UK STEEL

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A BARRIER TO DECARBONISATION:

INDUSTRIAL ELECTRICITY PRICES FACED BY UK STEELMAKERS

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1. EXECUTIVE SUMMARY

Gas, coal, and electricity prices increased substantially in the Autumn across the globe, as a result of resurgent energy demand resulting from the global economic recovery coupled with a lower-than-expected increase in energy supply. Whilst both coal and gas prices have soared in recent months, gas has seen by far the biggest increases which have prompted substantial switching from gas to coal to generate electricity in many markets. Because of the UK's commitment to phasing out coal power generation, the UK has had extremely limited capacity to perform this switch and has therefore seen some of the highest electricity price increases as a result.

This annual report shows the average electricity price UK steel producers typically face in 2021/22 had reached £95 per megawatt-hour (MWh) compared to the estimated German price of £59/MWh and French price of £63/MWh. Therefore, UK production sites are paying 61% and 51% more, respectively, than their main competitors. However, in September and October, this price disparity increased to over £88/MWh, a significant increase compared to the average price gap of £20/MWh over the past five years.[1]

The price disparity is a major barrier to meeting the Net Zero target, since all options for decarbonising steel production, from CCS, to hydrogen, to electric arc production, lead to significantly increased electricity consumption. Steel plant investment goes to the most cost-competitive regions, and increasingly that will be those with internationally competitive power prices. In the case of switching to hydrogen-based production, for a comparably sized sector, this would cost almost £300m more to run in the UK than in Germany just in terms of electricity prices. Equally, if all UK production were to convert to electric arc furnaces using scrap steel, the sector would face higher electricity costs of £200m. With the annual capital investment of the UK sector averaging £200 million, the current viability of a Net Zero steel sector in the UK is seriously questionable, without action on electricity prices.

Figure 1: Energy prices for steel producers in France, Germany, and the UK (2021/22)

Source: UK Steel

[1]As with previous UK Steel reports on this subject, the analysis is based on both historic and forward prices. In times of extreme volatility and atypical price spikes, this analysis can underplay the significance of the disparity particularly within shorter time periods.

Persistent cost disadvantages in the UK lead to underinvestment, which in turn leads to further erosion of competitiveness. The price disparities revealed by our research equate to a total additional cost to UK steel producers of around £90 million this year compared to those in Germany.

Over the past six years, the disparity has cost the UK sector an additional £345 million, the equivalent of 30% of the sector's capital investment.

It is clearer than ever that if the UK wishes to maintain steel production in this country and provide the right environment for it to decarbonise, it must urgently tackle this problem and provide competitive electricity prices.

This report makes the following recommendations:

1. **Implement German/French style network cost reductions**
2. **Maximise the level of renewable levy exemptions**
3. **Provide 100% compensation for indirect costs of carbon in electricity**
4. **Provide an exemption from Capacity Market costs**
5. **Link UK ETS to the EU ETS**
6. **Track industrial energy price disparities between countries**
7. **Industrial wholesale cost containment mechanism**

2. INTRODUCTION

High electricity prices are consistently cited as harmful to the steel industry's ability to decarbonise its production, a major impediment to investment, and harmful to its immediate market competitiveness.

The reasons for this are worth noting:

- Steel production and processing is an energy intensive process and the production of millions of tonnes of steel each year consume vast amounts of energy. For the most electro-intensive producers, electricity represents approximately 20% of converting globally priced raw materials into finished steel products for consumers.
- Steel is an intensively traded product with some 25% of all steel produced globally being exported. Outside of China these figures are significantly higher with the UK importing 60% of its requirements and exporting around 45% of production. The UK's main competitors are based in the EU, where most imported steel is produced and where most exported steel is going, making price differentials between the UK and EU competitors particularly important.
- The steel sector operates on relatively thin margins. Whilst there are increasingly specialised and high-value steels being produced, market requirements and economies of scale mean that the vast majority of steel made even in developed economies is commoditised and available from a broad range of sources. There is, therefore, intense competition, which keeps steel prices and margins low.
- High electricity prices generally reduce profit margins and thus to less reinvestment. Further, high electricity prices also act as a disincentive to investment from international steel companies, with the UK seen as a less favourable investment location than other countries.
- The three main routes to decarbonise integrated sites (CCS, hydrogen, and electrification) all involve higher electricity consumption. High electricity price is thus a substantial barrier to meeting the Net Zero target.

