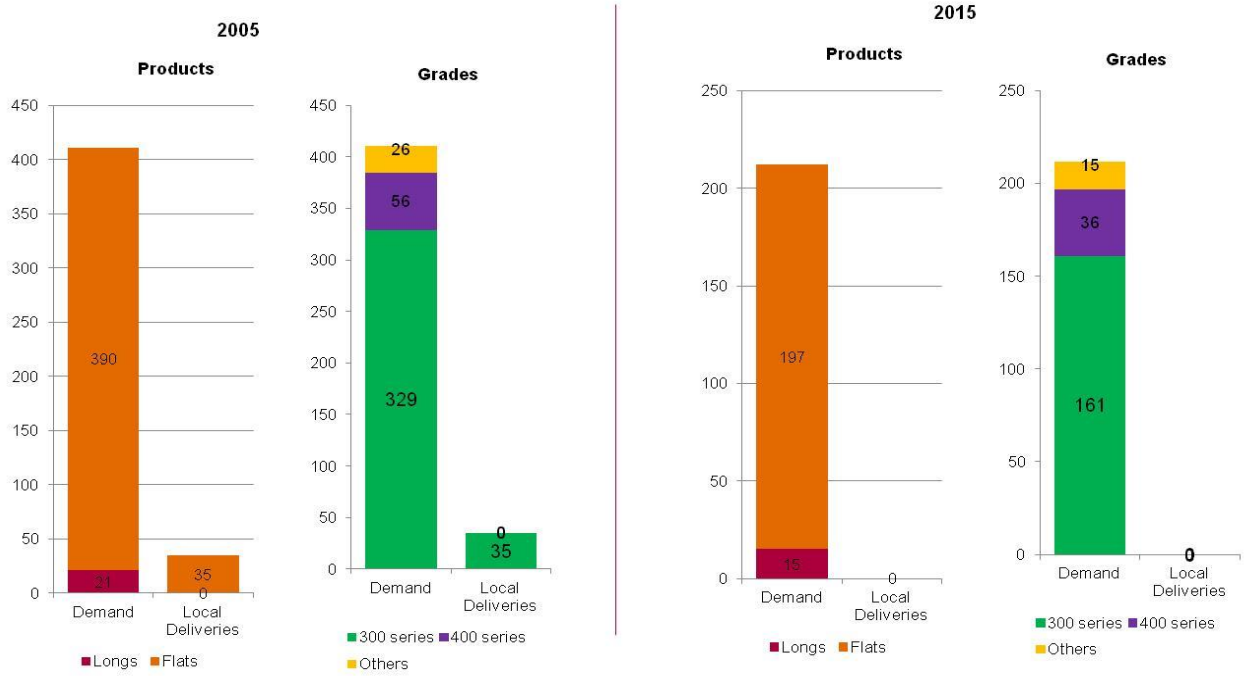
The major contraction in stainless steel demand had largely occurred by 2006. Demand depends more on the manufacturing sector such as home appliances, catering equipment, process equipment, automotive and transport. As home appliances have migrated to lower-cost production countries and automotive supply chains have consolidated out of the UK, consequently stainless demand has also followed similar trends. For example, since 2000, home appliance production in the UK has contracted by nearly two-thirds while imports have more than doubled.

Outukumpu was the only producer of stainless steel in the UK. It shut down its cold-rolling mill and finishing facilities in 2005. Currently, Outukumpu operates a rod mill in Sheffield. The existing meltshop produces semis which are then exported or transferred to other Outukumpu plants worldwide. This is due to the stainless steel industry in EU undergoing restructuring following closures and consolidation.

There is no capability to produce stainless flat products, which account for 95% of stainless steel demand.

Currently, supplies for stainless steel are almost entirely supplied by imports.

Exhibit 140: Stainless Steel Breakdown vs. Local Deliveries in UK (kt) and Prices (£/t)



Source: Hatch

Capability Summary

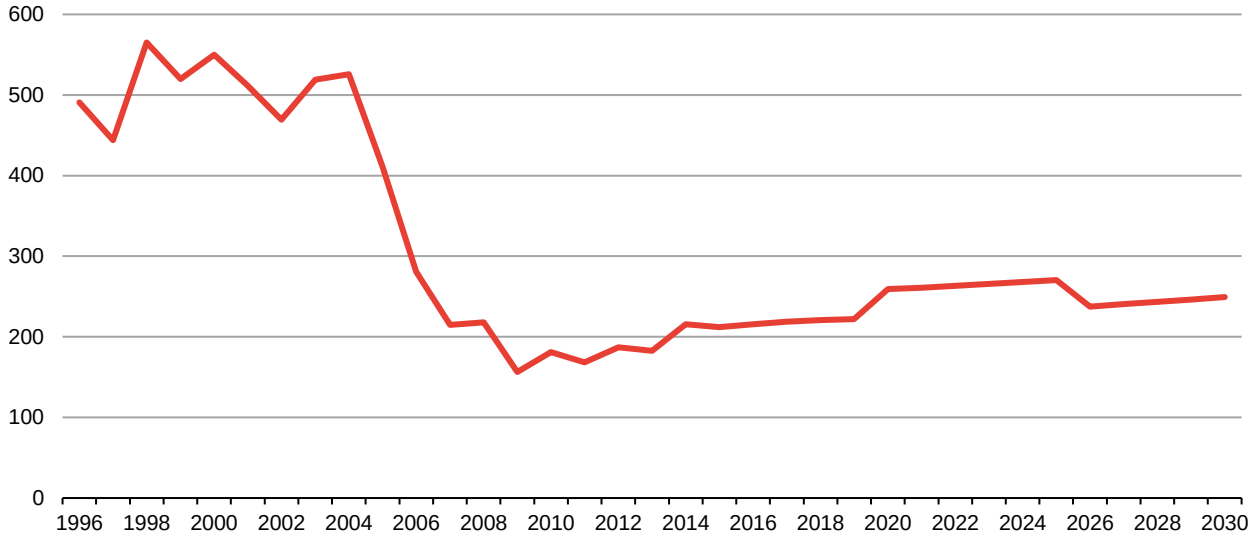
Attributes	Gaps	Reasons	
		Commercial	Technical
Capacity	No capacity in UK for stainless steel flats		• Outukumpu cold-rolling facility was shut down in 2005

Stainless Steel – Demand Forecast

Demand Outlook

Stainless steel demand is forecast to grow by 1.1% p.a. to 249 kt from 211 kt between 2015 and 2030. This works to an additional demand of +38 kt (+18%).

Exhibit 141: Forecast Demand for Stainless Steel (kt)



Source: Hatch

Sector Outlook

Over the next 15 years, there is likely to be growth in stainless steel consumption. The growth will be generated from Hinkley Point C nuclear projects (stainless steel liners in nuclear reactors, pipes), HS2 (body work for coaches) and nuclear decommissioning projects (pipe, cladding, ducting, doors). However, an important caveat is that the full benefits of these projects may not accrue to the UK because a majority of stainless steel could be procured and imported by the supply chain in the form of manufactured components and equipment. In light of this, the forecasts for stainless demand show that it could increase to 268 kt in 2024 on the strength of these projects and then decline to 249 kt in 2030 after these projects are completed.

Stainless Steel – Sector View

Competitiveness

A UK producer of stainless slab stated that energy prices affect their competitiveness compared with their other European facilities, where they have a better control of their cost base. They stated that they are looking to undertake energy saving measures and if they do not look to drive cost improvements, they will struggle in future.

Markets

They stated that there are issues with the management of scrap supply in the UK. Despite the UK exporting scrap, they currently have to import some of the scrap they use.

They also stated that there is a lack of metallurgists in the UK, which is limiting development of new products. They have started an apprenticeship scheme in response to this.

Capability & Capacity

A UK producer of stainless slab stated that they currently have capacity of 500 kt with 70% of their sales staying within the group and the remaining 30% either exported or sold in the UK. They stated that little investment is currently being made.

Supply Chains

No information was gathered during interviews on market issues for stainless steel.

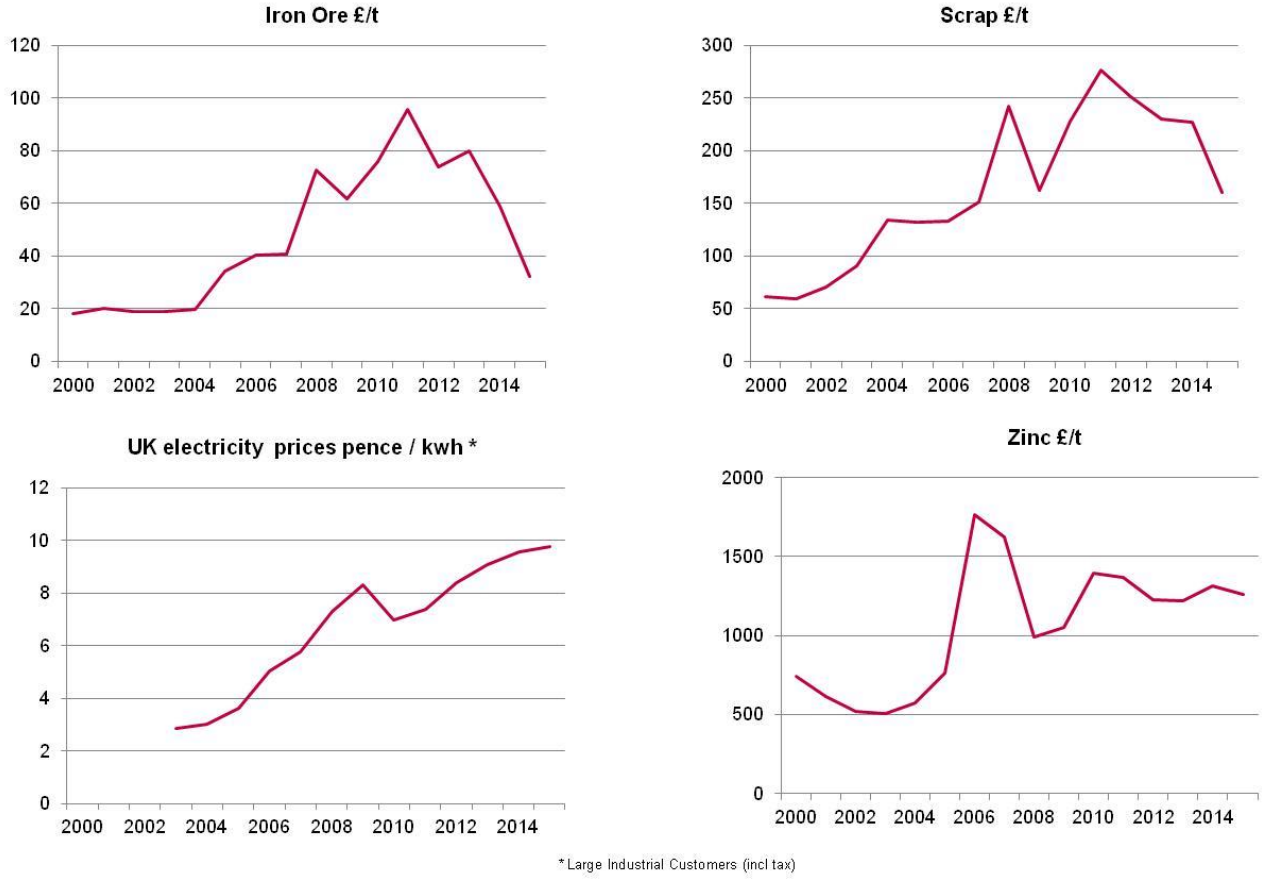
r.) Value Analysis

Value Analysis – Historical Demand

There is little correlation between prices realised and the changes in demand over the past 20 years. Generally, steel prices mirror the price trends of its key raw materials and inputs. The value of finished steel has not declined much since 2000, primarily because of increase in prices of steel-making raw materials and other production inputs such as electricity, zinc, ferroalloys.

The changes in prices of steel are similar to those in raw materials and inputs as shown in the exhibit below:

Exhibit 142: Prices of steel making raw materials and inputs



Source: Platts, Metal Bulletin, Department of Energy and Climate Change, SSY

Trends in the value of imports are aligned to demand value over the compared period. From a value standpoint, the UK steel industry has consistently lost between 50% and 60% of its value to imports. The share of imports in value terms has been on the increase from 2009 and is currently at 60% of the total UK steel demand.

The reasons for the increasing share of imports can be summarised as:

- Gaps in technical capabilities to service market segments such as automotive, energy sector, lifting and excavation sector.
- Increasing imports of higher-value grades.
- Increasing competitive pressures from imports and customers' intent to diversify supplier base.
- Capacity constraints.

Exhibit 143: UK Steel Demand vs. Imports – Value (£b)

Source: Platts, Metal Bulletin, Hatch

s.) Conclusions

Conclusions – Historical Demand

From the historical trends of demand for individual products, there are two clear groups emerging:

- Group 1 (Rebars, Sections, Rails, Wire Rods [mesh], HRC, Coated): These are products that are dependent on construction and infrastructure spend and have better survived and managed to recover some lost ground in demand.
- Group 2 (Merchant Bars, Wire Rods [drawing], Engineering Steel, Stainless Steel, Seamless Tubes, Plates, CRC, Tinplate): These are products that are dependent on manufacturing and have seen their demand eroded away.

Within these groups, rails, wire rods (drawing quality) and engineering steels have performed and survived better in the export markets, primarily to the EU. These products are specialised for specific applications in automotive, engineering and infrastructure. They are not strictly volume products but are more value-added and less sensitive to price

competition seen in other steel products. The capabilities of UK's steel industry is well positioned to service exports market

In the past two decades, the industry has been deeply embedded in an environment that only just ensures survival. It is unable to break the cycle of structural demand decline, lower profits and marginal surpluses to modernise and invest. The UK steel industry has not fully kept pace with the requirements of its customers.

The industry calls for radical transformation if it is to become a premier supplier of choice to the consuming sectors in the UK. Maintaining the status quo is not an option because doing so may make the industry even less relevant to its consumers. Therefore, it urgently needs to transform itself and perform a technological leap frog.

There are capacity constraints in some products – HDG, seamless tubes and stainless steel. In seamless tubes, demand volumes are still not sufficiently large enough to support investments in UK-based facilities. In stainless steel, this is due to Europe-wide capacity rationalisation because a large part of the demand has migrated out of Europe.

At a high level, it would appear that adding new capacities could potentially address the gaps. However, this also needs to be considered together with cost competitiveness of the new entrant vis-à-vis imports and existing producer/s.

