Department for
Business, Energy
& Industrial Strategy

Clean Steel Fund

Call for evidence

Closing date: 21 November 2019

August 2019

Any enquiries regarding this publication should be sent to us at:
enquiries@beis.gov.uk

Executive summary

Moving to net zero greenhouse gas emissions for the UK requires transformation across all sectors of the economy and unprecedented levels of investment in green and low carbon technologies. This transition can transform existing industries and provide opportunities for new ones. The UK is a world leader in clean growth and in setting our ambitious, legally binding target of achieving net zero emissions across the economy by 2050, we have demonstrated our commitment to maintain this position.

Steel is a strategically important industry for the UK and can be an important part of our clean growth story. To catalyse transformation, we will establish a new £250m Clean Steel Fund to provide a long-term signal of support to the steel sector and its decarbonisation efforts. The Fund will seek to support the sector to:

- Transition to lower carbon iron and steel production through new technologies and processes, placing the sector on a pathway that is consistent with the UK Climate Change Act (net zero).[1]
- Maximise longevity and resilience in the UK steel sector by building on longstanding expertise and skills and harnessing clean growth opportunities.

This call for evidence seeks views and supporting evidence to help us develop the detailed design of the Fund, including on barriers to realising clean steel ambitions, and the opportunities to be gained in overcoming these.

Current evidence shows options for reducing emissions from steel in primary and secondary production can be grouped into three broad categories. These are: switching to lower carbon fuels, including hydrogen; industrial carbon capture (ICC); and energy and material efficiency. We will look to develop the Fund with these options in mind, working with stakeholders to identify how to maximise the economic and environmental benefits of these options.

The Clean Steel Fund will be an important addition to the government's support for industrial decarbonisation. It will build on and enhance existing and planned policies including the £315m Industrial Energy Transformation Fund (IETF), the Industrial Clusters Mission and up to £170m from the Industrial Strategy Challenge Fund (ISCF) that has been allocated to kick-start delivery of the Mission, and the CCUS Action Plan. We also intend to establish a new £100m Low Carbon Hydrogen Production Fund, to support the deployment of low carbon hydrogen production at scale. This could enable a pathway to lower carbon steel production and support broader efforts to decarbonise industry.

Together these policies will be a vital part of transforming UK industry and seizing the opportunities of clean growth which are at the heart of our modern Industrial Strategy.

[1] For brevity iron and steel is referred to as steel throughout the rest of this document

Contents

General information

Why we are issuing a call for evidence

Previous stakeholder engagement, such as the ongoing 2050 Roadmaps Project[2] and Industrial Fuel Switching programme,[3] has highlighted the potential for decarbonisation in the steel sector and the barriers that prevent the take up of new lower carbon technologies and processes. This call for evidence is focused on helping us to better understand these issues and inform the development of a £250m Clean Steel Fund.

We invite your views and seek evidence in response to the questions. This will inform the design and delivery of the Fund in due course.

Details

Issued: 29 August 2019

Respond by: 21 November 2019

Enquiries to:

Industrial Energy Directorate - Clean Steel

Department for Business, Energy & Industrial Strategy,
1 Victoria Street,
London,
SW1H 0ET

Tel: 020 7215 5000
Email: cleansteel@beis.gov.uk

Document reference: Developing the Clean Steel Fund

Territorial extent: UK-Wide

[2] 'Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050', BEIS 2015 (viewed on 27 August 2019)
[3] 'Industrial Fuel Switching competition', BEIS, 2019 (viewed on 27 August 2019)

How to respond

Your response will be most useful if it is framed in direct response to the questions posed, and with evidence in support wherever possible. Further comments and wider evidence are also welcome. When responding, please state whether you are responding as an individual or representing the views of an organisation.

We encourage respondents to make use of the online e-consultation wherever possible when submitting responses as this is the government's preferred method of receiving responses. However, responses in writing or via email will also be accepted. Should you wish to submit your main response via the e-consultation platform and provide supporting information via hard copy or email, please be clear that this is part of the same response to this call for evidence.

Respond online at: https://beisgovuk.citizenspace.com/heat/creating-a-clean-steel-fund-call-for-evidence/

Email to: cleansteel@beis.gov.uk

Write to: Industrial Energy Directorate - Clean Steel

Department for Business, Energy & Industrial Strategy,
2nd Floor, 1 Victoria Street, London, SW1H 0ET

When responding, please state whether you are responding as an individual or representing the views of an organisation.

Confidentiality and data protection

Information you provide in response to this call for evidence, including personal information, may be disclosed in accordance with UK legislation (the Freedom of Information Act 2000, the Data Protection Act 2018 and the Environmental Information Regulations 2004).

If you want the information that you provide to be treated as confidential please tell us but be aware that we cannot guarantee confidentiality in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not be regarded by us as a confidentiality request.

We will process your personal data in accordance with all applicable data protection laws. See our privacy policy.

Quality assurance

This call for evidence has been carried out in accordance with the government's consultation principles.

If you have any complaints about the way this call for evidence has been conducted, please email: beis.bru@beis.gov.uk.