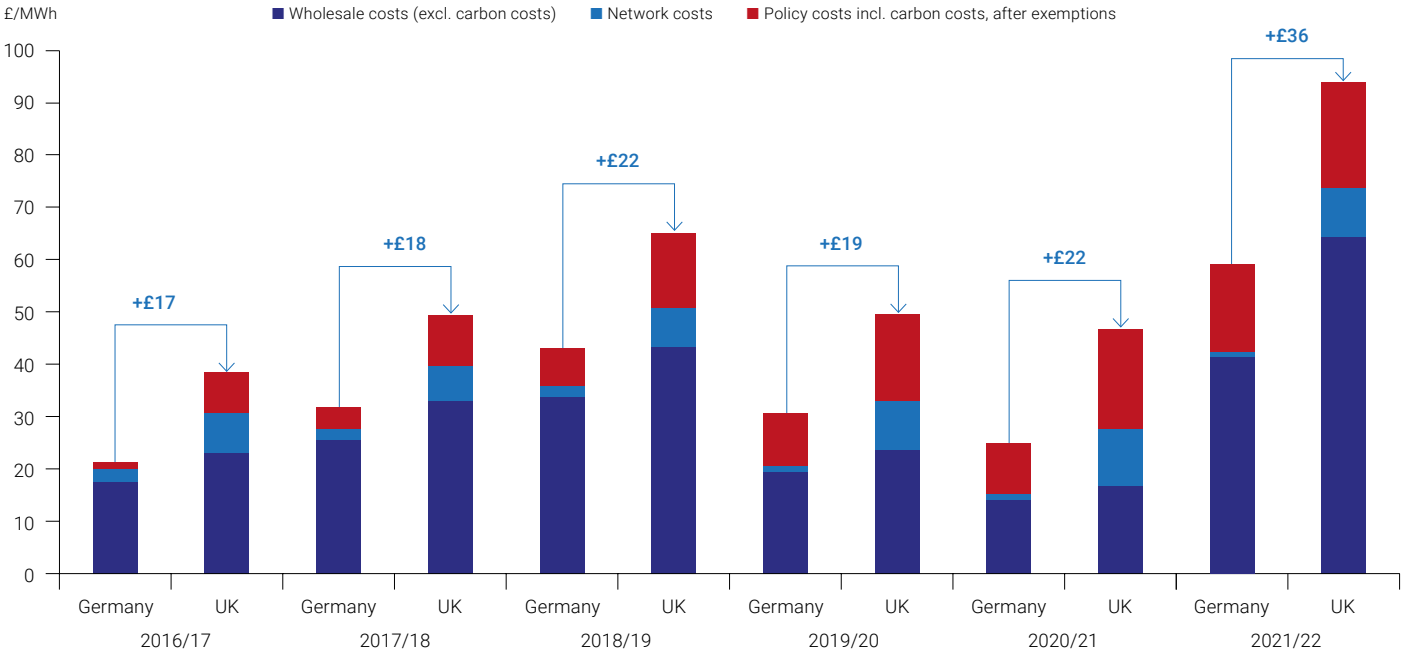
3. PRICE DISPARITY

When fully considering all the various interventions made by governments in support of their energy intensive industrial bases, the average price faced by UK steelmakers for 2021/22 is £95/MWh compared to the estimated German price of £59/MWh. This indicates a price disparity of £36/MWh. The disparity with French prices for 2021/22 is slightly lower at £32/MWh.

As illustrated in figure 2, electricity prices have increased significantly compared to last year, in both the UK and Germany, due to the high cost of natural gas.

Most concerning, the price disparity has almost doubled compared to the price gap of the past five years, which averaged £20/MWh.

