

Steel the Deal: The Race to the Top for European Green Steel

Introduction

The international race to green the steel industry is on, but while many European states are championing the necessary transition, the UK is trailing behind.

While the UK government pledged [£250 million](#) as part of the Clean Steel Fund ahead of the 2019 General Election, funding has yet to be distributed years later, despite repeated calls on the government to act. Despite the UK standing to gain [millions](#) from the repatriation of their share of EU research funds related to steel, at a time when support for green steel innovation, research and development is urgently needed, it is as of yet unclear how these will be allocated. In June, the Materials Processing Institute (MPI) [announced](#) a national project, H2DRI, to demonstrate UK green steel through the use of hydrogen and electricity, enabled by £270,000 in government funding

Despite areas of progress, the clock is ticking, both with regards to addressing climate breakdown and the need to safeguard a long term future for UK steel. The need for immediate action is heightened by sky-rocketing electricity costs faced by the industry, which are currently hampering the competitive edge of UK steel, and the sector's capacity to decarbonise. Billions in investment is required to transform the UK steel sector and unlock the economic, social and climate benefits that come with it. In addition to building our steel recycling capacity, this will have to include the greening of primary steel production, to ensure that value chains dependent on access to high grade steel derivatives can remain in Britain. Yet the current lack of capital spending support from the government is holding back the industry's modernisation process, putting the competitiveness and longevity of the sector and beyond it at risk.

The future of steel is green and while neighbouring European countries forge ahead with the private and government support necessary to transition the industry and align industry emissions with Paris Agreement commitments, the UK is lagging.

This briefing provides a snapshot of green primary steel projects, policies and funding in other European states. These examples demonstrate that with the right levels of industry and government support, UK green steel has the potential to become a world-leading industry.

Neighbouring states are leading on green steel

Across Europe, the number of green steel initiatives continues to soar as countries grasp the opportunity to modernise and secure a thriving future for the industry. Research published in 2021 by European NGO Bellona identified over twenty primary steel initiatives planned that use hydrogen throughout the continent.

As the Materials Processing Institute [notes](#), hydrogen DRI — meaning a direct reduction of iron — technology seems “the most adapted solution for the UK industry.” While varying in stages, there are fourteen planned DRI projects in Europe as of 2021. Should steel companies meet their goals, [several cities](#) in Europe will have commercial DRI production within the next four years. Absent from the findings in the table below is the UK.

DRI projects planned in Europe

No.	Producer	Location	Type
1	ArcelorMittal	Hamburg, Germany	Grey hydrogen
2	ArcelorMittal	Dunkirk, France	Natural gas
3	ArcelorMittal	Taranto, Italy	Unknown
4	ArcelorMittal	Eisenhüttenstadt, Germany	Hydrogen from electrolysis and pyrolysis of natural gas
5	ArcelorMittal	Bremen, Germany	Natural gas --> hydrogen from electrolysis
6	Voestalpine	Leoben (Donawitz), Austria	Hydrogen
7	Salzgitter AG	Salzgitter, Germany	Natural gas and hydrogen
8	Salzgitter AG	Wilhelmshaven, Germany	Natural gas --> hydrogen from electrolysis
9	SSAB	Gällivare-Oxelösund, Sweden	Hydrogen from electrolysis
10	LKAB	Kiruna-Malmberget-Svappavaara, Sweden	Hydrogen likely from electrolysis
11	Thyssenkrupp	Duisburg, Germany	Natural gas
12	Liberty	Galati, Romania	Natural gas
13	Liberty	Dunkirk, France	Hydrogen and natural gas --> hydrogen from electrolysis
14	H2 Green Steel	Boden-Luleå, Sweden	Hydrogen from electrolysis

[Source: [Bellona](#)]

Case study: France’s industry-government partnership

In February 2022, the French Prime Minister announced government support for ArcelorMittal's low carbon programme, which involves a [€1.7 billion](#) investment in its Fos-sur-Mer and Dunkirk sites in France.

Integral to this transformation is the financial support provided by the French state, which comes out of ring fenced investment of [€5.5 billion](#) to assist steel-aluminium, chemical and cement industries in their efforts to reduce emissions as part of its "France 2030" investment programme. ArcelorMittal France [said](#) the government support "makes possible the extremely high investments we need to make to decarbonise steelmaking on our Dunkirk site, Europe's largest steel producing site."

The two plants combined currently account for [25 percent](#) of the country's industrial greenhouse gas emissions, and the transition will represent a 10% reduction in France's manufacturing industry greenhouse gas emissions; a 7.8 million tonne reduction in CO2 emissions per year in France by 2030. Critically, this transformation is being carried out without reducing production capacities.

It has been [reported](#) the move by the French government to support such projects was influenced by a desire to level up investment in industrial heartlands which have suffered factory closures ahead of the presidential election. The project partnership is subject to EU approval and an assessment of the economic viability of energy infrastructure and supply.

Case study: Sweden's pioneering green steel backed by government

Sweden, with good access to electricity and hydropower, is driving forward pioneering green steel projects. Non-carbon-emitting power is a key component of the country's drive to reach net zero greenhouse gas emissions within the next [13 years](#), with a series of large-scale hydrogen-use industrial initiatives already underway.