Why is the Fund needed?

The UK's commitment to Net Zero

On 27 June 2019, the UK government set a legally binding target to achieve net zero greenhouse gas emissions across the UK economy by 2050. We are the first major economy to legislate for a net zero target, and the action we are taking will continue our proud tradition of climate leadership. We have made world-leading progress in cutting our emissions while growing the economy, but we have more to do and our net zero target provides the impetus for further action. Government has an important role to play in supporting action in key sectors. One such sector is steel, which constitutes a vital part of the UK's industrial manufacturing base.

Recognising the challenge of decarbonising the UK economy while minimising energy costs, the government has worked in close partnership with each energy intensive industrial sector, including steel, to agree decarbonisation and energy efficiency 2050 roadmaps.[4] These were developed in line with the previous 2050 greenhouse gas emissions reduction target. To help deliver these aims and targets, the government announced several industrial decarbonisation and energy efficiency policies (Table 1). The Clean Steel Fund aims to learn lessons from existing government funds and policies and build on them, reflecting the move to a more ambitious net zero 2050 target. The timing of the new Fund will be developed in consultation with industry and other stakeholders, mindful of the length of time required to transition to low carbon steel production and the need to ensure that we can indeed build upon current efforts to provide additional value.

Table 1 - Current policies to support industrial decarbonisation activities in the UK

Policy	Summary	Policy timing
Industrial Clusters Mission	Announced in December 2018 this Mission under the Industrial Strategy seeks to achieve the world's first net zero carbon industrial cluster by 2040, backed by £170m Industrial Strategy Challenge Fund (ISCF) investment in the near-term.	2019 – 2024 (ISCF)
Industrial Energy Transformation Fund (IETF)	Announced in Budget 2018, the IETF is a Fund worth up to £315m to support businesses with high energy use to transition to a low carbon future and to cut their bills through increased energy efficiency.	2019 – 2024
Transforming Foundation Industries Challenge (ISCF)	Announced in December 2018, this challenge will transform the UK's foundation industries (glass, metals, cement, ceramics, chemicals, paper) through innovation to make them internationally competitive, securing more jobs and greater sector growth by 2025. Government is prepared to invest up to £66m in this challenge.	2019 – 2024

[4] 'Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050', BEIS 2015 (viewed on 27 August 2019)

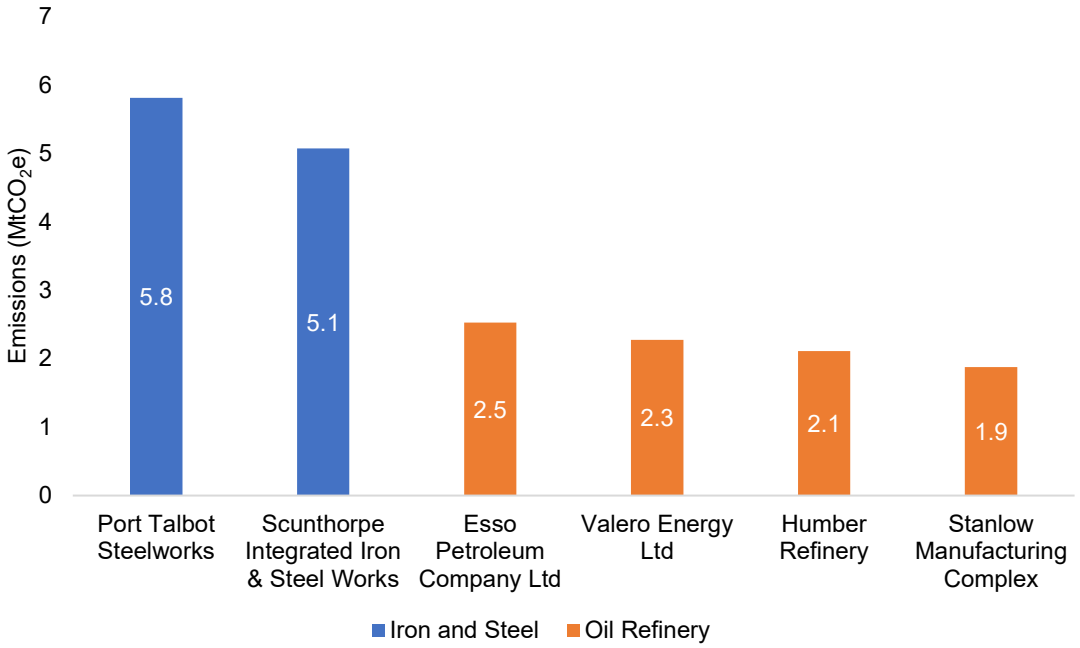
Policy	Summary	Policy timing
Carbon Capture Usage and Storage (CCUS) Deployment Pathway: an Action Plan	The Clean Growth Strategy established an ambition to have the option to deploy CCUS at scale during the 2030s, subject to the costs coming down sufficiently. As a vital first step to meeting this ambition, the CCUS Action Plan is designed to enable the UK's first CCUS facility to be commissioned from the mid-2020s. In July 2019 we launched a consultation on potential business models for CCUS, including a framework for future evaluation of models to support hydrogen production.	Action plan launched in 2018
BEIS Energy Innovation Programme (EIP)	The EIP is investing up to £505m which aims to accelerate the commercialisation of innovative clean energy technologies and processes. Over £100m of this money has been allocated to lower the cost and risks of de-carbonising industry, and accelerating the development of new lower cost, higher per-formance hydrogen supply solutions, strengthening UK leadership.	2015 – 2021
Climate Change Agreements Scheme (CCA)	The current CCA Scheme, which is available to existing participants, is worth an estimated £200m per year to March 2023 across 53 industrial sectors.	2013 – 2023
Industrial Heat Recovery Support (IHRS)	Capital support via the £18m live Industrial Heat Recovery Support Programme. The IHRS is covering both feasibility studies and preliminary engineering studies (Phase 1) and more detailed design, construction, commissioning and operation costs (Phase 2).	2018 – 2022