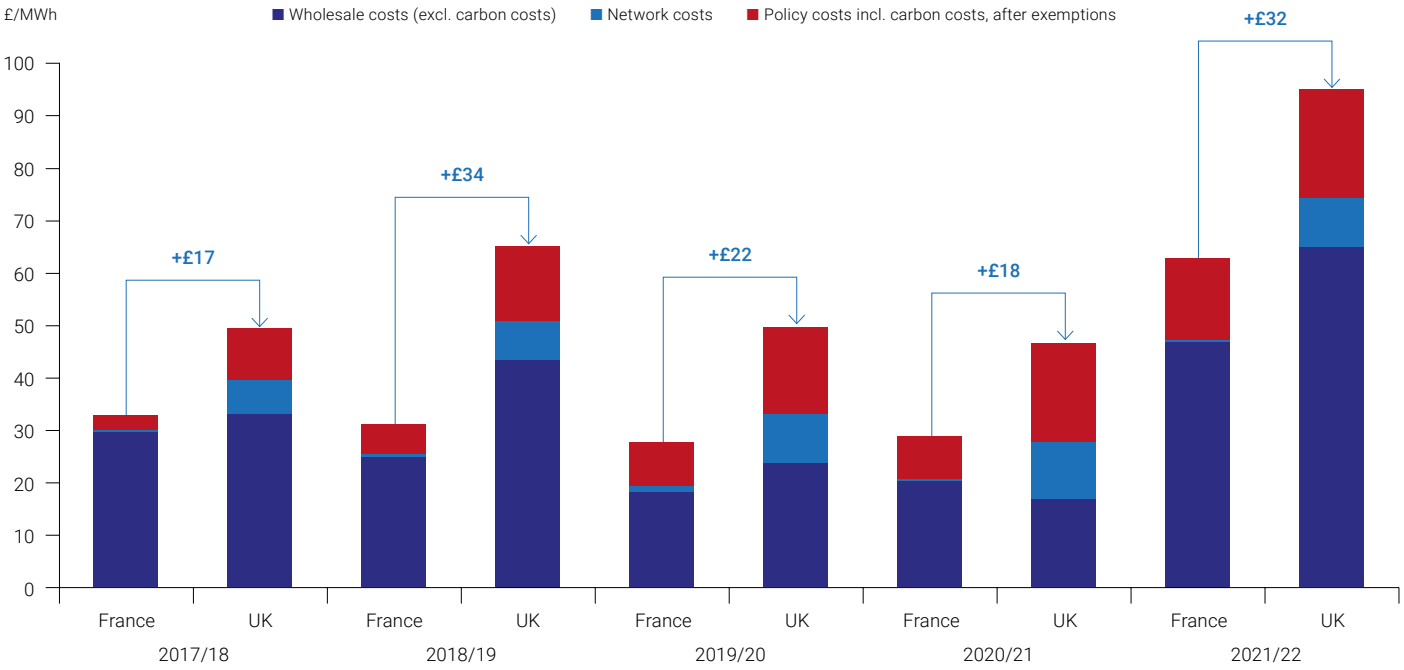
Figure 2: Comparison of Electricity prices for the UK and German Steel producers 2016/17 to 2021/22



Source: UK Steel

The disparity between UK and French industrial electricity prices has also significantly grown, to £32/MWh - double of what it was last year.

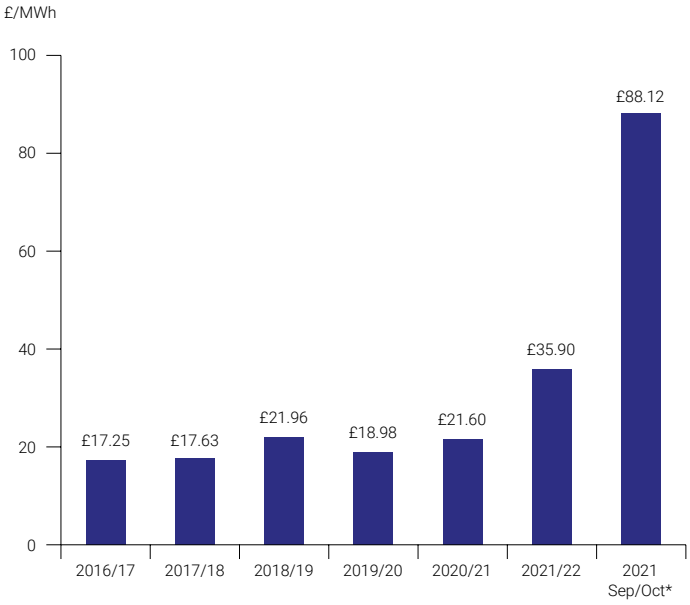
Figure 3: Electricity prices for the UK and French Steel producers 2016/17 to 2021/22



Source: UK Steel

Whilst gas and electricity prices rose over the past eight months across Europe, due to increased gas demand in Asia and lower supply from Russia, the increase is considerably higher here in the UK. This is due to the UK having a more gas intensive electricity generation fleet than Germany or France, which use more coal and nuclear respectively. September saw UK volatile wholesale prices increase to record levels, peaking at £2,500/MWh. The average UK electricity prices steel companies paid in September and October reached £182/MWh – almost double compared to estimated German averages at £94.02/MWh.