A circular plant close to Boden in the north of the country is seeking to produce low carbon steel, reducing emissions by up to [95 percent](#) when compared with traditional modes of steel production. By replacing coal with green hydrogen powered by decarbonised electricity, water and heat, H2 Green Steel hopes to decarbonise steel.

The project has [received](#) SEK 30 million in funding for initial technical work from the Swedish Energy Agency, a government agency responsible for matters of the supply and use of energy in Sweden.

In June, H2 Green Steel signed a 14-TWh power purchase agreement with Statkraft for its plant. By 2030, it [seeks](#) to produce 5 million mt of low carbon steel a year and will produce 2.5 million mt/year of steel throughout its first phase, with initial production predicted as early as 2024. The construction of the H2 Green Steel plant is [estimated](#) to require up to 5,000 workers and, when operational, will employ more than 1,500 people.

A collaboration between project owners SSAB, LKAB and Vattenfall launched HYBRIT's pilot facility, which aims to produce fossil-free hydrogen gas storage at Svartöberget in Luleå, Sweden. The hydrogen storage facility, the first of its kind, [aims](#) to play a central part in the total value chain for decarbonised iron and steel, with a test period running until 2024.

While [SSAB](#) is a Nordic and US-based steel company, LKAB—which carries out work in iron ore and special products—is wholly owned by the Swedish state, as is Vattenfall, which produces, distributes and sells electricity, heat and gas. In 2018, HYBRIT was [granted](#) SEK 528 million in financial backing by the state-owned Swedish Energy Agency. And in 2021, HYBRIT was [awarded](#) additional support from the EU Innovation Fund.

Building on its ambitions, SSAB is doing the groundwork to prepare a demonstration plant in Gällivare near the LKAB iron ore mine with the aim to complete it by 2025, coinciding with SSAB's Oxelösund blast furnace being converted to an electric arc furnace, [enabling](#) the production of ore-based green steel on commercial terms by 2026.

Case study: decarbonising Germany's biggest industrial emitter

Germany [produces](#) 25.6 percent of all steel output in the European Union, and has the highest levels of direct employment in the sector. Steel is currently the country's biggest industrial emitter of greenhouse gases, and the financial support required for a transition to green steel in Germany is [estimated](#) to sit in the region of €13 to €35 billion. Even though Germany is less blessed in terms of domestic resources to provide the required clean hydrogen for its steel transition, the two largest German steel companies are making first significant steps in that direction, backed by the German government.

In 2020, €5 million was made [available](#) by the German state to Salzgitter AG to produce green steel following the firm's plans to transition a blast furnace steel production plant into a hydrogen-based DRI one. In July 2022, the company [committed](#) over €700 million to begin the first stage of the so-called Salcos project. Unlike the DRI project in Luleå, however, Salcos will initially use a natural gas blend with hydrogen until sufficient quantities of hydrogen are available.

Moreover, following a challenging landscape for ThyssenKrupp AG amid the economic shock of the pandemic, the German Government [entered](#) talks regarding a possible aid package to provide financial assistance to and longevity for green steel. In 2021 Germany [announced](#) it would spend €5 billion for hydrogen steel production projects and research programmes, as well as supporting green steel infrastructure construction, with the government striving for the maximum green steel subsidies allowed under EU state-aid rules. A feasibility study for ThyssenKrupp's "H2morrow" project was [finalised](#) in 2021, and could see Blue Hydrogen being produced through Norway's Equinor to accelerate the transition to DRI steel at the company's vast Duisburg plant. A pilot

(H2Steel) replacing coking coal with hydrogen in the blast furnace itself was [started](#) in 2022, supported with €37 million from the German government.

Last year, the German Government announced plans around contracts for difference (CfDs), enabling steel, cement, ammonia and lime industries the green light to operate on the basis of ten-year CfDs should they commit to [slashing](#) CO2 emissions by over 50 percent using innovative technologies.

What next for the UK? Seizing the opportunity to create a world-class, competitive green steel sector

Modernising the steel sector unlocks intertwined social, political and economic benefits for the UK: levelling up investment in industrial heartlands, securing highly-skilled green jobs for the future, stimulating demand for a strategically important sector, developing world-leading expertise, boosting sustainable exports, and creating an ecosystem of UK supply chains.¹

Moreover, the UK is well placed to create a world-class green steel industry, and cannot reach its net zero targets without transforming the way steel is produced. Policy frameworks and investments in essential components, particularly clean hydrogen production and infrastructures that are key to unlocking green primary steel production, are already being prepared. It is crucial that steel manufacturers are ready and able to capitalise on these commitments. Seismic opportunities exist should the UK commit to a just plan for near net zero steel emissions, steel efficiency improvements, investment in green steel R&D, co-funding pilot trialling hydrogen-based UK steelmaking, and the creation of a clean steel hub to deliver for UK supply chains and the export market.

Progress is sorely needed to secure a long-term future for UK steel, most immediately by tackling excessive energy costs, but with an overarching goal of providing the investment and policies required to transition the sector to a green future. Evident from the examples outlined above is that government funding in neighbouring states is enabling transformative green steel projects. On its current trajectory, the UK is set to fall further behind European competitors in the development of clean steel, but a window of opportunity exists to turn this predicament around and deliver for the steel sector, steelworkers, and steel communities. The challenge for the UK Government now is to grasp this opportunity.

¹ Link to public investment briefing