Steel emissions

The scale of the decarbonisation challenge is significant for the steel sector. The integrated steel works in Scunthorpe and Port Talbot are the two largest industrial sources of UK carbon emissions[5] and overall the steel sector contributes 15% to industry emissions (12 $MtCO_2e$ in 2017).[6] To achieve net zero, emissions will need to be reduced as much as possible across all sectors of the economy, including steel. Tackling industrial emissions would also lead to improvements in air quality with associated benefits for public health and the environment.

[5] 'Union Registry', EU Commission (viewed 27 August 2019)
[6] Total industry emissions include those from industrial processes, oil refineries and relevant business emissions, 'Final UK greenhouse gas emissions national statistics', BEIS (viewed 27 August 2019)

Figure 1 - Emissions ($MtCO_2e$) of the five largest industrial emitters in 2018[7]



UK strengths in steel

Steel is a key industrial sector, and of vital importance for the UK economy. The sector employs around 32,000 people[8] and supports up to a further 40,000 jobs through its supply chains.[9] These highly skilled workers are critical in ensuring the prosperity of the sector. In 2018, the UK steel sector contributed £2bn in gross value added[10] and exported goods and services worth around £4.9bn.[11] Globally, there is increasing interest in how to transition to low carbon steel. With longstanding expertise in steel making, the UK is well positioned to demonstrate international leadership in clean steel and realise domestic growth and export opportunities in products and technical know-how.

A vibrant steel sector is of wider strategic importance for the UK. Steel is a fundamental material input to a variety of industries, including construction, automotive, defence and renewables. The UK is heavily reliant on domestic steel to deliver many of our largescale infrastructure projects. Over 93% of the steel used to maintain our rail track is produced in the UK,[12] and Crossrail, the biggest construction project in Europe, has seen 26 miles of tunnels built using almost exclusively British steel.[13] Looking ahead, the UK steel procurement pipeline[14] indicates that the government will need around three million tonnes of steel over the next decade for national infrastructure projects, worth around £0.5bn (for context, around eight million tonnes of finished steel was produced in the UK in 2018).[15] This will be used to deliver future major projects such

[7] Excludes power stations 'Final UK greenhouse gas emissions national statistics', BEIS (viewed 27 August 2019)
[8] Figure refers to 2017 and Great Britain only. Business Register and Employment Survey (Office for National Statistics). Downloaded from Nomis
[9] Calculated using the Type 1 Employment Multiplier (Office for National Statistics) of 2.26. Reference year: 2015.
[10] Figure refers to 2018 and is expressed in current prices. UK GDP Low Level Aggregates (Office for National Statistics)
[11] Figure refers to 2018. UK Trade in Goods, CPA (08) (Office for National Statistics)
[12] Steel public procurement guidance, BEIS 2019 (viewed 27 August 2019)
[13] British Steel press release, 2017 (viewed 27 August 2019)
[14] Steel public procurement guidance, BEIS 2019 (viewed 27 August 2019)
[15] International Steel Statistics Bureau. Statistics provided to BEIS

as the construction of Hinkley Point C and the maintenance and upgrading of the UK motorway network. These known sources of steel demand create a clear market opportunity for domestic producers and enable the UK government to deliver numerous infrastructure-related policy initiatives.