Figure 4: Price disparity between Germany & UK, £/MWh, 2016-2022



*Note: To calculate the price disparity for September & October 2021, wholesale prices from Nord Pool Group, the UK ETS, and EU ETS prices have been updated to reflect the average prices in those months. Network charges and other policy costs remain constant.

Source: UK Steel

4. EFFECT OF PRICE DISPARITY ON UK SECTOR

4.1. DECARBONISATION OF STEEL PRODUCTION

The Government's Net-Zero target will require fundamental changes to steel production in the UK and will necessitate substantial investment in new processes and equipment over the next dozen years. The Climate Change Committee has recommended that the ore-based steelmaking sites be near-zero emissions by 2035. To meet this ambition, the steel companies will need to invest in new production methods, which all increase the sector's electricity consumption. There are broadly three routes to substantially reduce emissions for integrated steelmaking: Carbon Capture and Storage (CCS), Electric Arc Furnaces (EAF), and hydrogen-based steelmaking.

The sector consumes 2.5TWh of grid electricity each year, the equivalent of 800,000 houses. With a sectoral switch to EAFs, the consumption would more than double to 5.5TWh and increase by five times for the affected sites. Hydrogen-based steel production would increase the entire sector's electricity demand to over 8.3TWh (assuming blue hydrogen produced offsite via natural gas steam reforming), which would more than triple the entire sector's consumption, but increase the demand of the affected sites by almost 9 times. Finally, CCS experiences energy losses significantly when capturing emissions, which will also lead to much higher electricity consumption.

With the current disparity of £35.90/MWh, it would cost £198m more to operate an electrified steel sector in the UK than in Germany or £298m more to operate a hydrogen-based steel sector. As such, it would be difficult to see investment in decarbonisation in the UK over its key European competitors. Instead, investment would flow towards the most cost-competitive market.

4.2. INVESTMENT

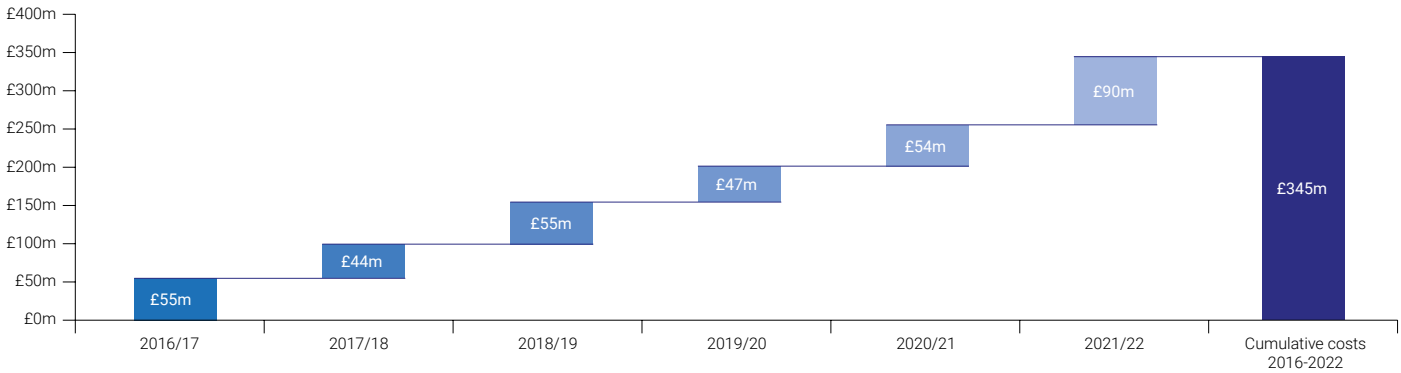
Looking beyond decarbonisation, the UK steel sector must make hundreds of millions of investments each year to remain efficient, competitive and to continue to meet customer demands.

Long-term investment is greatly impacted by the electricity price gap. All the major steel producers in the UK are part of multi-national companies with facilities in the EU and four also operating outside the EU. In this context, the cost competitiveness of each particular market is crucial to attracting investment. Persistent cost disadvantages in the UK lead to underinvestment, which in turn leads to further erosion of competitiveness. As outlined above, this has huge ramifications for investment in decarbonisation and meeting the Net Zero target.

Over the past five years, the industry has paid £345m more for their electricity than their competitors in Germany and £307m more than steelmakers in France. To place this in context, the average annual capital investment in the UK sector is £200 million.