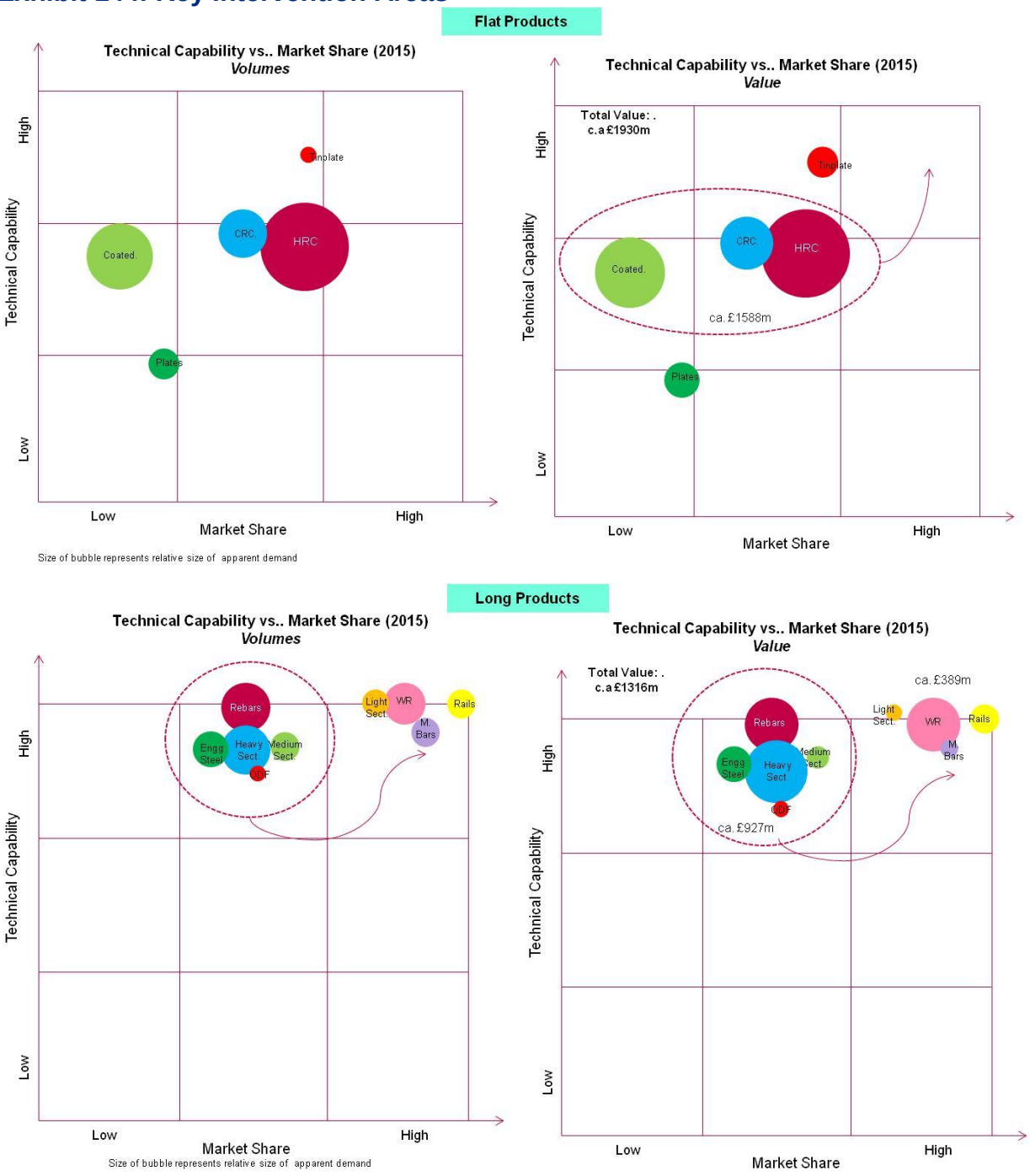
The requirements of the steel-consuming sectors are constantly evolving and will continue to do so in the future. Themes such as lightweighting of cars, increasing offshore wind tower heights, demanding environments for oil & gas pipelines and thin-walled cans imply that the steel industry will have to constantly invest, improve and innovate in new product development to service its customers.

A number of interviewees suggested that the UK faces a cost disadvantage on business rates and energy prices. This report does not dispute this cost disadvantage aspect. It goes beyond this to highlight that there are some serious gaps in the downstream finished product capabilities. The evidence gathered in the study suggests that while lowering energy prices and business rates are important levers, there are numerous issues that need to be addressed urgently in the downstream for the industry to attain the required technological capability.

The success of the steel industry is dependent on the success of its customers – manufacturing, construction, infrastructure. For far too many years, manufacturing and supply chains have been allowed to migrate and hollow out. It is very challenging for the steel industry to invest in an environment of policy uncertainty. This has had a cascading effect on consumers, who find it challenging to build long-lasting, sustainable relationships with a steel industry that is uncertain about its own future.

On the basis of the above, the key intervention areas identified are provided in the below exhibit.

Exhibit 144: Key Intervention Areas



Conclusions – Demand Forecast

After nearly two decades of continuous decline, demand in the UK could be on a path to recovery. This will build upon green shoots of recovery in 2012–2015. The recovery is likely to be slow and gradual and this involves responding to numerous evolving changes in customer demands which are likely to continue unabated. The biggest boost to demand will be from the increasing infrastructure investments supported by the government to grow the economy. The other sectors that will also contribute to the demand growth could be automotive, renewables and yellow goods. A key factor which is weighing down the prospects of acceleration of demand recovery is the uncertainty due to EU exit. This

uncertainty is cascading across industrial and commercial construction, machinery and packaging.

The base-case demand scenario works on a conservative basis of unchanged local content in automotive production and the presence of supply chains in the UK. It is acknowledged that the government will push forward with a broad, inclusive industrial strategy. However, benefits may not accrue to the steel industry before 2022. Large-scale reshoring of manufacturing and supply chains can be very challenging and time consuming. But despite the challenges there is room for demand improvement, such as automotive supply chains, renewables supply chains. With some support for manufacturing, it is not inconceivable for flat products demand to improve by 7–8%. The trickledown effect of supply chain reshoring can help boost spend in industrial and commercial construction as well further supporting construction growth.

The demand recovery presents an excellent opportunity for the UK steel industry. However, the industry has to address numerous capability issues and it has to break out of the cycle it finds itself in and make the leap forward to position itself competitively. The demands of the customers cannot be accommodated by incremental improvements or capability enhancements. The industry must take full advantage of the demand recovery, with possible government support with renewed industrial policy, and plan on building up an industry that is fit for purpose in the coming years.

5. Appendix 5: Barriers Analysis

Introduction

This appendix looks at the barriers facing the UK steel industry in realising future opportunities. It begins with an overview of the cross-cutting barriers before looking in detail at the barriers on a product-by-product basis.

Cross-cutting Barriers

Investment Capability

There is an urgent need to encourage investment in new capital equipment to close supply chain gaps and enhance capability as well as create a step change in flexibility, productivity, and cost competitiveness by early adoption of disruptive technologies that have the potential to allow the UK to achieve competitive advantage as a world leader. This will require closer engagement with the customer and end users, to better understand market drivers and demand.

A major barrier for the UK steel industry is that the UK production infrastructure is already built and a reluctance to uproot and replace 'sunk capital' before its end of life tends to limit advances to incremental development rather than encourage adoption of the latest technologies being applied on greenfield developments elsewhere. The cycle is perpetual as 'sunk capital' does not all reach end of life at the same time.

Supply Chain Capability

Greater engagement between producers and the steel supply chain, building on strong relationships already in place, would improve communication and collaboration between producers and end users on product design and material specification. Producers could consider supply chain initiatives similar to the highly successful engagement with architects, procurers and fabricators in the construction supply chain that has resulted in an increase in the steel intensity of commercial buildings.[181,182]

The lack of flexibility in, or guarantee of, delivery from producers and global procurement policies from OEMs must be overcome if UK market share is to increase. An overcomplicated UK steel supply chain increases the distance between the producers and end users. Collaboration between UK suppliers would help identify opportunities to drive greater value and reduce wastage. This may require process innovation.

Such engagement, coupled with the UK's general business strengths, will also help to improve the attractiveness of the UK offer as a whole, with respect to international competitors, which would increase the likelihood of manufacturing being reshored back to

[181] Market management in Construction, A strategic analysis of CSPIJ's options for channels to market in the Benelux construction steel market, CORUS (Internal Report), 2005.

[182] Start building with finished rooms, Modular Building System, CORUS Living Solutions (Internal Report), 2005.

the UK. Customers have identified the fact that there is a single UK producer of many steel products as a barrier to increasing the overall UK market share, as consumers seek to de-risk their procurement policies. Producers could consider opportunities to increase the range of individual products, which will increase competition within the UK industry, but should also allow the UK industry to compete more effectively with imports.

Research & Development

Short term – Working in collaboration with supply chain and end users on product development, cost-reduction technologies, productivity innovation and transformation planning.

Medium term – Several opportunities in both capability and product development, including near net shape, raw material processing, CO_2/energy reduction and other process compression and efficiency technologies to de-risk and accelerate commercialisation,[183] require large-scale piloting and upscaling facilities. This will require enhancement of existing R&D facilities through capital investment. The cross-cutting barrier identified above relating to capability investment must be addressed alongside investment in R&D, or the higher value-added steels developed risk being commercialised outside the UK.

Long term – The clear opportunity for step change in productivity, cost base and value-added product requires sustained investment in technical capability and facilities. Enabling technologies include automation and big data (Industry 4.0), clean technology and circular economy. Consider whether existing R&D interventions for other sectors (Aerospace Technology Institute/Advanced Propulsion Centre) could give similar benefits if replicated in the steel sector.

While there is a recurring theme highlighting the need for increased emphasis on capability and product development, this has historically required combined input between businesses which have recently become separated, and in future some framework to address this deficit will be required.

Respondents to the report may wish to consider how skills can help them with some of the challenges posed by these cross-cutting barriers, where gaps have been identified in technology and risk management capability.

Skills

A number of producers, fabricators and consumers mentioned skill shortages[184] in key areas such as: metallurgy, with the point made by three producers that there are currently no metallurgy degrees offered in the UK; engineering, at professional, chartered and technician levels; technical skills such as those required to work with different grades; and process skills such as production management and risk management. Concerns were also identified in terms of the impact of skills as a result of the EU exit.

[183] Industrial Decarbonisation & Energy Efficiency Roadmaps to 2050 - Department of Energy and Climate Change and the Department for Business, Innovation and Skills. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416667/Iron_and_Steel_Report.pdf

[184] Skills was raised as an issue by 10 respondents across the 100 interviews, including four producers, a trade union, an automotive OEM, an aerospace OEM, a housing developer and renewable energy developer.

In addition, a number of consuming sectors talked about skills shortages in their own industries, with the potential to impact on sector growth. Alongside this there is also clearly competition between different sectors with automotive cited as particularly effective at attracting engineers.

A trade union felt that the restructuring of the UK industry has left the country with a number of smaller players which might best rely on external and shared R&D support. This would protect R&D activities from moving abroad as a result of corporate decisions and would ensure the continuity of key skills for a national industry.

As a number of interviewees did not raise skills in the context of accessing future opportunities, this report cannot draw specific conclusions around the future skills requirements of the sector, although some skills gaps have been highlighted.

Therefore, in response to all these enablers there is a need to consider the role played by skills, and how upskilling could help to close identified gaps, particularly in technology and risk management capability.

Barriers Analysis – Product-by-Product Barriers

Long Products (Rail, Sections, Merchant Bar, Engineering Steel, Rebar & Wire Rods)

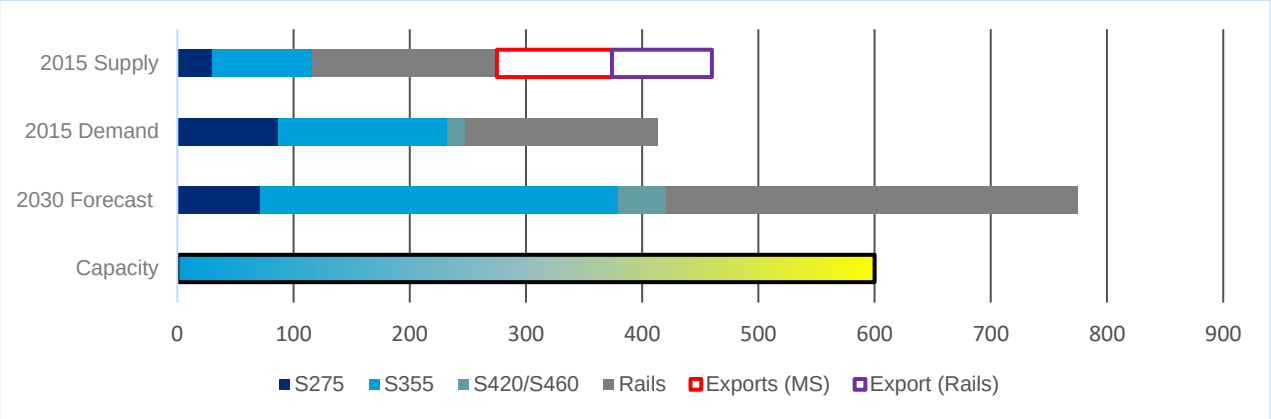
Rails

Capacity/Capability

Rail production in the UK was consolidated to one site after the closure of the Workington rail mill in 2006. This singular rail production route within the UK is at British Steel's medium section mill on their integrated Scunthorpe site. This mill utilises semis from the bloom caster and has a shared capacity with medium section production of 600 kt p.a. as shown in figure 1.[185] The 2015 demand shows that British Steel currently uses the capacity and capability of this process route to supply essentially all (~96%) of the UK demand for rail while producing ~100 kt p.a. for export into the EU, which gives it a 25% market share.[186]

[185] Exhibit 145 compiled from Q1 Analysis Output & Q2 Demand Forecast for Rails & Medium Sections.
[186] Interview Findings Rail, Headline Findings: Markets.

Exhibit 145: Supply/Demand/Forecast Volumes and Capacities Comparison for Rail and Medium Sections



British Steel operates a second rail mill in Hayange, France, which has greater product capability, due to having a heat treatment unit attached to the mill. British Steel has identified that this leaves them with a capability gap in large-scale production of its high-value Zinoco corrosion-resistant rail in the UK.[187] The UK demand data available does not have grade breakdown granularity, but current demand cannot be more than 4% by volume.

Competitiveness

The medium section mill had significant investment under previous owner Corus to extend its capability to produce quality rail products. Product innovation research in rail products has been put at risk by the closure of Swinden Technology Centre in Rotherham, but there has been significant recent investment in a rail research centre at the University of Huddersfield. British Steel stated that the future trends in rail products are towards innovative wear- and corrosion-resistant longer-life rail[188] and it now feels well placed for the comprehensive continued capability development that this product/sector requires.[189]

Uncompetitive energy and business rates were stated as being a constraint on competitiveness primarily as they limited the producer's ability to make the investments required to stay competitive.[190] In this area, they believe they are at a significant disadvantage to their main European competitor, which has a long track record of heavy investment owing to consistent assistance from government.[191]

Supply Chains

No supply chain issues were raised during the interviews,[192] but one major producer stated a perceived lack of drive to innovate and another stated they were unaware of the UK's capability,[193] which could both point towards a lack of engagement across the supply

[187] Interview Findings Rail, Headline Findings: Capability.
[188] Interview Findings Rail, Market responses: (British Steel).
[189] Analysis of Interview Responses, Rails: Capability & Capacity.
[190] Interview Findings Rail, Headline Findings: Competitiveness.
[191] Interview Findings Rail, Competitiveness Responses: (British Steel).
[192] Analysis of Interview Responses, Rails: Supply Chains.
[193] Interview Findings Rail, Headline Findings: Capability.

chain. British Steel stated that they feel they need more connectivity with their customers.[194]

Future demand

The future demand for rail and medium sections[195] clearly shows that in 15 years' time, it is predicted that the current capacity of this process route will be surpassed. Given the very strong market position that British Steel has in rail[196] (much lower levels of market penetration in rail products than medium sections), and the higher value of this product, the British Steel rail business is unlikely to suffer from this predicted future capacity gap. Infrastructure spend and procurement policy were highlighted as future demand drivers.[197]

Building on the already successful export market for rails was highlighted by several respondents with the possibility of new markets such as the USA and Africa further increasing demand.[198]

Interventions

The most relevant intervention strategies for rail products concern the need to close the heat treatment and coatings capability gap to extend the UK offering to the full product range. The business case for making these investments would need to be made utilising a forecast of grade migration towards differentiated products over the next 15 years and the size of the opportunities for export penetration in current and new markets.[199]

Medium Sections

Capacity/Capability

Medium sections production in the UK has a singular shared production route with capacity of around 600 kt p.a. as shown in Exhibit 145.[200] Medium sections are the lower-value product in this process route, commanding approximately 80% of the price per tonne of rails.[201] Currently, British Steel supplies approximately a third of UK demand for this product while at the same time producing approximately 100 kt for exports. The medium section mill lacks thermomechanical rolling facilities which prevents it producing the highest value heat-treated grades, but these currently only make up 5% of the market.