The UK steel sector makes a significant contribution to local economic growth and prosperity through its direct employees, the wider supply chain, and the local communities that this supports. There are centres of excellence in steel making across the country which provide high value, high skilled jobs. For example, in Neath Port Talbot, steel sector wages were around 46% higher than average in the local area in 2018[16]. The steel sector employs 4,400 people in Neath Port Talbot, representing 9% of regional employment.[17]

1. **The UK steel sector has a number of strengths identified above, are there any others that we have not identified?**
2. **Are there any further opportunities, not already identified, from a UK clean steel sector?**
3. **What other wider benefits could the Fund deliver?**
4. **How could the UK government facilitate creation of a market for low carbon steel?**

Challenges for the steel sector

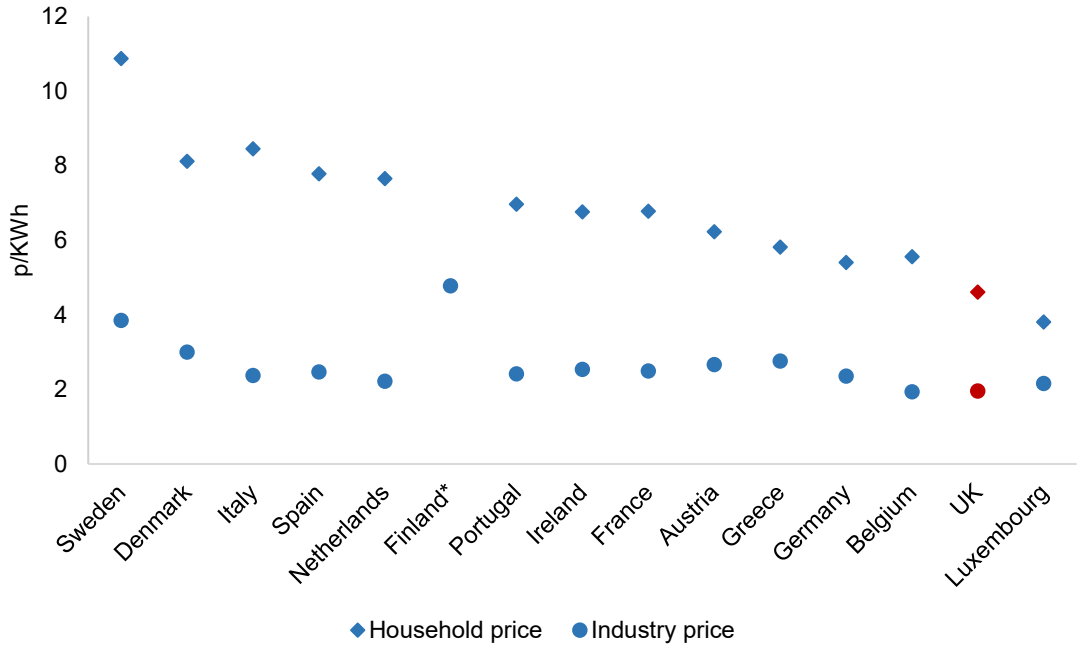
Energy costs

Steel is a highly energy intensive industry, and differences in domestic and international energy prices can affect the competitiveness of UK firms. While UK industrial gas prices are lower than the majority of our competitors in other European countries (Figure 2), industrial electricity prices are currently higher (Figure 3). This is particularly challenging for steel operations using, or planning to use, electric arc furnaces.

Government is committed to minimising energy costs for businesses, to ensure our economy remains strong and competitive. Since 2013, we have provided more than £312m in direct compensation to the UK steel sector to manage these higher energy costs.[18] Improvements in industrial energy efficiency is a complementary strategy for cutting energy bills. Policies including the Industrial Energy Transformation Fund and Industrial Heat Recovery Support Programme (Table 1) will support firms taking action to make longer term improvements in energy efficiency.

[16] Figure for Tata Steel UK employees calculated from accounts year-ending 31 March 2019 from Companies House. Figure for Neath Port Talbot is a provisional 2018 estimate from Earnings and Hours Worked, Plate of Work by Local Authority: ASHE Table 7 (Office for National Statistics)
[17] Figure refers to 2017. Business Register and Employment Survey (Office for National Statistics). Downloaded from Nomis
[18] As of 14 August 2019

Figure 2 - Industrial and household gas prices in selected EU member states in 2018, including taxes[19]



* Data for household gas prices in Finland are currently unavailable.

Figure 3 - Industrial and household electricity prices in selected EU member states in 2018, including taxes[20]

[19] Note that the chart is ordered by the median of household and industry prices for each country, this does not imply a weighted-average price for each country. 'International industrial energy prices', BEIS 2019 (viewed on 27 August 2019)

[20] Note that the chart is ordered by the median of household and industry prices for each country, this does not imply a weighted-average price for each country. 'International industrial energy prices', BEIS 2019 (viewed on 27 August 2019)

Attracting investment

The ability of our steel sector to compete in an internationally competitive market is a priority for this government. For the UK steel sector to remain competitive, it is important that it is able to attract investment in capital equipment, which can enhance capability, productivity and cost competitiveness.[21]

The government is already taking steps to bring costs down and to help support a move to lower carbon industry through funds such as the IETF and others listed in Table 1, It is envisaged that the Clean Steel Fund will further support the sector to attract investment to implement decarbonisation projects.

Barriers to decarbonising the steel sector

Technology barriers

There are technological barriers that hamper investment in steel decarbonisation projects. Steel decarbonisation technologies are at varying stages of readiness for large-scale industrial deployment, with some commercially ready and others still undergoing experimental development. For some technologies, for example hydrogen-based steel making, it may be up to 10 years until they are ready for deployment on a large industrial site in the UK. Cost-effectiveness of projects is maximised where investment is aligned with the long capital replacement cycles seen in the steel sector, this means major equipment may only be replaced once or twice between now and 2050, and therefore early policy signals that encourage consideration of appropriate decarbonisation pathways for specific sites are desirable.