All UK steel companies are committed to re-investing all

Figure 5: Additional costs to UK steel sector due to electricity price disparity, compared to Germany



Source: UK Steel

savings on electricity costs resulting from Government action back into their UK operations. As such, direct action on lowering industrial energy prices will result in an almost 50% increase in annual capital investment over and above business as usual. Over the past six years, a total of £345m in investment has therefore been lost due to higher electricity prices.

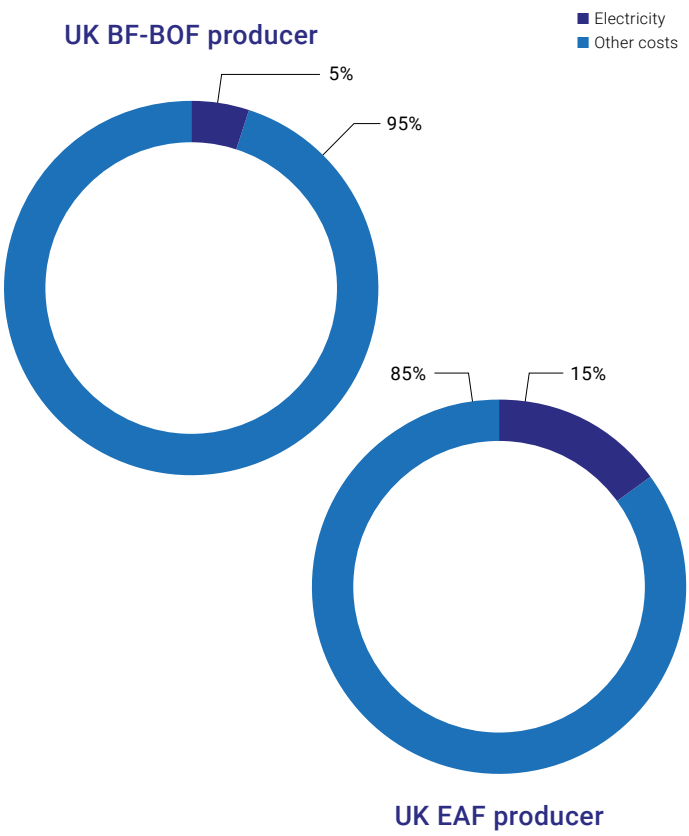
4.3. INTERNATIONAL COMPETITIVENESS

Raw materials such as iron ore and coal are sold in global markets, and there will, therefore, be little difference in the price of iron ore used by a steel producer in the UK, France, or India. It is where there are national and regional variations in costs that competitiveness issues arise. A consistently higher electricity price, therefore, impacts their ability to compete and diminishes their profitability. The power price disparities identified in this report translate into a total additional cost to UK steel producers compared to those in Germany of around £90 million per year[1].

The price of electricity greatly impacts the producers' costs. Independent research (see figure 6) conducted this year shows that electricity costs represent between 5-15% of total production costs in the UK.

Due to the nature of the production methods, electric arc furnace producers are more impacted by electricity costs than blast furnace producers. The CRU model conclusions also support the UK Steel analysis in how affected the UK is by the price difference, suggesting that production will likely be less competitive. While electricity prices have also risen in Germany, they have remained at 10% of total costs for EAF producers, which would put the costs of the steel product below the market spot price.

Figure 6: Electricity share of total UK steel production costs



Source: CRU International; CRU Steel Cost Model, 2021.

[1]Electricity Consumption figure updated from ISSB. 2017 steel sector consumption of imported electricity was 2.5TWh.

5. OPTIONS FOR LOWERING THE PRICE DISPARITY

These measures are needed in the short to medium term in advance of Government plans to reduce electricity costs through investment in new low-carbon production. The steel industry's investment in decarbonisation must happen in this decade, and therefore the sector will need parity of industrial power prices now, rather than in the 2030s. The options below would help reduce the disparity in industrial electricity prices between Germany, France, and the UK now:

1. Implement German/French style network cost reductions: In the light of the upcoming electricity network reforms and the significant benefits energy intensive industries bring to the grid, new exemptions must be introduced. With a model like Germany's, a 90% exemption is provided to all three elements of network charging (transmission, distribution, and balancing), which would lower the average electricity price for steel producers by almost £9/MWh on our benchmark data.

2. Maximise the level of renewable levy exemptions: The UK has only provided relief at 85% aid intensity, whereas in Germany, electro-intensive companies receive higher relief – paying a maximum of 0.5% of their GVA (average over three years). We estimate that a similar approach in the UK could reduce electricity costs for the steel sector by an average of £4/MWh. Outside of the EU, the UK could now provide 100% exemption, reducing prices by £6/MWh.