Competitiveness

The medium section mill had significant investment under previous owner Corus, but this was not to increase capability or competitiveness in medium sections.

The UK process route for medium sections has a higher cost per tonne compared with imports from European competitors such as ArcelorMital's Beval plant in Luxembourg,[202] who produce steel from scrap and roll medium sections from near-net shape semis, known

[194] Interview Findings Rail, Headline Findings: Supply Chains.
[195] Exhibit 145 compiled from Q1 Analysis Output & Q2.
[196] Interview Findings Rail, Headline Findings: Markets.
[197] Analysis of Interview Responses, Rails: Markets.
[198] Analysis of Interview Data, Rails: Markets.
[199] Analysis of Interview Data, Rails: Markets.
[200] Exhibit 145 compiled from Q1 Analysis Output & Q2.
[201] Q1 Analysis Output, Medium Sections: Demand in UK (kt) and Prices (£/t) Graph.
[202] Q1 Analysis Output, Medium Sections: Summary Table: Commercial.

as beam blanks.[203] This technology (a UK invention) significantly reduces the amount of rolling and hence energy required and at the launch of the B4 beam blank caster in 2012, ArcelorMital calculated it would save them €62 per tonne[204] compared with purchasing slabs.

Structural cost-competitiveness disadvantages were highlighted by several interview respondents as a particular hindrance to this sector.[205]

Supply Chains

A significantly increased use of stockholders for the supply of sections over the past decade has led to increasing fragmentation and lower engagement across the supply chain and increased import penetration to reduce stockholders' supplier risk.[206] Several interview respondents stated a desire to buy British[207] and that better engagement would be mutually beneficial.[208]

A move towards enterprise resource planning was stated by one consumer,[209] which represents a risk to UK supply if the producer and this consumer are not engaged, but an opportunity if the converse is true.

Future demand

The future demand for rail and medium sections[210] clearly shows that in 15 years' time, it is predicted that the current capacity of this process route will be surpassed. Given the lower price per tonne[211] and weaker market position than rail, medium sections supply may suffer due to this predicted future capacity gap. Government procurement policy was highlighted as being particularly important[212] for medium sections with international contractors tending to default to suppliers from known producers in their own countries if allowed.[213] The 2030 forecast for sections also shows a predicted increase in migration towards the higher-value grades that require thermomechanical rolling, doubling the market share to 10% and around ~50 kt p.a. The rate of this grade migration could increase if future changes in the Eurocode that limit the use of higher strength steels are reversed.[214]

[203] 2012 Corporate Responsibility Report - ArcelorMittal, Luxembourg. http://luxembourg.arcelormittal.com/icc/arcelor-lux-en/med/83e/83e03f19-f7ae-f319-6ed8-6a67d7b2f25d,11111111-1111-1111-1111-111111111111.pdf. pp17.
[204] 2012 Corporate Responsibility Report - ArcelorMittal, Luxembourg. http://luxembourg.arcelormittal.com/icc/arcelor-lux-en/med/83e/83e03f19-f7ae-f319-6ed8-6a67d7b2f25d,11111111-1111-1111-1111-111111111111.pdf. pp17.
[205] Interview Findings Sections, Headline Findings: Competitiveness.
[206] Analysis of Interview Responses, Sections: Supply Chains.
[207] Analysis of Interview Data, Construction: Markets.
[208] Analysis of Interview Data, Construction: Markets.
[209] Interview Findings Sections, Supply Chain: (Severfield).
[210] Exhibit 145 compiled from Q1 Analysis Output & Q2 Demand Forecast for Rails & Medium Sections.
[211] Exhibit 145 compiled from Q1 Analysis Output & Q2.
[212] Analysis of Interview Responses, Sections: Supply Chains.
[213] Analysis of Interview Responses, Sections: Markets.
[214] Interview Findings Sections, Headline Findings: Supply Chains.

Interventions

A major cross-cutting issue that was highlighted as key is supply chain capability.[215] The focus of possible specific interventions in this product area should be on increasing productivity by investing in process route compression technologies. This requires significant CAPEX. Demands on CAPEX for these types of product capability/competitiveness must compete with essential replacement and compliance plans in a financial environment where CAPEX demands often outstrip supply.[216]

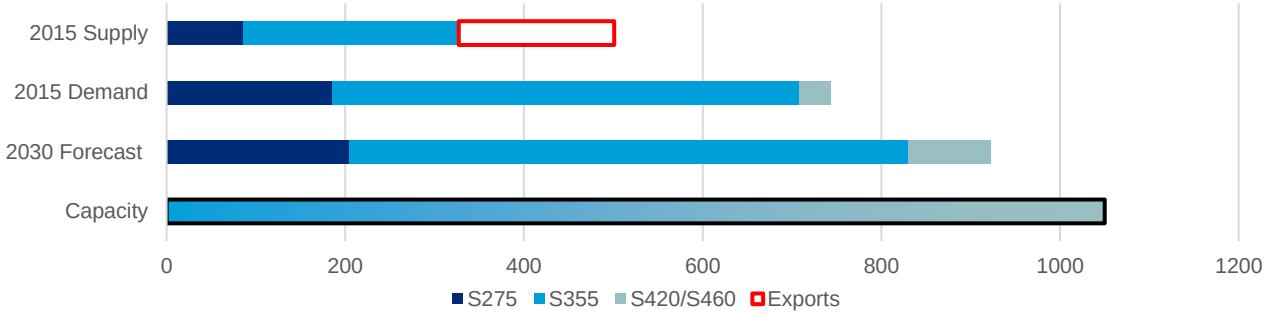
The forecast rate of demand migration to thermomechanical processed grades predicts only a modest loss of market share over the next 15 years, which by volume is approximately a sixth of the volume gap between local supply and forecast demand in other grades.

Heavy Sections

Capacity/Capability

Heavy section production was consolidated to the 1 Mt p.a. Teesside Beam Mill facility when the Scunthorpe Heavy section mill was closed in 2004. Exhibit 146[217] shows that the beam mill is only ~50% utilised to supply less than half of UK demand and sustain an export market of ~175 kt.

Exhibit 146: Supply/Demand/Forecast Volumes and Capacities Comparison for Heavy Sections



Like the medium section mill, the beam mill lacks thermomechanical rolling facilities, which prevents it supplying products for this higher-value 5% of the market.

Competitiveness

The UK process route for heavy sections has a higher cost per tonne compared with imports from European competitors such as ArcelorMital's Differdange plant in Luxembourg,[218] which is an integrated site with a dedicated process route from electric arc furnace through specifically designed heavy-section beam-blank casters and a heavy section mill with a capacity of 0.7 Mt.[219] This significantly reduces the through process

[215] Interview Findings Sections, Headline Findings: Supply Chains.
[216] Interview Findings Rail, Competitiveness Responses: (British Steel).
[217] Exhibit 146 compiled from Q1 Analysis Output & Q2 Demand Forecast for Heavy Sections.
[218] Q1 Analysis Output, Heavy Sections: Summary Table: Commercial.
[219] http://luxembourg.arcelormittal.com/Our-sites/.

costs compared with a geographically disparate UK route[220] utilising BF-BOF and slab casting.

Supply Chains

As for medium sections, the significantly increased use of stockholders for supply over the past decade has led to increasing fragmentation and lower engagement across the supply chain and increased import penetration to reduce stockholders' supplier risk.[221] A desire to buy British[222] and for better, mutually beneficial engagement was stated by several interviewees.[223]

A move towards enterprise resource planning was stated by one consumer,[224] which could be an opportunity for UK supply if the producer and this consumer are engaged, but a risk if the converse is true.

Future demand

Exhibit 146[225] shows that the UK has significant spare capacity and the forecast demand for heavy sections could comfortably be met in capacity terms. Like medium sections, the 2030 forecast for sections also shows a predicted increase in migration towards the higher-value grades, doubling the market share to 10% and ~90 kt p.a. The rate of this grade migration could increase if future changes in the Eurocode that limit the use of higher strength steels are reversed.[226]

A small growth in demand is forecast, largely owing to infrastructure projects in sectors such as rail and nuclear.[227] Exhibit 146[228] shows that the UK's three producers are capable and have the capacity to supply this.

Interventions

The most relevant intervention to allow the forecast heavy sections demand to benefit UK suppliers is for government procurement policy to consider the wider socioeconomic impacts of UK sourcing.[229] HMG has recently introduced steel specific procurement guidance to take account of social and environmental factors, but that the nature and duration of contracts may take some time for the full effects to be felt.

Light Sections

Capacity/Capability

Exhibit 147[230] shows that there are two producers of light sections in the UK, Celsa and Bromford Iron and Steels, who both operate a shared light section/merchant bar mill. Celsa is an EAF steel producer whereas Bromford purchases semi-finished steel in the form of billets. The light section market is small at approximately 100 kt p.a., with the UK

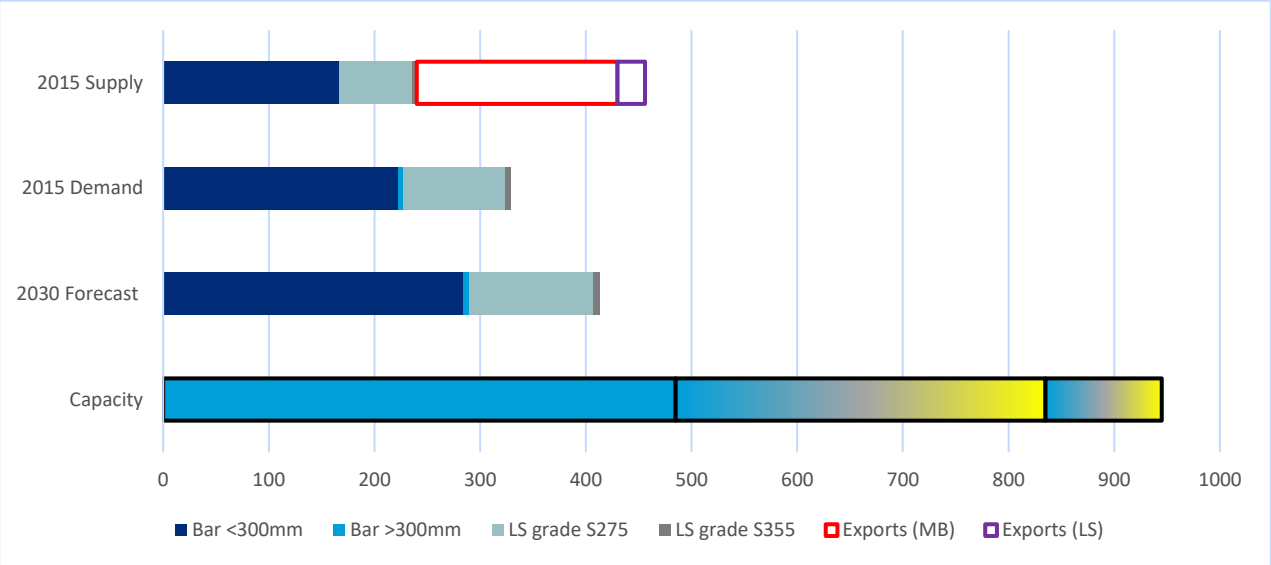
[220] Demand Forecast, Heavy Sections: Opportunities.
[221] Analysis of Interview Responses, Sections: Supply Chains.
[222] Analysis of Interview Data, Construction: markets.
[223] Analysis of Interview Responses, Sections: Supply Chains.
[224] Interview Findings Sections, Supply Chain: (Severfield).
[225] Exhibit 146 compiled from Q1 Analysis Output & Q2 Demand Forecast for Heavy Sections.
[226] Demand Forecast, Heavy Sections: Demand Outlook.
[227] Analysis of Interview Responses, Sections: Markets.
[228] Exhibit 146 compiled from Q1 Analysis Output & Q2 Demand Forecast for Heavy Sections.
[229] Analysis of Interview Responses, Sections: Markets.
[230] Exhibit 147 compiled from Q1 Analysis Output & Q2 Demand Forecast for Light Sections & Merchant Bar.

supplying 75% of demand and being capable to serve all requirements while having a large amount of spare capacity.

Competitiveness

Light sections is well severed in terms of producers and capacity with cross-cutting cost-competitiveness disadvantages the main theme highlighted by several interview respondents.[231]

Exhibit 147: Supply/Demand/Forecast Volumes and Capacities Comparison for Merchant Bar and Light Sections



Supply Chains

As light sections is a small niche market, the cross-cutting theme of government procurement policy for major infrastructure projects was seen as the most important.[232]

Future demand

A small growth in demand is forecast largely owing to infrastructure projects in sectors such as rail and nuclear.[233] Exhibit 147[234] shows the UK's three producers are capable and have the capacity to supply this.

Interventions

The most relevant intervention to allow the forecasted light sections demand to benefit UK suppliers is for government procurement policy to consider the wider socio-economic impacts of UK sourcing.[235]

[231] Interview Findings Sections, Headline Findings: Competitiveness.
[232] Q2 Demand forecast, Light Sections: Opportunities.
[233] Q2 Demand forecast, Light Sections: Demand Outlook.
[234] Exhibit 147 compiled from Q1 Analysis Output & Q2 Demand Forecast for Light Sections & Merchant Bar.
[235] Analysis of Interview Responses, Sections: Markets.

Merchant Bar

Capacity/Capability

As well as Celsa and Bromford, Caparo Merchant Bar (a joint venture between Caparo & Tata Steel) produces products for this market and between them these facilities supply around 75% of UK demand. The merchant bar demand has fallen to approximately a third of its previous level from the past two decades,[236] which explains the large overcapacity seen in Exhibit 147.[237]

Merchant bars are commodity products, and the three UK producers can supply nearly all the markets requirements. The only gap in UK production is for specialised flat bar over 300mm in gauge, which has marginal volumes.

Competitiveness

Merchant bar demand is primarily for its use in construction (80%) with the balance for manufacturing (20%)[238] and as such is viewed as a semi-finished product where price is the key factor.[239] The relatively low value of merchant bars helps guard against import and is why UK producers supply around 70% of UK demand.[240] As UK demand has fallen, producers have been increasingly competing on the European market,[241] which is shown by export volumes in figure 3.[242]

The ability of the UK producers to compete in this market is limited by the cross-cutting cost-competitiveness issues.[243]

Supply Chains

There were few concerns raised by interviewees regarding supply chains[244] but one contractor did state that they would like to use more UK-sourced steel but would need to build stronger relationships with suppliers,[245] which would require better engagement across the supply chain.

Future Demand

The major sector of demand (construction) is expected to grow over the next 15 years and this accounts for most of the forecast growth shown in figure 3.[246] The UK merchant bar industry is well placed to supply any increase in demand from a capacity and capability point of view.