As with any new technology deployed in industry, it is important that there is commercial scale demonstration in order to provide assurance around performance and cost. Where technology aims to reduce greenhouse gas emissions there is an additional layer of confidence needed to ensure that technology can be used to reduce emissions in a cost-effective way.

There may be broader technological barriers to deployment, such as the availability of fuels and feedstocks or the requirement of a CO_2 transport and storage network, in the case of Industrial carbon and capture (ICC).

High cost of decarbonisation

The Committee on Climate Change estimates a total annual cost of £8bn to cut emissions from industry to 10 $MtCO_2e$ in line with its Further Ambition Scenario.[22] Costs to achieve decarbonisation in industry are twofold:

- Capital costs of installing equipment to enable deep decarbonisation, such as ICC.

[21] 'UK steel industry: future market opportunities', BEIS 2017 (viewed on 27 August 2019)
[22] 'Net Zero Technical Report', Committee on Climate Change 2019: Page 105 (viewed on 27 August 2019)

- Potentially higher operating costs to decarbonise, for example through operating ICC or switching to low carbon fuels which may, in the near term, cost more than high carbon alternatives.

Inability to pass costs through to end users

The steel sector is particularly exposed to international competition. Certain steel products are a commodity, which means they are priced globally and that suppliers are price takers. This can mean that steel suppliers often operate on reduced profit margins, with difficulty to pass through costs onto end users. Furthermore, the UK steel sector can also be affected by international differential carbon costs and market developments.

The impact on profitability of the international market has potential to reduce the capital available for the sector to invest in decarbonisation projects.

5. **Have we identified the most significant barriers to investment in decarbonisation of steel production? Are there others we should consider?**
6. **How are investment decisions on decarbonisation projects made in your organisation? What evidence is required to support decisions?**
7. **What would help your Boards to agree to decarbonisation projects?**

What could the Fund support?

Framing for the Clean Steel Fund

We expect that existing policies will go some way to enabling energy efficiency and decarbonisation projects in the steel sector. However, we judge that additional support is required, in addition to existing funds such as the ISCF and the IETF, given the scale of major steel decarbonisation projects, and long lead in times and payback periods.

Navigating these challenges will require partnership between government, the steel industry, and its customers. This will inform the continued development of a supportive policy environment accompanied, where appropriate, by public investment to increase investor confidence and leverage private sector funding. In this light we believe the time is right to develop a new dedicated fund to support the steel industry in a shift to a low carbon pathway over the next decade and beyond.

To support the transition to clean steel in the UK we have identified two key objectives for the Fund that will inform future detailed design. These are:

- To transition to lower carbon steel production through new technologies and processes, placing the sector on a pathway consistent with the UK Climate Change Act (net zero).
- To maximise longevity and resilience in the UK steel sector by building on longstanding expertise and skills and harnessing clean growth opportunities.

Our expectation is that the Fund will provide a proportion of the investment for projects, with the rest funded by industry. We propose to operate the fund as a competition, to maximise value for money for taxpayers. All projects will need to be compliant with state aid rules.

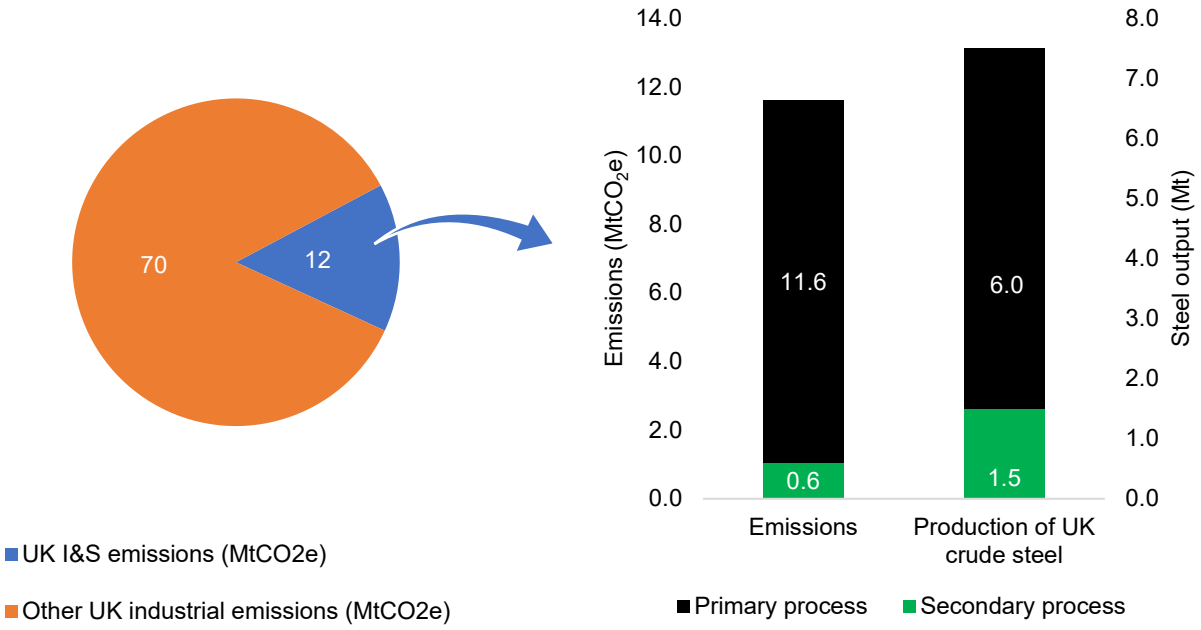
8. **Have we correctly identified the objectives for this Fund?**
9. **How can we maximise broader societal benefits, alongside value for money, in the design of the Fund?**