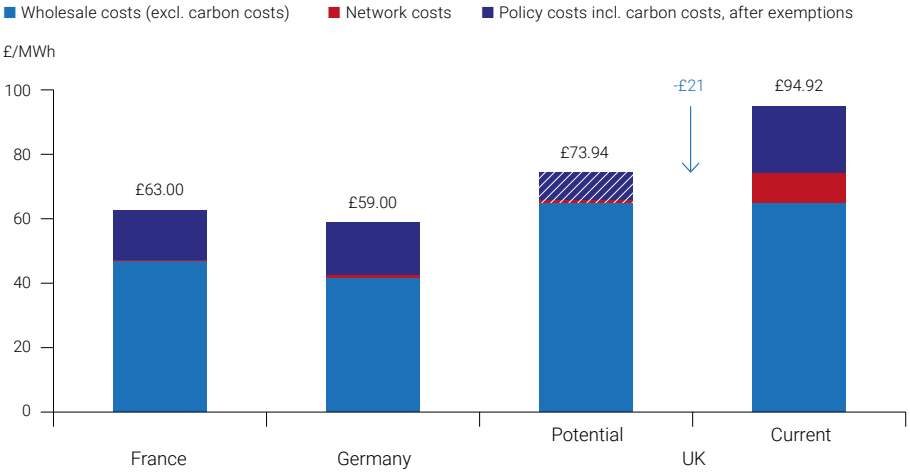
3. Provide 100% compensation for the indirect costs of carbon: Carbon prices in the UK ETS have increased higher those in the EU ETS, and, on top of this, only UK consumers pay an additional £18/tCO2 in the Carbon Price Support (CPS). This means the total carbon price in the UK is now £64/tonne compared to £45/tonne in the EU. The Government currently compensates steel producers for 75% of the cost of this, but no longer subject to EU state rules it could increase this to 100%. This would reduce electricity costs for the sector by £3/MWh.

4. Provide an exemption from Capacity Market costs: Provide full exemption for the Capacity Market costs, which would lower the average electricity price for steel producers by about £3/MWh.

5. Link UK ETS to the EU ETS: UK ETS prices have diverged from the EU ETS, leaving UK electricity suppliers and their customers paying higher prices than their EU counterparts. It must therefore link the UK ETS to the EU ETS to avoid significant price divergence.

6. Track industrial energy price disparities between countries: Government should track the gap in industrial energy prices between the UK and other key competitors and reasons for the differences, to enable more informed policymaking. An update should be published every year alongside an Annual Energy Policy Statement giving a unified view for investors from the Government and regulator on the future of energy policy. The Belgian Government currently publishes an annual review of the impact of energy costs for energy-intensive, trade-exposed industries, headed up by the Commission for Electricity and Gas Regulation (CREG) and PwC.

Figure 7: Potential electricity prices for UK steel producers, compared to France and Germany



Source: UK Steel

In implementing the proposals outlined above, the electricity price disparity would be reduced by £21/MWh or 58% of the current price disparity between the UK and Germany.

As the UK's electricity system is especially exposed to natural gas and thus impacted by the recent substantial price increase in natural gas, wholesale costs have risen significantly in the UK. Where the above proposals would previously have almost eliminated the price disparity, this year, a considerable difference would remain. As such, an additional proposal is put forward to bring prices in line with German levels:

7. Industrial wholesale cost containment mechanism: To deal with the rapid rise in wholesale costs over the past eight months, the Government should introduce a wholesale price cap, ensuring that industry does not face higher wholesale prices than Germany. This could be inspired by the French ARENH price, where the Government provides a fixed amount of capacity at a competitive price or a virtual interconnector (based on the Italian existing scheme), offering large industrial consumers the chance to buy electricity at competitive prices via a virtual cross-border trade if they invest in new interconnection capacity. Implementing this along with the above recommendations would eliminate the electricity price disparity between the UK, Germany, and France.

Action on electricity will demonstrably lead to a significant increase in investment, capacity, and jobs within the steel sector, delivering benefits to the broader manufacturing sector and the UK economy while facilitating the transition to Net Zero.

UK Steel is the trade association for the UK steel industry and champions the country's steel manufacturers.

We represent the sector's interests to government and promote our innovative, vibrant and dynamic industry to the public.

Together, we build the future of the UK steel industry.

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