Interventions

As nearly half of merchant bar produced is for export the most important factor to increase the utilisation of the UKs assets and increase our export market is addressing our cross-

[236] Q1 Analysis Output, Merchant Bar: Merchant Bars Supply in UK (kt) Graph.
[237] Exhibit 147 compiled from Q1 Analysis Output & Q2 Demand Forecast for Light Sections & Merchant Bar.
[238] Q1 Analysis Output, Merchant Bar: Demand Sector Breakdown (kt) – 2015.
[239] Analysis of Interview Responses, Merchant Bar: Competitiveness.
[240] Q1 Analysis Output, Merchant Bar: Demand in UK (kt) and Prices (£/t).
[241] Analysis of Interview Responses, Merchant Bar: Markets.
[242] Exhibit 147 compiled from Q1 Analysis Output & Q2 Demand Forecast for Light Sections & Merchant Bar.
[243] Q1 Analysis Output, Merchant Bar: Opportunities.
[244] Analysis of Interview Responses, Merchant Bar: Competitiveness
[245] Analysis of Interview Responses, Merchant Bar: Supply Chains.
[246] Exhibit 147 compiled from Q1 Analysis Output & Q2 Demand Forecast for Light Sections & Merchant Bar.

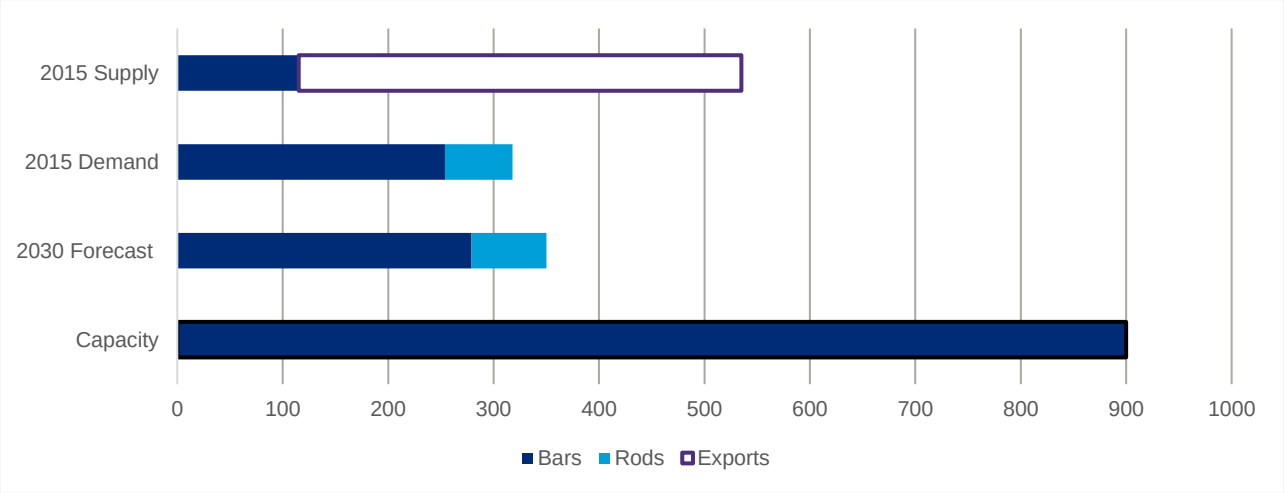
cutting structural cost and productivity weaknesses as compared with European competitors.

Engineering Steels

Capacity/Capability

Liberty's Speciality Steels has three sites in South Yorkshire (Aldwarke, Brinsworth and Stocksbridge) that between them make up the UK's capacity of approximately 1 Mt p.a. in this product. This resource is currently significantly underutilised with a majority of its output feeding exports as shown in Exhibit 148.[247] The only process capability gap is for engineering steels supplied as rods, which is currently around 20% of demand.

Exhibit 148: Supply/Demand/Forecast Volumes and Capacities Comparison for Engineering Steels



Competitiveness

As all liquid steel produced utilises the EAF route, the predominant factors in competitiveness are energy price, and because most grades manufactured require premium (clean) scrap that is competed for against global prices, raw material cost.[248]

Several interviewees expressed the view that there is a lack of product innovation and little change in product specifications over time, as well as inability to meet complex customer demands which can limit their use of UK supplied steel in this area.[249]

Supply Chains

Procurement across global fragmented supply chains in the automotive and aerospace sectors, where decisions on sourcing are often made outside of the UK[250] or by specialist stockholders,[251] is a major threat to this sector. Several consumers also expressed an opinion that a lack of willingness to supply small orders[252] and deal with smaller

[247] Exhibit 148 compiled from Q1 Analysis Output & Q2 Demand Forecast for Engineering Steels.
[248] Q3 Analysis, Engineering Steels: Market Share Analysis.
[249] Analysis of Interview Responses, Engineering Steels: Capability & Capacity.
[250] Analysis of Interview Data, Automotive: Supply Chain.
[251] Analysis of Interview Data, Aerospace: Supply Chain.
[252] Analysis of Interview Data, Aerospace: Capability & Capacity.

consumers rather than just OEMs[253] by UK producers is causing them to look elsewhere for supply.

Future Demand

Increase in demand is likely to be primarily from the aerospace and engineering/machinery sectors.[254] Consumers across the automotive sectors expressed the opinion that material substitution due to lightweighting presents a risk to future steel use,[255] with the drive towards EU emissions targets offsetting any potential growth in demand.[256] The continued contraction of the oil & gas industry in the UK will partially negate the effects of growth in other sectors, but in terms of volume the UK has sufficient spare capacity to fulfil this increased demand and erode the two-thirds UK demand share that imports hold.[257]

Interventions

A focus on identifying supply chain vulnerabilities in aerospace, engineering and automotive sectors and strategies to strengthen and grow the onshore element of these supply chains needs to be considered in parallel with specific government strategies for these sectors. Alloy development for product innovation to meet changing customer needs, with a particular emphasis on the development of higher-strength steels for lightweighting, is required if demand is not to be lost due to product migration and to allow the UK to utilise its significant latent capacity in this product.

Addressing cross-cutting industry cost factors as well as investment in technologies to improve pre-processing of scrap and hence significantly improve yield and energy efficiency are required to improve cost competitiveness and compete globally in this sector.

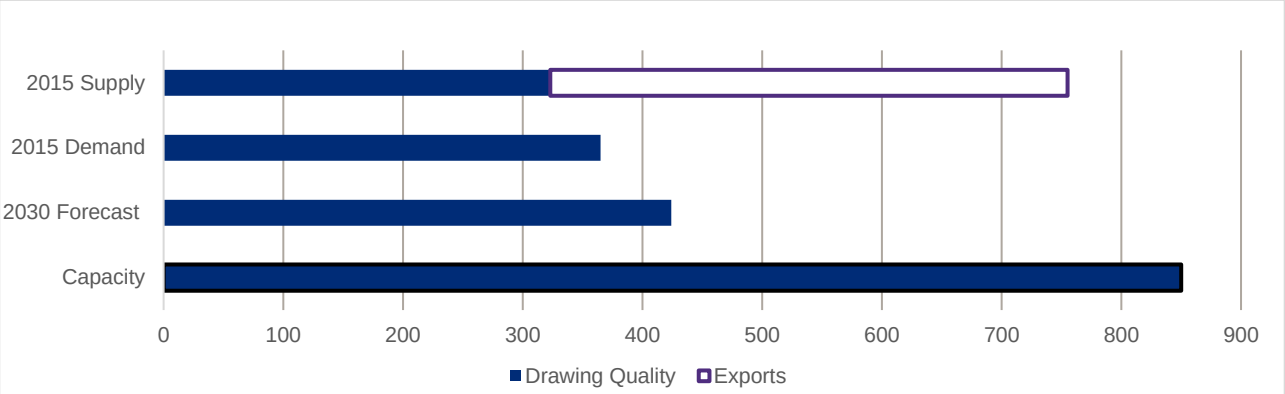
Wire Rod

Capacity/Capability

British Steel's wire rod mill serves the high-value side of UK demand and has enough capacity to maintain a healthy export market in high-value tyre cord grades to the EU[258] as shown in Exhibit 149.[259] Celsa's wire rod mill is in a separate part of the market and supplies commodity mesh wire rod primarily for the construction sector. The mill's capacity, as shown in Exhibit 150,[260] is shared with rebar production, and specific issues related to this product will be discussed in the rebar section.

[253] Analysis of Interview Data, Automotive: Competitiveness.
[254] Q2 Demand forecast, Engineering Steels: Sector Breakdown (kt).
[255] Q2 Demand forecast, Engineering Steels: Sector Outlook.
[256] Q1 Analysis Output, Engineering Steels: Engineering Steels Supply in UK (kt) Graph.
[257] Q1 Analysis Output, Engineering Steels: Engineering Steels Supply in UK (kt) Graph.
[258] Exhibit 149 compiled from Q1 Analysis Output & Q2 Demand Forecast for Wire Rod.
[259] Exhibit 150 compiled from Q1 Analysis Output & Q2 Demand Forecast for Rebar and Wire Rod.
[260] Exhibit 150 compiled from Q1 Analysis Output & Q2 Demand Forecast for Rebar and Wire Rod.

Exhibit 149: Supply/Demand/Forecast Volumes and Capacities Comparison for Drawing Quality Wire Rod



Competitiveness

The competitive advantage in this product that allows for such a strong export volume is built on a strong reputation for product research in this area in the UK, which has recently been put at risk by the closure of the Swinden Technology Centre and the fragmentation of the wider process/product development route once encapsulated within Tata Steel.[261] British Steel is concerned about product innovation[262] and its capability to invest to keep up with this,[263] as well as concerns around skills shortages in engineering/metallurgy and attracting talent into the industry.[264]

Supply Chains

British Steel noted that UK domestic demand suffers from hollowed-out supply chains and that the UK industry needs to be better connected with the customer to stop them losing sight of the customer's real needs.[265]

Future Demand

High-value drawing wire rod is likely to see modest growth that is forecast to track changes in the manufacturing index.[266] In capacity terms, the UK is capable of supplying this increase in demand.

Interventions

A major risk to maintaining the strong market-leading position in this product area is the need for investment in securing product development capability so that gaps in the UK's offering do not appear because of new wire products developed overseas.[267]

Rebar

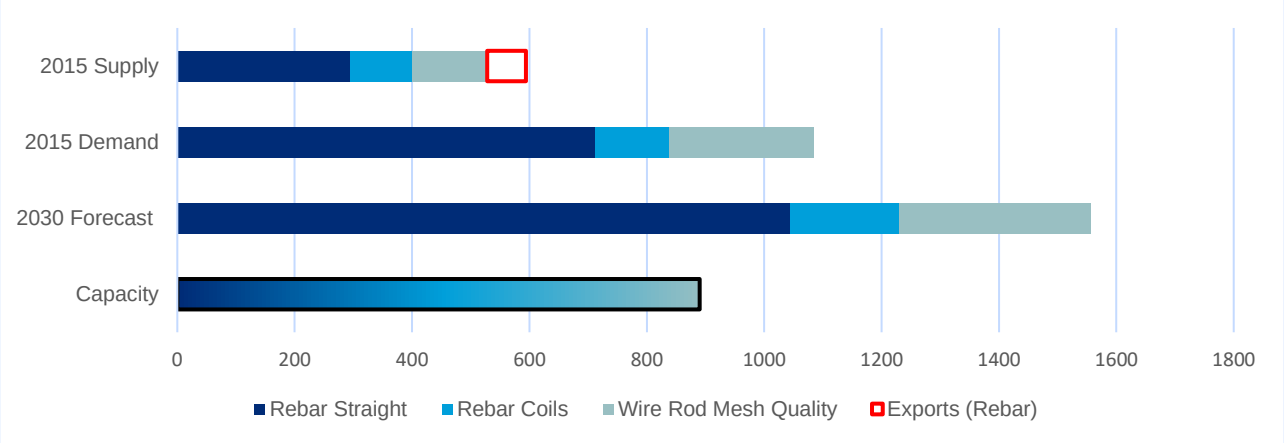
Capacity/Capability

Celsa is the only current UK supplier of rebar. ATG Thamesteel, who operated the Sheerness plant, went out of business in 2013. Liberty has recently bought these assets.

[261] Q3 Analysis, Wire Rod: Market Share Analysis.
[262] Interview Findings Rail, Markets Responses: (British Steel).
[263] Analysis of Interview Responses, Wire Rods: Capability & Capacity.
[264] Interview Findings Rail, Cross-cutting Responses: (British Steel).
[265] Q2 Demand forecast, Wire Rod: Sector Outlook – Drawing Quality WR.
[266] Q2 Demand forecast, Wire Rod: Sector Outlook – Drawing Quality WR.
[267] Q3 Analysis, Wire Rod: Intervention Prioritisation Matrix.

There are no capability gaps as rebar is a commodity product with little scope for differentiation, though this can cause capacity issues as Celsa's bar mill is also capable of supplying mesh-quality wire rod, as shown in Figure 6.[268]

Exhibit 150: Supply/Demand/Forecast Volumes and Capacities Comparison for Rebar and Mesh-Quality Wire Rod



Competitiveness

As commodity products, cross-cutting industry cost factors are more prominent in the competitiveness of rebar and mesh-quality wire rod, with Celsa stressing this as the most notable factor on how competitive it can be on cost[269] and that a significant disparity still remains with its European rivals.[270] The lack of UK supplier competition was highlighted in several interviews as a reason for import penetration as consumers look to maintain a diverse supplier base in order to manage their supply risk.[271]

Supply Chains

The lack of supplier competition in the supply chain is further complicated by the singular UK producer's vertical integration, which means UK supply downstream is often deliberately not used as the parent company is considered a competitor.[272] Large infrastructure projects and the construction sector are an increasingly significant part of demand for mesh-quality wire rod[273] and the sole driver of demand in rebar. Transparency and reporting on material sourcing are issues being highlighted by several interviewees.[274]

Future Demand

Construction spend is forecast to grow at 1.9% until 2030 with infrastructure spend higher at 2.7%,[275] which is shown in the strong demand growth particularly for rebar as shown in

[268] Exhibit 150 compiled from Q1 Analysis Output & Q2 Demand Forecast for Rebar and Wire Rod.
[269] Analysis of Interview Responses, Wire Rods: Competitiveness.
[270] Analysis of Interview Responses, Wire Rods: Competitiveness.
[271] Analysis of Interview Responses, Rebar: Supply Chain.
[272] Analysis of Interview Responses, Rebar: Supply Chain.
[273] Q2 Demand forecast, Wire Rods: Sector Breakdown (kt).
[274] Q2 Demand forecast, Rebar & Mesh Quality WR: Sector Outlook.
[275] Q2 Demand forecast, Rebar & Mesh Quality WR: Sector Outlook.

Exhibit 150.[276] Current demand outstrips capacity and is forecast to almost double current operating capacity by 2030.