Options for clean steel

In the UK there are two routes for making steel. The first route involves the production of molten iron in a blast furnace. First, iron ore is heated up, usually with coking coal, and converted into pig iron. This hot metal is then mixed with oxygen at high temperature to form steel in a blast furnace. The second route uses electricity to heat up and melt recycled steel scrap into new products in an electric arc furnace.

Molten iron can also be produced in a direct reduced iron (DRI) process, the iron produced via this route would then be transferred to an electric arc furnace where it can be mixed in with steel scrap to form steel. Both the primary and secondary routes produce crude steel, which then undergoes further casting and fabrication to make steel products such as sections for construction, coiled steel for the automotive industry and sleepers for the rail industry.

Figure 4 – Steel sector emissions in 2017 broken down by process type[23] (with output by process type)[24]



A review of real-world projects and relevant industry literature shows there are three broad, categories of options for reducing emissions from steel and realising clean growth opportunities in both primary and secondary production routes:

1. Switching to lower carbon fuels

The emissions intensity of both primary and secondary steel production routes can be reduced if the sector shifts onto a low carbon pathway; away from high carbon fuels and processes through lower carbon alternatives such as natural gas, and over time to low and zero carbon using hydrogen, biomass and electricity (which will be close to zero carbon in 2050). Each fuel brings both opportunities and challenges.

For primary steel production, natural gas can either be blended with coking coal in the blast furnace or used directly in iron ore production. Switching to natural gas would reduce greenhouse gas emissions per unit of steel compared to current processes used in the UK today. Over the longer-term, further decarbonisation strategies would be needed, such as a shift to hydrogen or use of ICC, to ensure that steel is on an emissions reduction pathway consistent with net zero. Similar to natural gas, hydrogen could be blended with coking coal with relatively few changes to the equipment as part of a decarbonisation pathway. Using pure hydrogen could greatly reduce the carbon intensity of steel, if the hydrogen is low carbon, but this is a longer-term strategy as it would require large changes to equipment. The challenges associated with using hydrogen include the additional costs compared to using coking coal, and the need for a secure supply of low carbon hydrogen in order to start trialling technologies (Box 2).

[23] 'Total UK & steel sector emissions', BEIS 2019 (viewed on 27 August 2019)
Site level emissions - 'Union Registry', EU Commission (viewed 27 August 2019)
Steel output - World steel association
2018 data is available on steel sector emissions and output (bar chart). However, 2017 data has been used here for consistency with the national emissions statistics (pie chart), for which 2017 data is the latest available.
[24] Primary process includes all emissions/steel produced by blast furnace operators. Emissions are source emissions and do not include indirect emissions from the use of electricity

Box 2: Low Carbon Hydrogen Production Fund

Hydrogen is an energy carrier with potential to support the UK's efforts to transform and decarbonise the energy system in line with our 2050 net zero target. The current market for hydrogen in the UK is small; production estimates range from 10-27 TWh and only a fraction of this is low carbon (the same is true internationally).[25]

Government is currently investing up to £108m in a range of innovation programmes to explore and develop the potential of low carbon hydrogen across the value chain.[26]

While it is not possible to be certain of the precise role hydrogen will play in 2050, the Committee on Climate Change (CCC) have suggested that a major increase in hydrogen production is required in order to meet net zero,[27] with a complete switch to low carbon production methods. The steel sector, along with other parts of the energy system, including transport, other industry, heat in buildings and power, can only fully consider hydrogen as a decarbonisation option if it is readily available, at a competitive price and with assurance that it is low or zero carbon.

Alongside innovation, we are developing policy to support low carbon hydrogen production, for example through the recent consultation on business models for CCUS, which includes hydrogen.[28] However, we believe that further support will be required to accelerate commercial scale demonstration and deployment of first of a kind low carbon hydrogen production facilities. This will be critical to overcome the current low carbon hydrogen supply constraint and give greater confidence to potential high-volume users including, but not limited to, the steel sector.

The UK government will establish a new £100m Low Carbon Hydrogen Production Fund to:

- Deploy low carbon hydrogen production capacity to enable greater use of hydrogen as a decarbonisation option across the energy system.
- Encourage future private sector investment in low carbon hydrogen to support scale up and market development that aligns with the UK's clean growth objectives.

We intend to consult on the shape of the Fund during 2020 with a view to launching the Fund for bids in 2021.

Biomass, such as charcoal or bio-char, could be used to directly replace a quantity of coal in the blast furnace route for iron making, without major process redesigns. However, long-term supplies of biomass are uncertain, and the best use of limited biomass feedstock needs to be considered across the economy, in the light of our new net zero target. If biomass is used in steel making, less would be available for decarbonisation projects in other carbon intensive sectors.

[25] 'Energy Research Partnership, Role of hydrogen in the UK Energy System', The Energy Research Partnership 2016 (viewed on 27 August 2019)
'Investment Frameworks for the Development of CCUS in the UK': CAG Final Report' CCUS Advisory Group 2019 (viewed on 27 August 2019)
[26] Through the BEIS Energy Innovation Programme and the OLEV Hydrogen for Transport Programme.
[27] 'Net Zero Technical Report', Committee on Climate Change 2019: Page 61 (viewed on 27 August 2019)
[28] 'Carbon capture, usage and storage (CCUS): business models', BEIS 2019 (viewed on 27 August 2019)

The processes that use electricity such as the electric arc furnace, are lower carbon per tonne of steel compared with primary steel production. The carbon intensity of electricity will fall further as more renewables and low carbon energy sources are integrated onto the grid. This would reduce the emissions intensity of secondary steel production further and potentially for primary production, as technology is being developed to electrify certain processes.

2. Industrial carbon capture (ICC)

To date, much of the thinking for decarbonisation of steel has focused on capturing the carbon dioxide emitted from the various production processes, known as Industrial Carbon Capture (ICC). Across a steelmaking site, there will be many units whose operations will produce carbon dioxide, which can be captured and then either stored or utilised. However, the large number of different emission sources can present a challenge with implementing ICC in an existing steelworks. Capturing the carbon dioxide from all of these sources could prove expensive. New types of blast furnace are being developed which improve the efficiency of the process and also make it easier to capture carbon dioxide at a lower cost. Another consideration is that ICC systems, where the carbon dioxide is not then used, require a carbon dioxide transport and storage network.[29] As major steelmaking sites in the UK are located predominantly near industrial clusters, they would be well-placed when these carbon dioxide transport networks are set up.

3. Energy and material efficiency

It is vital to minimise the energy input required to produce steel. Whilst many of the opportunities for improving energy efficiency have been realised there are still opportunities (such as improved heat recovery) for further efficiency savings across the sector. Any new technology or process should ideally also be designed to ensure it is energy efficient in a range of future scenarios (such as switching to hydrogen). In this context energy efficiency could have a role to play in the Clean Steel Fund.

Material efficiency is a complementary but distinct option to energy efficiency. Fundamental to achieving this is a circular economy approach, which aims to keep products and materials in circulation for as long as possible and using them at their highest value.[30] In practice this means, using steel more efficiently throughout its lifespan through not only improved and lightweight product design, but also reuse and remanufacture and better sorting of scrap to increase the quality of recycled steel, reducing need for primary steel. However, often steel is blended with other elements such as manganese and nickel, which impact on the quality of steel that can be produced via secondary production. For this and other reasons, not all steel can be recycled and there are some losses in the system meaning an ongoing demand for some primary steel production will remain.

Many of the solutions listed above are expensive. It will be important to ensure that the £250m Fund is well designed to maximise its impact in enabling a transition to a clean steel industry. Government's current view on the Fund is that it will be sequential to existing funds such as the IETF and ISCF, building on the support they provide to the development of decarbonisation projects, so they are ready for deployment. We expect that the Fund will aim to focus on supporting the development and trialling key processes which could put steel production on a

[29] 'Carbon capture, usage and storage (CCUS): business models', BEIS 2019 (viewed on 27 August 2019)
[30] 'The Government's Waste and Resources strategy' sets out how we will improve the management of our material resources: by minimising waste, promoting resource efficiency and moving towards a circular economy

pathway to decarbonisation, compatible with our net zero target, with funding dependant on compatibility with state aid law.

10. **What estimates do you have on the costs and availability of these three technology options for reducing emissions?**

11. **How does the availability of these technologies align with your refurbishment/replacement cycles?**

12. **Are there any other technology options that we should consider? What evidence do you have to support this, including on costs and availability?**

13. **Are there any additional policies that government should consider to support the steel sector in the shift to decarbonisation pathway?**

Next steps

We are committed to ongoing dialogue with stakeholders as we review responses to this call for evidence.

Transforming the steel sector is a long-term endeavour and this call for evidence allows us to take on board early views and use them to guide our policy thinking. We want to be mindful of responses to this call for evidence as we work through the linkages with other industrial decarbonisation policies and funds including the Industrial Clusters Mission, Industrial Strategy Challenge Fund, Industrial Energy Transformation Fund and will consult formally on the Clean Steel Fund in due course.