Interventions

To increase the market share of UK-supplied rebar, any possible intervention strategies would first need to address the lack of supplier competition and gap in capacity. The purchasing of the assets of Sheerness bar mill gives Liberty the possibility of adding a second supplier and ~0.75 Mt p.a. to the UK rebar capacity. Celsa currently operates an EAF production route, and energy usage is a particularly significant proportion of cost/tonne of rebar production. Further interventions to increase the competitiveness of rebar production in the UK should focus on scrap pre-processing and efficiency in the EAF.[277]

Flat Products (Plates, Hot & Cod Rolled Coils, Coated Products [Metallic & Organic Coated Sheet], Tinplate)

Plates

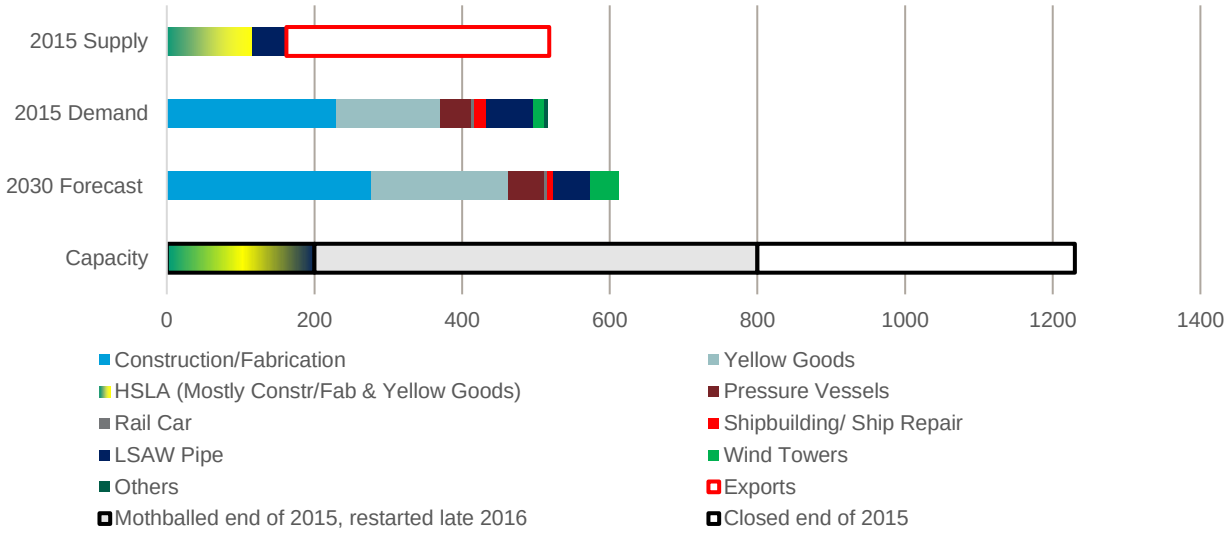
Capacity/Capability

Tata's plate business ceased production at the end of 2015 (and hence is included in the 2015 supply figures in Exhibit 151[278]), with mills in Scunthorpe and Lanarkshire being mothballed. Liberty Steel bought the Scottish mills, with the Dalzell plant in Motherwell restarting production in late 2016, and Clydesbridge to follow suit at a date yet to be confirmed.

Liberty's Dalzell mill is limited to rolling plate with a maximum width of around 3.5m and currently operates using steel slabs bought on the open market. Spartan's slab supply is from parent company Metinvest's Azovstal plant in Ukraine and their mill is limited to around 2m in width and is primarily focused on producing plates for yellow goods and welded sections. The lack of a direct link between slab supply and rolling facilities also limits the ability to offer higher strength and quality products and impedes entry to the higher-value end of the market.[279]

[276] Exhibit 150 compiled from Q1 Analysis Output & Q2 Demand Forecast for Rebar and Wire Rod.
[277] Q3 Analysis, Rebar: Intervention Prioritisation Matrix.
[278] Q2 Demand Forecast, Plates: Opportunities.
[279] Q2 Demand Forecast, Plates: Opportunities.

Exhibit 151: Supply/Demand/Forecast Volumes and Capacities Comparison for Plate[280]



Competitiveness

The lack of a suitable UK offering was noted by interviewees across several sectors including construction, nuclear, renewable energy and oil & gas.[281] Several interviewees noted that the plate products supplied from the UK are more expensive and less competitive than imports.[282]

Supply Chains

In addition to being uncompetitive on price with imports, three consumers cited that UK producers offer poor response times.[283] One of the UK producers stated that only 30% of their contact is direct with consumers and that there is an opportunity for more engagement as they feel they do not always know what can be done with their products.[284]

Future Demand

Forecast for plate demand is expected to grow by around 20% (~100 kt) over the next 15 years primarily in construction, yellow goods and wind towers.[285] Requirements for demand increases are forecast to follow global trends in plate requirements, which indicate a shift towards higher-quality X80 pipeline grades, higher-strength normalised structural grades, increased use of wider (4500–5000mm) plate and thicker and stronger plate for pressure vessels and power plant applications.[286]

Interventions

Of the three significant growth areas forecast for home-market demand, the UK currently has some capability in two, but little capability in the third, plate for wind towers. The

[280] HSLA: High-Strength Low-Alloy and LSAW: Longitudinal-Submerged Arc-Welded.
[281] Q2 Analysis of Interview Responses, Plates: Capability & Capacity.
[282] Interview Findings, Plates: Headline Findings Competitiveness.
[283] Q2 Analysis of Interview Responses, Plates: Competitiveness.
[284] Q2 Analysis of Interview Responses, Plates: Competitiveness.
[285] Q2 Demand Forecast, Plates: Sector Breakdown for Plate Demand (kt).
[286] Q2 Demand Forecast, Plates: Demand Outlook.

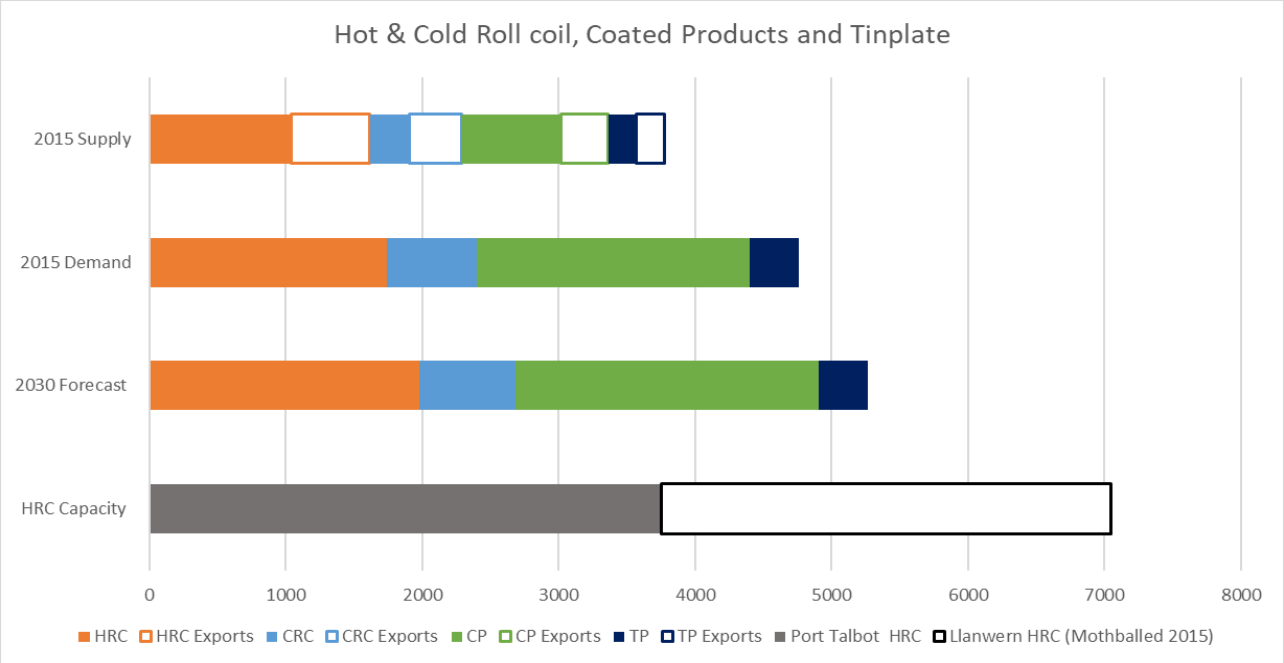
predicted growth in demand for wind turbine towers gives an opportunity for UK production of high-strength, 3m-plus-wide plates that Liberty Steel has recognised.[287] This would require two parallel interventions: firstly, a modern plate mill utilising technologies such as thermomechanical rolling and accelerated cooling could supply the higher-quality end of the market; secondly, steel-making and slab-casting facilities capable of supplying suitable semi-finished products to enable the mill to fulfil its full product range potential.[288]

Hot Rolled Coil

Capacity/Capability

UK demand for hot rolled coil is stable at ~1.8 Mt and two-thirds of this is supplied from within the UK at Tata Steel's Port Talbot plant, as shown in Exhibit 152.[289] The overall demand on the hot-strip mill is much greater than this, as its output also feeds downstream mills producing cold rolled coil, coated products and tinplate. Port Talbot's hot-strip mill is considered the bottleneck of the plant,[290] and in order to increase throughput, limits its strip thickness to greater than 2mm. Tata Steel mothballed another hot-strip mill in Llanwern in 2015, reducing the capacity by ~3 Mt p.a.

Exhibit 152: Supply/Demand/Forecast Volumes and Capacities Comparison for HR and CR Coil, Coated Products and Tinplate



Competitiveness

The primary development focus over the past five years has been lowering the cost of liquid steel and, while this has brought improvements in yield, it can affect cleanliness and

[287] Interview Findings, Plates: Supply Chain Responses (Liberty Steel).
[288] Q3 Analysis, Plate: Intervention Prioritisation Matrix.
[289] Exhibit 152 compiled from Q1 Analysis Output & Q2 Demand Forecast for HRC, CRC, Coated Products & Tinplate.
[290] Interview Findings, HRC: Steel Expert Response.

quality. Tata recognises that it is still behind its competitors on steel-making cost.[291] Competitiveness is constrained by contrasting needs to maintain throughput of high-volume orders to drive down costs while pursuing the migration towards thinner, high-strength lower-volume grades with potentially higher margins. Several interviewees felt UK producers were not as innovative and progressive as they were 10–15 years ago in developing new products.[292] A number of interviewees also raised concerns around customer service and response times.[293] There is uncaptured value in some hot rolled coil products that are within capability, such as thin gauge hot rolled coil products,[294] owing to the capacity and throughput restraints to allow the hot rolled coil mill to supply downstream mills.

Supply Chains

Several interviewees across the construction and automotive sectors expressed the view that more engagement with producers was needed,[295] with some of these recognising the difficulty in doing this due to procurement decisions often being made offshore and the fragmented nature of the supply chain.[296]

Future Demand

The majority of demand for steel sold as hot rolled coil is for pipes and hollow sections and other construction products.[297] Grade migration is a risk to supply in these areas as anticipated shifts towards an increased use of X80 pipeline grades, shifts in structural grades to higher strength S700 grades for hollow sections and an increased use of thinner hot rolled coil material (less than 1.5mm)[298] would further decrease the market share that currently can be supplied.

Interventions

Intervention strategies and priorities are considered with cold rolled coil and coated products below.

Cold Rolled Coil

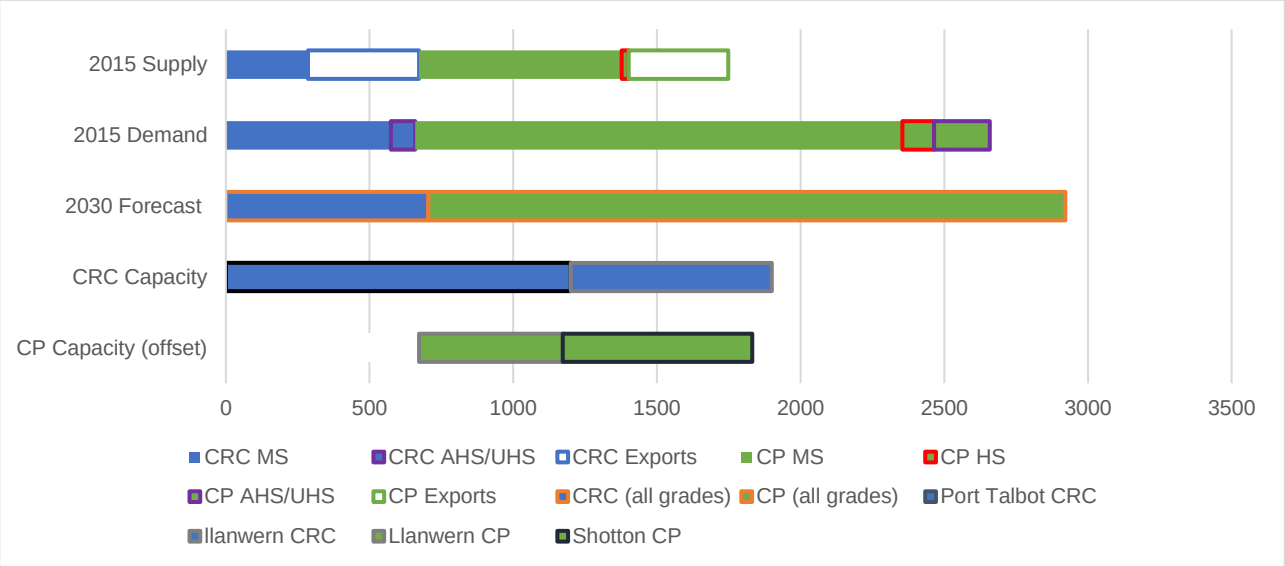
Capacity/Capability

UK demand for cold rolled coil has declined steadily since the mid 1990s from ~1.7 Mt p.a. to less than half this figure (~0.7 Mt p.a.) in 2015, as shown in Exhibit 153.[299] Around 55% is UK supplied (~0.4 Mt p.a.). UK production is boosted by a similar amount per annum for export. The market trend for cold rolled coil remains downwards, largely due to migration to coated products and thin-gauge hot-rolled material.[300] Exhibit 153 also shows that the UK does not currently supply any advanced high-strength or ultra-high-strength cold rolled coil. These grades make up 15% by volume, but are the highest in value. The cold rolled coil capacity across Port Talbot and Llanwern was close to fully utilised to supply cold

[291] Interview Findings, HRC: Competitiveness Responses (Tata Steel).
[292] Q2 Analysis of Interview Responses, HRC: Competitiveness.
[293] Q2 Analysis of Interview Responses, HRC: Competitiveness.
[294] Q2 Analysis of Interview Responses, HRC: Capability & Capacity.
[295] Q2 Analysis of Interview Responses, HRC: Supply Chains.
[296] Q2 Analysis of Interview Responses, HRC: Supply Chains.
[297] Q2 Demand Forecast, HRC: Sector Breakdown for HRC Demand (kt).
[298] Q2 Demand Forecast, HRC: Demand Outlook.
[299] Exhibit 153 compiled from Q1 Analysis Output & Q2 Demand Forecast for CRC, Coated Products & Tinplate.
[300] Q1 Analysis Output, CRC: Headline, Demand and Supply Slide.

rolled coil for sale and to feed the downstream coated product mills in Llanwern and Shotton.

Exhibit 153: Supply/Demand/Forecast Volumes and Capacities Comparison for Cold Rolled Coil, Coated Products and Tinplate[301]



Competitiveness

The view of many consumers was that the perceived capability in cold rolled coil was the biggest limiting factor in terms of supply of automotive grades and is the reason for rising imports.[302] Many consumers were also of the opinion that the UK has struggled to invest in research and strategies to increase capability due to structural cost issues and due to Europe-wide investment strategies by the international parent company.[303] Several interviewees also raised concerns around customer service and response times.[304]

Supply Chains

Like hot rolled coil, the key issue that came across in multiple interviewees was the view that more engagement with producers was needed,[305] recognising that the difficulty in doing this is due to procurement decisions often being made offshore and the fragmented nature of the supply chain.[306]

Future Demand

Forecast demand growth in cold rolled coil over the next 15 years is modest at less than 50 kt,[307] but the total opportunity (including displacement of imports) is around ~375 kt. Around 30% of this is from the automotive sector.[308] This more attractive, higher-value part of the market is predicted to accelerate the rate at which it is migrating towards advanced

[301] CP capacity is offset by 672 kt so it lines up with CRC supply for CP in 2015 Supply bar.
[302] Q2 Analysis of Interview Responses, CRC: Capability & Capacity.
[303] Q2 Analysis of Interview Responses, CRC: Competitiveness.
[304] Q2 Analysis of Interview Responses, CRC: Competitiveness.
[305] Q2 Analysis of Interview Responses, CRC: Supply Chains.
[306] Q2 Analysis of Interview Responses, CRC: Competitiveness.
[307] Q2 Demand Forecast, CRC: Sector Breakdown for CRC Demand (kt).
[308] Q2 Demand Forecast, HRC: Opportunities.

higher-strength and ultra-high-strength grades for lightweighting to meet emissions regulations.[309] These grades are imported from Germany and from Tata Steel's sister plant in IJmuiden[310].

Interventions

Intervention strategies and priorities are considered with hot rolled coil and coated products below.

Coated Products (Metallic & Organic Coated Sheet)

Capacity/Capability

Coated products demand has not seen a structural decline[311] and the UK capacity is shared between three mills in Wales. Port Talbot's CAPL line and Llanwern's galvanising line, which mainly supply the automotive sector, and Shotton's Colorcoat line, which is supplied from Llanwern and serves the construction sector. There is insufficient capacity to meet the demand for metallic coated products from the market and also to supply Shotton, as seen in Figure 9.[312]

Like cold rolled coil, the most recent data (2015) shows very little high-strength (HS) and no higher-strength grades (AHS, UHS) are supplied from the UK. These higher-value grades make up 15% of the demand by volume. As well as gaps in UK supply for higher-strength material, the UK supply also does not supply the higher-value end of the market for heavier zinc coatings (Z>600) which make up 5% of demand by volume.[313]

Competitiveness

Like cold rolled coil, many consumers were also of the opinion that due to structural cost issues and the Europe-wide investment strategies of the international parent company, the UK has struggled to invest in research and development.[314] Several interviewees also raised concerns around customer service and response times.[315] One major automotive OEM highlighted that the galvanneal products that used to be UK sourced could no longer be supplied from within the UK.[316]

Supply Chains

As for hot rolled and cold rolled coil, responders from the construction and automotive sectors recognised that more engagement with producers was needed,[317] and also the difficulty in doing this, with procurement decisions often being made offshore and the fragmented nature of the supply chain.[318]

[309] Q2 Demand Forecast, HRC: Sector Outlook.
[310] Q1 Analysis Output, CRC: Summary, Grades.
[311] Q1 Analysis Output, CP: Headline, Demand and Supply Slide.
[312] Exhibit 153 compiled from Q1 Analysis Output & Q2 Demand Forecast for CRC, Coated Products & Tinplate.
[313] Q1 Analysis Output, CP: Headline, Demand and Local Deliveries by Technical Requirement – 2015.
[314] Q2 Analysis of Interview Responses, CP: Capability & Capacity.
[315] Q2 Analysis of Interview Responses, CP: Competitiveness.
[316] Interview Findings, HRC: Capacity & Capability Responses (Honda).
[317] Q2 Analysis of Interview Responses, CP: Supply Chains.
[318] Q2 Analysis of Interview Responses, CP: Supply Chains.

Future Demand

Growth in coated products is forecast to increase the overall demand approximately 10% over the next 15 years, but like cold rolled coil this extra demand (~220 kt) is minor compared with the future opportunity due to imports (1.3 Mt).[319] Specific opportunities have been highlighted where, like cold rolled coil, a perceptible sharp increase in AHS and UHS steels exists to help lightweight manufacture to meet 2030 emissions targets as well as downgauging for construction applications.[320] These grades are currently imported from Tata's IJmuiden plant and ArcelorMittal in Europe and POSCO in South Korea.[321]

There are also future growth opportunities around gaps in UK supply of coatings for Mg-Al, galvanneal, Z600 and higher grades. Mg-Al and galvanneal are produced within Tata Steel[322] offshore as part of a consolidated Europe-wide offering to the automotive market.[323] Only ArcelorMittal and Wupperman currently have these Z>600 capabilities in coatings.[324]

Interventions (for Hot Rolled and Cold Rolled Coil and Coated Products)

Correspondence with Tata representatives as part of the steering group responsible for this study indicates that the process routes in South Wales are capable of producing higher-strength coated products and therefore the lack of UK supply is neither a market demand or capability issue.[325] Capabilities in South Wales for cold rolled coils include a fully onshore route capable of producing dual phase 800MPa yield strength steels, to supply automotive AHS grades, and parts of the process route have been used to supply a dual-phase 1000MPa yield strength product suitable for UHS automotive grades.

The importance of relentless product innovation research was highlighted by several consumers in construction and automotive as they have seen the UK's product offering drop behind their competitors in this sector. It is their belief that this is due to cost pressures exacerbated by a lack of commercialisation of new products in the UK. To overcome this capability gap, product research into new coatings and wear-resistant steels, and ultra-high-strength low-alloy steels, would need to be commercialised in the UK, which would involve a strategic decision backed up by investment across the wider Tata group. Colorcoat, produced at Shotton, is a great example of how this can work, with consumers enthusing that it is the 'best on the market' and that they are willing to pay a premium for this product.[326]

Two capacity issues limit the output of strip products from South Wales as shown in Exhibit 152[327] and Exhibit 153[328]. These are the Port Talbot hot-strip-mill bottleneck, which could be overcome by restarting Llanwern's hot-strip mill if demand dictates, and the

[319] Q2 Demand Forecast, CP: Opportunities.
[320] Q2 Demand Forecast, CP: Demand Outlook.
[321] Q1 Analysis Output, CP: Summary, Grades.
[322] Q1 Analysis Output, CP: Summary.
[323] Interview Findings, CP: Steel Expert Response.
[324] Interview Findings, CP: Steel Expert Response.
[325] Summary Output, Steering Group Feedback.
[326] Q2 Analysis of Interview Responses, CP: Capability & Capacity.
[327] Exhibit 152 compiled from Q1 Analysis Output & Q2 Demand Forecast for HRC, CRC, Coated Products & Tinplate.
[328] Exhibit 153 compiled from Q1 Analysis Output & Q2 Demand Forecast for CRC, Coated Products & Tinplate.

bottleneck in galvanised sheet at Llanwern, which constrains Tata's offering in automotive coated products as well as Colorcoat from Shotton for the construction sector.

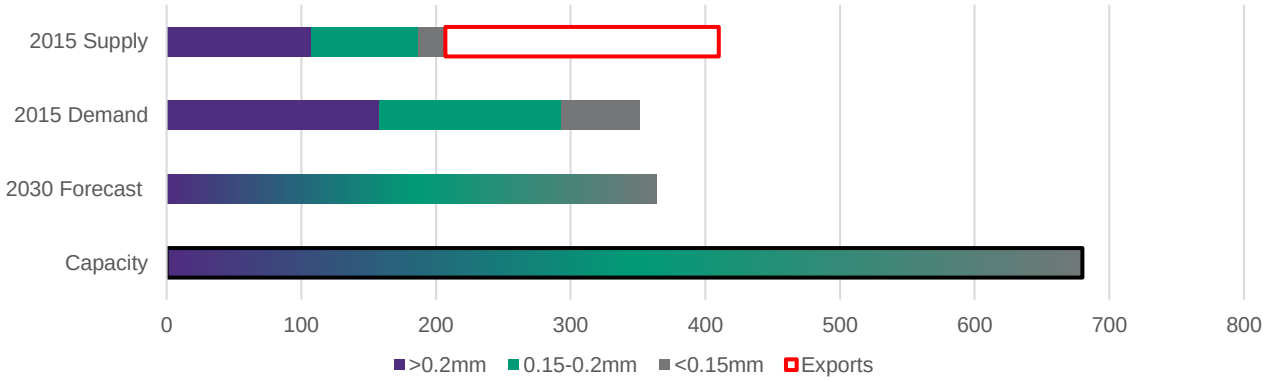
An opportunity exists to improve integration across the fragmented European supply chains, particularly in the automotive sector, where material choice decisions are often made outside of the UK. Any targeted increase in UK supply to this sector would have to consider intervention strategies to increase engagement between UK steel producers' application experts and the designers and material specifiers within major international OEM consumers.

Tinplate

Capacity/Capability

UK demand declined steadily from the mid-1990s, driven by demand for lightweighting higher-strength grades, but had stabilised in recent years at around 0.5 Mt p.a.[329] The UK-supplied market share is around 60%, which is supplemented by export volumes of ~0.2 Mt p.a. as shown in Exhibit 154.[330] UK capacity is sufficient to satisfy demand and there is capability across the whole range of grades and thicknesses. However, market penetration of exports has been greatest in the lowest thickness materials, which could highlight some emerging capability gaps for very thin (0.13mm and less) material.[331]

Exhibit 154: Supply/Demand/Forecast Volumes and Capacities Comparison for Tinplate



Competitiveness

The UK enjoys a strong competitive position that allows it to export strongly to Europe and the USA.[332] The sole producer believes this position is always under threat from material substitution, which in their eyes is partly due to a lack of understanding on the consumer's part as to the recyclability of steel.[333]

[329] Q1 Analysis Output, Tinplate: Headline, Demand and Supply Slide.
[330] Exhibit 154 compiled from Q1 Analysis Output & Q2 Demand Forecast for Tinplate.
[331] Q1 Analysis Output, Tinplate: Summary slide, Headline and Thickness.
[332] Q2 Analysis of Interview Responses, Tinplate: Markets.
[333] Q2 Analysis of Interview Responses, Tinplate: Markets.

Supply Chains

The market in this sector is seen to be changing with an increasingly international supply chain for a smaller number of end consumers.[334]

Future Demand

Tinplate demand is forecast to likely remain flat over the next 15 years in terms of volume, but this masks an increase in demand at lower gauges.[335] Increased demand could be generated from actions to erode the proportion of imports (~40%) that supply UK market demand[336] for what is a high-value product.[337]

Interventions

Product innovations, such as polymer coatings and investment in capability for thinner gauges, are required to maintain the current market share. Tata also realises that better engagement with consumers and supply chain agility is required to grow markets for this high value product.[338]

Other Products (Stainless Steel, Open Die Forgings & Seamless Tubes)

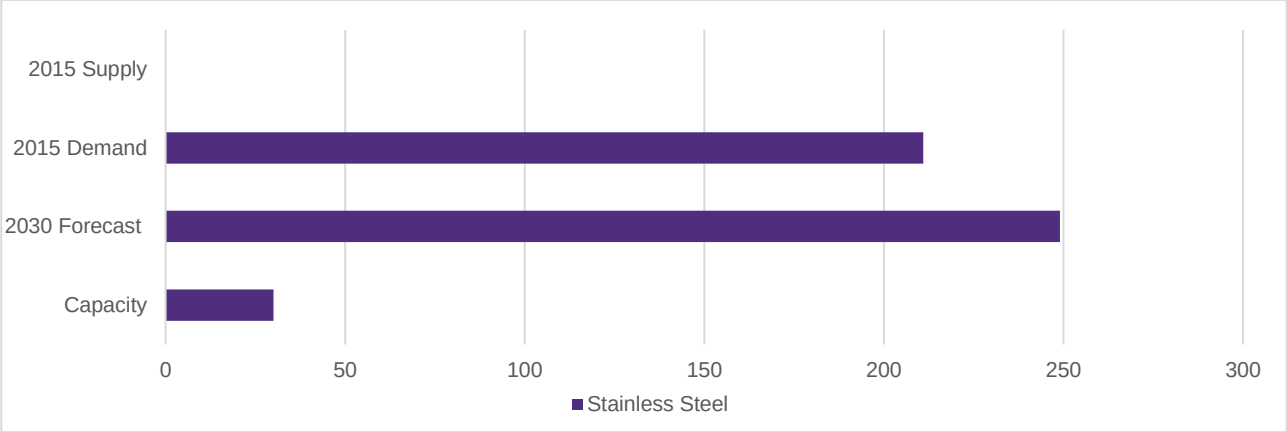
Stainless Steel

Capacity/Capability

Outokumpu's integrated site in Sheffield includes melting and casting operations that produce semi-finished products such as slab, bloom, billet and ingot. The only finishing facilities on site are a small 30 kt bar/rod mill that produces rod coil, bar and rebar as shown in Exhibit 155.[339] In 2005 the cold rolling and finishing units were closed and now all flat rolled products are finished abroad and re-imported into the UK. The steel-making facilities are not state-of-the-art, but have been producing innovative steel grades and the site has the capability of producing in excess of 0.6 Mt p.a. of semi-finished products, but does not achieve this due to low volume demands.

[334] Q2 Analysis of Interview Responses, Tinplate: Supply Chains.
[335] Q2 Demand Forecast, Tinplate: Sector Outlook.
[336] Q2 Demand Forecast, Tinplate: Demand Outlook.
[337] Q1 Analysis Output, Tinplate: Demand in UK (kt) and Prices (£/t) Graph.
[338] Q2 Analysis of Interview Responses, Tinplate: Supply Chains.
[339] Exhibit 155 compiled from Q1 Analysis Output & Q2 Demand Forecast for Stainless Steel.

Exhibit 155: Supply/Demand/Forecast Volumes and Capacities Comparison for Stainless Steel[340]



Competitiveness

Output is controlled from the Company's HQ in Finland and Outokumpu has production facilities in Sweden and Finland that can feed the UK demand for stainless steel. There is no other UK supplier putting pressure on Outokumpu.

Supply Chains

No relevant information was collected on supply chain issues.

Future Demand

An increase in demand for stainless steel is forecast due to its use in nuclear power stations and rail cars, but the majority of this demand is likely to be imported into the country in the form of manufactured goods.[341] The remaining net increase in demand falls short of the volumes required to make restarting the UK mills a commercially viable option and could be covered be Outokumpu's Scandinavian facilities.

Interventions

No specific interventions are relevant given the low demand for stainless steels, but were demand to increase further to the levels seen two decades ago (around the 600 kt p.a.), then options should be reviewed, and strategies to address the cross-cutting constraint around investment capability become relevant.