We will also progress the design and delivery of the Low Carbon Hydrogen Production Fund. The steel sector can only consider the option of hydrogen if it is available. We intend to consult on the shape of the Fund during 2020 with a view to launching the Fund for bids in 2021.

14. Do you have suggestions on how best we might engage with Industry as we develop the work programme to inform the design of the Clean Steel Fund?

Call for evidence questions

1. The UK steel sector has a number of strengths identified above, are there any others that we have not identified?

2. Are there any further opportunities, not already identified, from a UK clean steel sector?

3. What other wider benefits could the Fund deliver?

4. How could the UK government facilitate creation of a market for low carbon steel?

5. Have we identified the most significant barriers to investment in decarbonisation of steel production? Are there others we should consider?

6. How are investment decisions on decarbonisation projects made in your organisation? What evidence is required to support decisions?

7. What would help your Boards to agree to decarbonisation projects?

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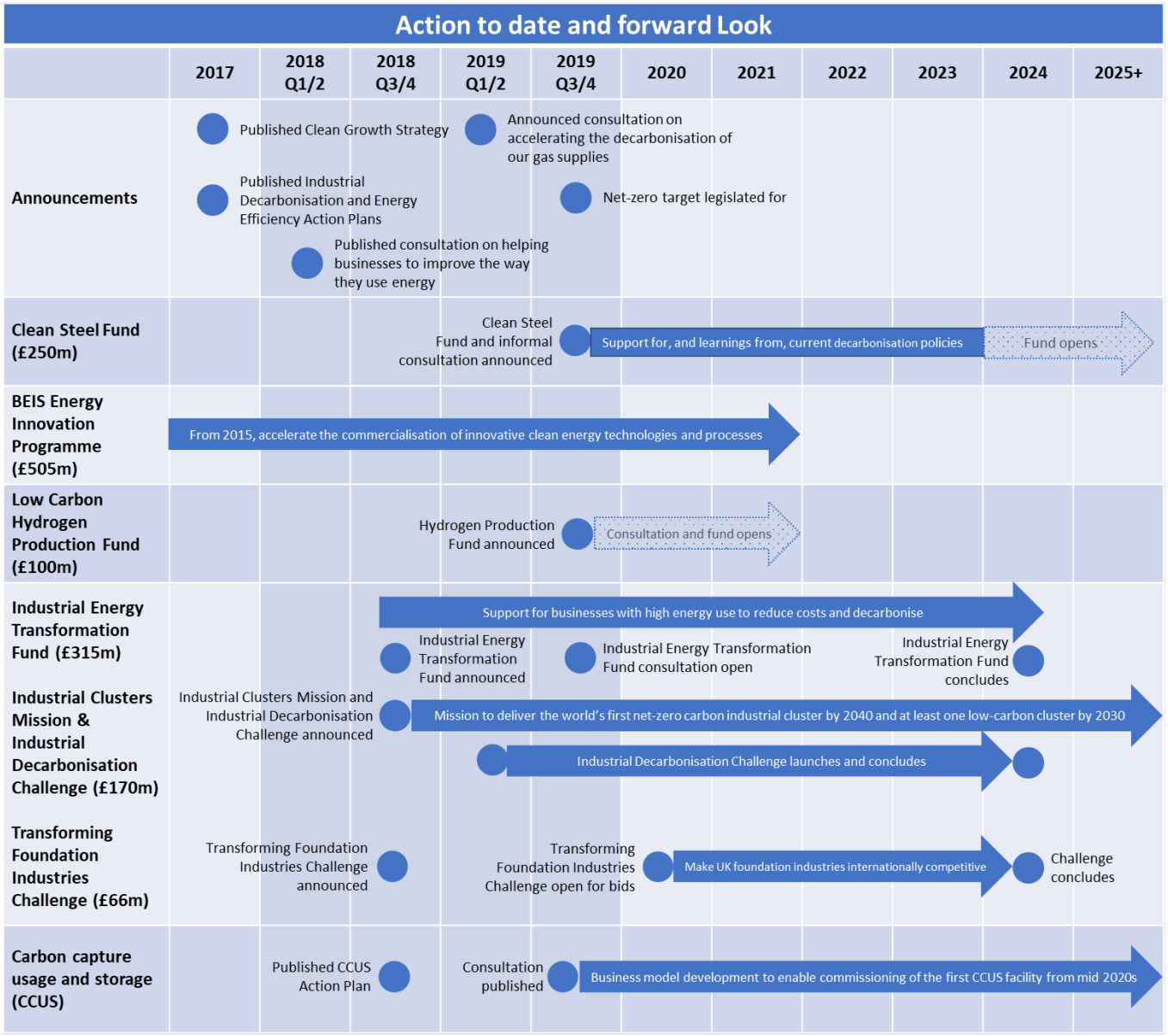
14. Do you have suggestions on how best we might engage with Industry as we develop the work programme to inform the design of the Clean Steel Fund?

Action to date and forward look

The timeline reflects indicative policy milestones. These may evolve as we develop the funds.



This consultation is available from:
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