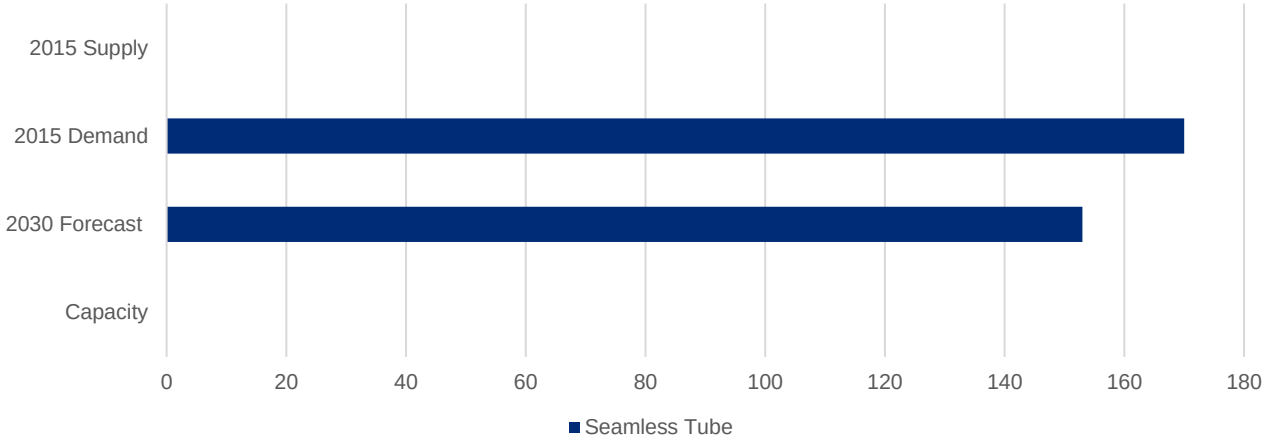
Seamless Tubes

Capacity/Capability

The seamless tube market has declined by 50% in the past 10 years, coinciding with the decline in the oil & gas industry and, since the closure of Timken Desford Tube in 2008, has been wholly supplied by imports. Exhibit 156[342] shows that these imports are currently less than half of what would be required to make a new UK mill a realistic economic proposition.

[340] No visibility from Q1 data of output from Outokumpu's Sheffield bar/rod mill.
[341] Q2 Demand Forecast, Stainless Steels: Sector Outlook.
[342] Exhibit 156 compiled from Q1 Analysis Output & Q2 Demand Forecast for Seamless Tubes.

Exhibit 156: Supply/Demand/Forecast Volumes and Capacities Comparison for Seamless Tube[343]



Competitiveness

As no parts of the seamless tube process route exist, factors effecting UK competitiveness are not relevant.

Supply Chains

No relevant information was collected on issues regarding the small supply chain that exists in this product.

Future Demand

Seamless tube demand is forecast to decline over the next 15 years due to the continuing contraction of oil & gas production in the UK.[344] Although shale gas was identified by several interviewees as an opportunity, they had no visibility about if and when this would come to fruition and how much demand this would generate.[345]

Interventions

An in-depth assessment would need to determine whether interview responses suggesting market interest, combined with expected future demand from the oil & gas industry plus possible new markets, would alter the competitive picture sufficiently to merit the significant investment needed to re-enter the market.

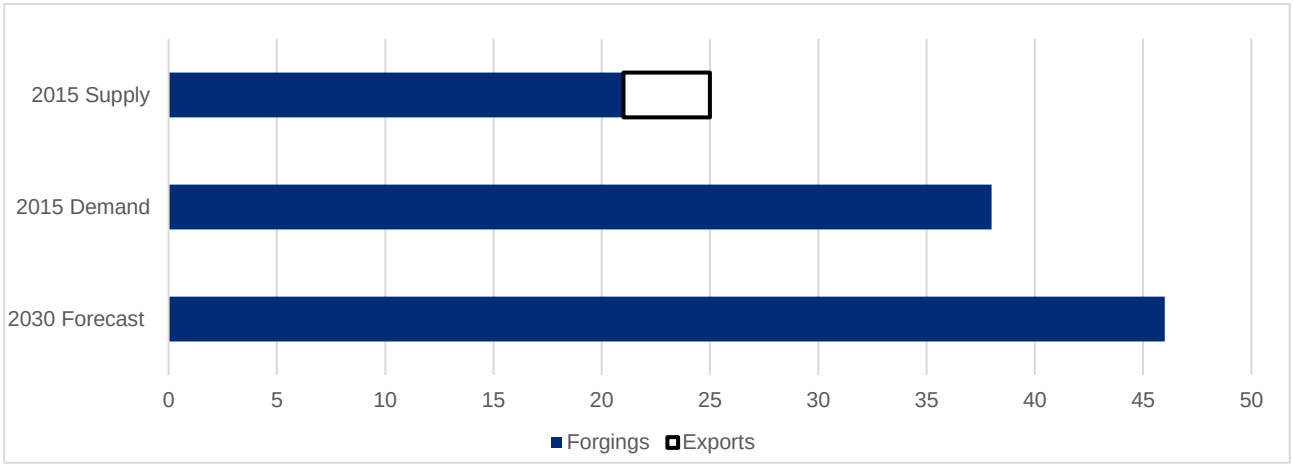
Open Die Forgings

Capacity/Capability

Sheffield Forgemasters has the largest open die forge in the country and is limited to a 10 kt pressing force. They also have 4 t and 2.5 t forging presses. Other large forging press operators include Somers Forge (4 kt), Arconic (3 kt) and Independent Forgings and Alloys (1.6 kt). There are several smaller open die forging operations in the UK. The UK forging industry is currently supplying just over 50% of UK demand and a small export market as shown in Exhibit 157.[346]

[343] No capacity for seamless tube in UK, hence zero 2015 Supply bar.
[344] Q2 Demand Forecast, Seamless Tube: Demand Outlook.
[345] Q2 Analysis of Interview Responses, Seamless Tube: Markets.
[346] Figure 13 compiled from Q1 Analysis Output & Q2 Demand Forecast for Open Die Forgings.

Exhibit 157: Supply/Demand/Forecast Volumes and Capacities Comparison for Open Die Forgings[347]



Competitiveness

In 2010, Sheffield Forgemasters secured an £80 million government loan towards a 15 kt press which would have made it a world leader in heavy forgings. This was later rescinded, resulting in significant capability gap to make large components, particularly for the nuclear industry in this country.

Abbey Forge has bought a 3 kt press but is holding back its installation for two years due to the cost of installation and current low demand.

There is significant competition from low-cost economies including Poland, China, Romania and Italy. Some of the operations in these countries have invested in higher levels of automation and computer-aided design for product development and material efficiency, thereby increasing the quality of their product and cutting costs.

Supply Chains

The global nature of the supply chains in the oil & gas industry has adversely affected demand.[348] In the other key sectors for open die forgings demand, nuclear and power stations infrastructure, demand is highly dependent on government procurement policy.[349]

Future Demand

Contraction of production in the oil & gas sector has impacted heavily on open die forges demand,[350] but planned investments in the nuclear sector present an opportunity for growth in the UK demand.[351]

Interventions

The benefits of any recovery in the oil & gas sector or new nuclear power stations to the UK open die forging industry is highly dependent upon the procurement policy in place for these major infrastructure projects.[352] Key to supplying this increased demand from the UK if it materialises is the continued availability of spare capacity (as several forges have

[347] Capacity is spread across several small producers, and hence no visibility of the overall UK capacity figure.
[348] Q2 Analysis of Interview Responses, ODF Tube: Supply Chains.
[349] Q2 Analysis of Interview Responses, ODF Tube: Markets.
[350] Q2 Demand Forecast, ODF: Demand Outlook.
[351] Q2 Demand Forecast, ODF: Demand Outlook.
[352] Q2 Demand Forecast, ODF: Uncertainty and Risks.

closed in recent years) and the ability to invest in anticipation of the market upturn to bring this equipment either up-to-date or online.

6. Appendix 6: Interview Allocation

Interview Allocation Across Sectors & Actual Interviews Held

The table below illustrates the initial allocation of the 100 interviews across sectors and the actual number of interviews that were conducted in each sector. In the initial allocation there were 15 places reserved for allocation further down the line.

	Allocated	Interviews held
Aerospace	6	6
Automotive	15	14
Construction	30	33
Nuclear	3	3
Oil & Gas	5	6
Other/not allocated	15	
Producers, Trade Bodies and Service Centres	15	23
Rail	6	6
Renewable energy	5	9
Total	100	100

Number of Pre-Engagement Questionnaires Received for Each Sector

The table below illustrates the number of pre-engagement questionnaires received across the seven sectors. While the response rate was not as high as desired, we were still able to extract useful information to aid the demand forecasts.

	PEQ received
Aerospace	2
Automotive	6
Construction	11
Nuclear	1
Oil & Gas	1
Rail	2
Renewable energy	2
Total	25

Supply Chain Maps

The table below shows the key groups identified within each sector.

Automotive	Aerospace	Construction	Nuclear	Oil & Gas	Rail	Renewable energy	Trade bodies
Producers	Producers	Distributors	Producers	Producers	Component manufactures	Producers	Constructions
Tiers	Tier 4	Fabricators	Fabricators	Fabricators	Infrastructure builders and contractors	Generators	Automotive
Body in White	Tier 3	Consultants/ Contractors	Consultants/ Contractors	Contractors	Rail manufactures	Casting	Renewable Energy
Seating and interior frames	Tier 2	Clients	Clients	Clients		Gearbox	Aerospace
Exhaust/ Power Trains	Aircraft manufacturers					Rotor/blade	Nuclear
Others	Clients					Tower	Rail
OEMs						OEMs	

Number of Relevant Interviewees for Each Steel Product

The table below illustrates the number of interviewees across all sectors where steel products are relevant to them.

Product	Number of relevant interviewees
Rebars	17
Sections	26
Merchant Bars	3
Wire Rods	5
Engineering Steels	18
Rails	4
Open Die Forgings	7
Plates	31
Hot Rolled Coils	20
Cold Rolled Coils	11
Coated Products	20

Tinplate	3
Seamless Tubes	10
Stainless Steel	2

7. Appendix 7: Topic Guide

Introduction

To aid the stakeholder engagement element of this research, topic guides were established to guarantee interviews were focused, consistent and ensured time was used effectively. The topic guides included a list of semi-structured questions that was intended as a guide, rather than a fixed list of questions to be followed from start to finish. While there was a core set of questions for all interviewees, separate topic guides were created for each of the seven sectors. This allowed minor amendments where required to ensure questions were applicable and relevant for that sector. The producer topic guide differed slightly in that it also included an additional set of questions specific to producers in addition to the core set that were provided to all interviewees. The final set of topic guide questions received scrutiny from our consortium, industry experts and BEIS analysts before being piloted with several interviews. After some minor amendments following the pilot interviews, the topic guide was approved by the steering group.

The core structure of the topic guide consisted of the following themes:

- Background information on respondent organisation
- Current and future levels of steel consumption
- Methods of procurement of steel
- Future steel intensity, technical specifications and materials substitution
- UK steel competitiveness

Please find example topic guides for the construction and automotive sector below:

Construction Topic Guide

Background

1a.) Please could you provide a bit of background about your business model?

Prompts:

- Application type
- Markets/Customers you supply to (% breakdown)
- Volume of output
- Market share
- Competitors

Project/Product Pipeline

2a.) What drives demand for your projects/products?

2b.) What do you see as the key opportunities and threats to your business in future?

Prompts:

- Product development
- Composite materials
- Regulatory issues (e.g. emissions, safety, recyclability)
- Customer requirements
- Other

2c.) What are your future project/production plans?

- Growth in volume – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%
- Decline in volume – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%

Prompts:

- Up to 2020, up to 2025
- What are these volumes based on (Financial commitments already made, approved orders, board approved business plans, sector growth projections, gut feel)?

2d.) What is driving these plans?

Prompts:

- Business cycles
- Policy decisions
- New technology
- Supply or demand factors

2e.) How do your investment levels compare to 5 years ago?

- More – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%
- Less – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%
- About the same

2f.) What are your plans for future investment?

- More – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%
- Less – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%
- About the same

Prompts:

- Is the investment forthcoming?
- What factors are preventing it?

Steel Products

3a.) What is your current consumption of steel products?

Prompts:

- Finished steel
- Components

3b.) How do you expect this consumption to change? In 2020? In 2025?

- Growth in volume – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%
- Decline in volume – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%

3c.) What do you see as the key drivers in this decision?

3d.) Where do you typically procure your steel products from? Where do you typically procure steel components from? Please state the source for each product type, and the origin of the supplier of these products:

Source	Product type	Steel origin
Direct from mill		(Capture Mill)
Direct from stockholder		
Through a fabricator		(Is fabricator UK based?) (Do you insist on origin of steel used?)

3e.) Why do you procure from a (mill/stockholder/fabricator)?

Prompts:

- Quality
- Price
- Product range
- Delivery times
- Strength, spec or tolerance of product
- Discount
- Innovation
- Reliability
- Other services – If so, what are these services? What is the value to you? To what extent do the services offset price?
- Other

3f.) If UK based: Which suppliers do you use and why do you procure (insert relevant product/component type) from a UK-based supplier?

Prompts:

- Explore for both finished steel and components
- Quality – can foreign competitors replicate the quality?
- Price
- Delivery times
- Strength, spec or tolerance of product
- Discount
- Innovation
- Reliability
- Quality of customer service
- Other services – If so, what are these services? What is the value to you? To what extent do the services offset price?
- Other

3g.) If non-UK based: Why do you procure (insert relevant product type) from a non-UK-based supplier?

Prompts:

- Where does the steel come from?
- Why do you buy from a non-domestic producer (explore factors above)?
- Do you specify the origin of your steel? Is it important to you?
- Have you procured these products from domestic suppliers in the past? If so, why did you switch?
- Are hollowed-out supply chains influencing procurement decisions?
- What would make you decide to source more of your requirements from UK steel?

3h.) Do you anticipate your sourcing decisions changing in future? In 5 years? 10 years?

Prompts:

- Explore for both finished steel and components
- If no, why?
- If yes, why?

3i.) Do you think there is opportunity for improvement in your current model of steel procurement?

3j.) What future changes do you envisage in the steel supply chain?

Prompts:

- Steel producers or stockholders undertaking more fabrication/services?
- Fabricators offering more services?

Use of Steel – Steel Intensity

4a.) What do you think could change the intensity of your steel usage in future? What are the biggest factors driving your material choices?

Prompts:

- New products
- Government regulations
- Consumer/Client demand
- Engineer/Architect decisions
- Other

4b.) What do you think will be the major changes in the type of steel you will consume in 5 years? 10 years?

Prompts:

- Grade
- Dimensions
- Coatings
- Strength
- Other

4c.) What levels of service will you require in the future around the direct steel and/or steel components you procure?

Use of Steel – Technical Specifications

5a.) How will the change in future steel intensity change the technical specifications of the steel you use now?

Prompts:

- How fast are these trends being driven?

5b.) What substitute materials could erode use of steel in the type of steel products that you process or manufacture? If possible, please could you quantify the size of the substitution in volume, value and timescale.

5c.) Are there any specific areas where you think steel processed products can substitute other processed or manufactured products? If possible, please could you quantify the size of the substitution in volume, value and timescale.

5d.) What drives materials innovation in the end products you produce? What role do you play?

Prompts:

- How often do you meet suppliers to discuss innovation?
- Are you dependent on producers offering new products?

5e.) What developments in your industry could increase future demand for UK steel?

5f.) What are the design challenges driving your materials choice?

Prompts:

- Lighter, stronger, cheaper, flexible, workable, wears better, other

5g.) How well do steel producers currently adapt to the changing needs of consumers?

Prompts:

- What level of consultation do you have with your materials providers (frequency, nature of consultation)?

5h.) How well placed are producers to meet the future needs of consumers?

5i.) How engaged are you with the engineers and product designers in your sector? How do they influence your purchasing decisions?

UK Steel

6a.) How competitive is the UK steel industry in international markets? In particular, EU competitors?

Prompts:

- How can UK producers improve?
- Can UK producers capture more downstream activity?
- Can producers get closer to customers?

6b.) Do you have any needs that are currently unmet by UK producers?

Prompts:

- Do you have a view on whether UK producers could meet these in the future?

6c.) In comparison to wider international competitors, are there markets the UK steel sector does not currently compete in, in which it should?

Prompts:

- If yes, what would be required to do this?
- If yes, how competitive would the UK steel sector be in these markets?
- What would be the value of these opportunities?

6d.) How is the UK steel industry placed to deal with the uncertainty surrounding the UK's future relationship with the EU (Brexit)? Are there possible markets outside of the EU?

Further Engagement

If necessary, are you happy for the Department for Business, Energy and Industrial Strategy or Grant Thornton and their consortium partners to follow up with you?

Automotive Topic Guide

Background

1a.) Please could you provide a bit of background about your business model?

Prompts:

- Products
- Markets you supply to (% breakdown)
- Volume of output
- Where do you build your products/components?
- Market share
- What are your plans going forward? 2020? 2025?
- Competitors

Production

2a.) What drives demand for your products? Check PEQ

2b.) What do you see as the key opportunities and threats to your business in future?

Prompts:

- Product development
- Electric vehicles
- Composite materials
- Regulatory issues (e.g. emissions, safety, recyclability)
- Customer requirements (lower cost, longer life, fuel efficiency)
- Shift from private ownership to public transport
- Skills
- Other

2c.) What are your future production plans?

- Growth in volume – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%
- Decline in volume – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%

Prompts:

- Up to 2020, up to 2025
- What are these volumes based on (Financial commitments already made, approved orders, board approved business plans, sector growth projections, gut feel)?

2d.) What is driving these plans?

Prompts:

- Business cycles
- Policy decisions
- New technology
- Supply or demand factors

2e.) How do your investment levels compare to 5 years ago?

- More – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%
- Less – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%
- About the same

2f.) What are your plans for future investment?

- More – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%
- Less – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%
- About the same

Prompts:

- Is the investment forthcoming?
- What factors are preventing it?

Steel Products

3a.) What is your current consumption of steel products?

Prompts:

- Finished steel
- Components

3b.) How do you expect this consumption to change? In 2020? In 2025?

- Growth in volume – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%
- Decline in volume – 10–20%, 20–30%, 30–40%, 40–50%, more than 50%, more than 100%

3c.) What do you see as the key drivers in this decision?

3d.) Where do you typically procure your finished steel products from? Where do you typically procure steel components from? Please state the source for each product type, and the origin of the supplier of these products.

Source	Product type	Steel origin
Direct from mill		(Capture Mill)
Direct from stockholder		
Through a fabricator		(Is fabricator UK based?) (Do you insist on origin of steel used?)

3e.) Why do you procure from a (mill/stockholder/fabricator)?

Prompts:

- Explore for both finished steel and components
- Quality
- Price
- Product range
- Delivery times
- Strength, spec or tolerance of product
- Discount
- Innovation
- Reliability
- Quality of customer service
- Other services – If so, what are these services? What is the value to you? To what extent do the services offset price?
- Other

3f.) If UK based: Which suppliers do you use and why do you procure (insert relevant product/component type) from a UK-based supplier?

Prompts:

- Explore for both finished steel and components
- Quality – can foreign competitors replicate the quality?
- Price
- Product range
- Delivery times

- Strength, spec or tolerance of product
- Discount
- Innovation
- Reliability
- Quality of customer service
- Other services – If so, what are these services? What is the value to you? To what extent do the services offset price?
- Other

3g.) If non-UK based: Why do you procure (insert relevant product type) from a non-UK-based supplier?

Prompts:

- Explore for both finished steel and components
- Where are the imports from?
- Why do you buy from a non-domestic producer (explore factors above)?
- Do you specify the origin of your steel? Is it important to you?
- Have you procured these products from domestic suppliers in the past? If so, why did you switch?
- Are hollowed-out supply chains influencing procurement decisions?
- What would make you decide to source more of your requirements from UK steel?
- For non-UK sourced components, could any of these be brought back into the UK?

3h.) Do you anticipate your sourcing decisions changing in future? In 5 years? 10 years?

Prompts:

- Explore for both finished steel and components
- If no, why?
- If yes, why?

3i.) Do you think there is opportunity for improvement in the current model of steel procurement?

3j) What future changes do you envisage in the steel supply chain?

Prompts:

- Steel producers or stockholders undertaking more fabrication/services?
- Fabricators offering more services?

Use of Steel – Steel Intensity

4a.) What do you think could change the intensity of your steel usage in future? What are the biggest factors driving your material choices?

Prompts:

- New products
- Government regulations
- Consumer/Client demand
- Engineer/Architect decisions
- Other

4b.) What do you think will be the major changes in the type of steel you will consume in 5 years? 10 years?

Prompts:

- Grade
- Dimensions
- Coatings
- Strength
- Other

4c.) What levels of service will you require in the future around the direct steel and/or steel components you procure?

Technical Specifications

5a.) How will the change in future steel intensity change the technical specifications of the steel you use now?

Prompts:

- How fast are these trends being driven?

5b.) What substitute materials could erode use of steel in the type of steel products that you process or manufacture? If possible, please could you quantify the size of the substitution in volume, value and timescale.

5c.) Are there any specific areas where you think steel processed products can substitute other processed or manufactured products? If possible, please could you quantify the size of the substitution in volume, value and timescale?

5d.) What drives materials innovation in the end products you produce? What role do you play?

Prompts:

- How often do you meet suppliers to discuss innovation?
- Are you dependent on producers offering new products?

5e.) What developments in your industry could increase future demand for UK steel?

5f.) What are the design challenges driving your materials choice?

Prompts:

- Lighter, stronger, cheaper, flexible, workable, wears better, other

5g.) How well do steel producers currently adapt to the changing needs of consumers?

Prompts:

- What level of consultation do you have with your materials providers (frequency, nature of consultation)?

5h.) How well placed are producers to meet the future needs of consumers?

5i.) How engaged are you with the engineers and product designers in your sector? How do they influence your purchasing decisions?

UK Steel

6a.) How competitive is the UK steel industry in international markets? In particular, EU competitors?

Prompts:

- How can UK producers improve?
- Can UK producers capture more downstream activity?
- Can producers get closer to customers?

6b.) Do you have any needs that are currently unmet by UK producers?

Prompts:

- Do you have a view on whether UK producers could meet these in the future?

6c.) In comparison to wider international competitors, are there markets the UK steel sector does not currently compete in, in which it should?

Prompts:

- If yes, what would be required to do this?
- If yes, how competitive would the UK steel sector be in these markets?
- What would be the value of these opportunities?

6d.) How is the UK steel industry be placed to deal with the uncertainty surrounding the UK's future relationship with the EU (Brexit)? Are there possible markets outside of the EU?

Further Engagement

If necessary, are you happy for the Department for Business, Energy and Industrial Strategy or Grant Thornton and their consortium partners to follow up with you?

8. Appendix 8: Analysis of Capacity and Capability Barriers

Introduction

A headline finding from the study is that there is a £3.8bn p.a. future opportunity in UK steel demand identified in 2030. This is in revenue terms and is over and above the value of domestic market supply achieved by the UK steel sector in 2015.

It is possible to make an illustrative comparison between the capacity and capabilities of UK steelmaking assets in 2015 and this future demand opportunity. This only takes into account sites operating throughout 2015, assumes that UK sites continue to export at the volumes achieved in 2015 and that no investment is made in new or mothballed assets to improve product capacity or capability.[353]

Under this comparison, of the £3.8bn future opportunity in 2030:

- £0.7bn or 18% can be accessed by UK mills operating in 2015 – i.e. this much of the future opportunity could be realised if all spare capacity in UK assets was utilised;
- A further £2.0bn or 52% is outside the capacity of UK mills operating in 2015 – i.e. UK mills make these products, but even if assets were at full capacity, it is estimated that more than half the future opportunity could not be realised (subject to the above assumptions).
- A further £1.1bn or 30% is outside the capability of UK mills operating in 2015 – i.e. UK mills do not currently make these products and could not in the future without new investment in assets.

It is important to note that this is a crude comparison based on a snapshot of the industry in 2015. UK producers may decide to target domestic opportunities over exports if they are more profitable, or invest in restarting mothballed or new steelmaking assets if there are viable commercial opportunities. It is also unrealistic for a country to satisfy its entire steel demand from domestic producers. This comparison highlights some of the choices facing UK steel producers and policymakers in accessing a greater share of the future opportunity, working from the baseline of the position of the industry in 2015.

Exhibit 158: Notes and Assumptions

Product	Note and Assumption
Wire Rods	Split between mesh and drawing quality as produced in two different mills for different markets
	UK Demand and UK domestic supply split using figures from forecast model

[353] Sites not taken into account include sites that closed in 2015 (such as SSI's Redcar plant) and sites that were mothballed in at least part of 2015 (such as Newport, Sheerness, Llanwern HRC line). Spare capacity in UK combi mills has been allocated to higher value products first. The comparison assumes the 2015 product mix achieved in UK strip production is unchanged, due to constraints in operating capacity.

	Separate value (for mesh/drawing) calculated using same ratio of kt to £/t, as no other figures available
	Have assumed all wire rod export is drawing quality
	2030 forecast demand, mesh quality 1.9% pa growth over period and drawing quality 1% pa
	Use as much of spare capacity as required to fulfil wire rod (mesh) forecast demand, rest for rebar, assume Celsa have liquid & semi finished steel capacity to match mill capacity
	Assume that BS have liquid & semi-finished steel capacity for WR,MS,HS & Rail and possible MB for Caparo (now Liberty owned)
Merchant Bar	Split between more & less than 300mm more useful >300m is 2% of market
	Bar >300mm is not within current capability
	Assume between them Celsa, Bromford and Caparo have the liquid steel/purchases semi-finished steel capacity available
	Assume that BS have liquid & semi-finished steel capacity for WR,MS,HS & Rail and possible MB for Caparo (now Liberty owned)
Rail	Assume that BS have liquid & semi-finished steel capacity for WR,MS,HS & Rail and possible MB for Caparo (now Liberty owned)
Medium sections	TMR grades not within current capability (est. 10% of 2030 demand)
	Use as much of spare capacity as required to fulfil rail forecast demand, rest for MS
	Assume that BS have liquid & semi-finished steel capacity for WR,MS,HS & Rail and possible MB for Caparo (now Liberty owned)
	Tonnage outwith capacity is difference between full capacity and demand - outwith capability
Heavy sections	TMR grades not within current capability (est. 10% of 2030 demand)
	Assume that BS have liquid & semi-finished steel capacity for WR,MS,HS & Rail and possible MB for Caparo (now Liberty owned)
	demand within capability is forecast demand -TMR grades and is within capacity - not enough capacity then left to access TMR grades if mill was capable
Engineering steels	No finishing facilities for engineering steels to be supplied as rods
Plates	Outside capability defined as all forecast demand within Pressure vessels, Rail Car, Shipbuilding/Ship Repair, Wind Towers. This holds for Metinvests Spartan mill but as Dalzell has restarted this assumptions no longer holds. This means more demand is now within Capability, but is still outside Capacity. Capacity figure for Plates (630 kt) is Spartan (200 kt) + Dalzell (430 kt)
	Fill capacity with Construction/Fabrication, Yellow goods and pipeline (LSAW pipe) sectors, leftover in these sectors is tonnage outwith capacity
	Assume Spartan and Liberty Dalzell can source enough suitable slab
HRC/CRC/CP/TP	Capacity is constrained by liquid & semi-finished steel capacity which has been matched to current operating mills capacity, so current output is essentially operating at max capacity
	Whilst PT does have some capabilities in higher strength strip (not used for production in 2015 data) and some mothballed capacity (assume operating model for PT is kept the same) therefore if they wanted to do some higher value orders, it would mean exchanging these for other lower value orders, so all unmet demand is a capacity issue.
	If capacity constraints where solved in some way at Port Talbot not all the demand could be met, due to capability restraints. To estimate these in 2030, the 2015 data for grades/strengths that PT do not currently supply in HRC/CRC/CP has been used for 2030.

Stainless Steel	Essentially no mill (1 small mill, whose output didn't show up in quantitative analysis), therefore no capacity to meet demand, assume a new mill would have capability to access whole market
Seamless tube	No seamless tube mill, therefore no capacity to meet demand, assume a new mill would have capability to access whole market
Open die forgings	The level of market within capability and capacity for 2030 has been kept the same as 2015. The remainder is classified as outside capability. Not enough granularity on the many disparate assets that make up this sector to do anything else.

Exhibit 159: Capacity and Capability Analysis

Legend
Spare capacity to be utilised
Value that cannot be gained
Figures from Executive Summary Figure 1

	Rebar	Wire Rods mesh qual.	Wire Rods draw qual.	Light Sections	Merchant Bars	Rails	Medium Sections	Heavy Sections	Engineering Steels	Plates	HRC	CRC	Coated Products	Tinplate	Seamless Tubes	Stainless Steel	ODF	Total
2015 Current demand* (Kt)	843	246	366	101	227	166	348	762	318	511	1,754	676	2,328	364	171	211	38	9,430
2015 Current demand* (£m)	248	74	110	37	83	84	129	348	139	194	528	234	856	182	136	342	52	3,775
2015 Current UK Production (Kt)	468	123	745	100	356	245	215	502	535	511	1,617	672	1,376	410	0	42	25	7,942
2015 Current UK Export (Kt)	66	0	432	26	190	86	99	174	420	356	577	386	480	203	0	42	5	3,542
2015 Current capacity (Kt)	890		850	950		600		1,050	900	630	4,075				0	42		
2015 Spare Capacity (Kt)	299		105	494		140		548	365	119	0				0	0		
2015 Current Domestic supply* (Kt)	402	123	313	74	166	159	116	328	115	155	1,040	286	896	207	0	0	20	4,400
2015 Value of Current Domestic supply* (£m)	118	50	128	27	61	81	43	150	50	59	313	99	332	104	0	0	27	1,594
2030 Value Projection of 2015 Domestic Supply	152	50	128	31	69	83	50	154	62	85	480	147	511	150	0	0	29	2,181
2030 Forecast demand outwith Capability (Kt)					6		42	92	64	99	120	93	258		155	249	22	1,200
2030 Value outwith Capability (£m)					2		18	43	34	54	55	48	147		128	573	32	1,134
2030 Forecast demand* (Kt)	1,234	325	418	123	285	182	421	922	351	615	1,993	719	2,576	364	155	249	46	10,977
2030 Value of Forecast demand (£m)	468	133	171	51	118	94	181	432	189	338	921	370	1,468	264	128	573	67	5,966
2030 Demand within Capacity (Kt)	499	325	418	123	279	182	233	795	287	274	1,040	286	896	207			24	5,868
2030 Value within Capacity (£m)	189	133	171	51	116	94	100	373	155	151	480	147	511	150			35	2,856
2030 Tonnage outwith Capacity (Kt)	735						146	35		242	833	340	1,422	157				3,910
2030 Value outwith Capacity (£m)	279						63	16		133	385	175	811	114				1,976
Value of Future Opportunity* (£m)	315	126		20	49	12	131	279	127	253	440	223	958	114	128	573	37	3,785

		Total 2030	Future Opportunity
Tonnage	Within Capability & Capacity	53%	22%
	Outside Capacity	36%	59%
	Outside Capability	11%	18%
Value	Within Capability & Capacity	48%	18%
	Outside Capacity	33%	52%
	Outside Capability	19%	30%

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