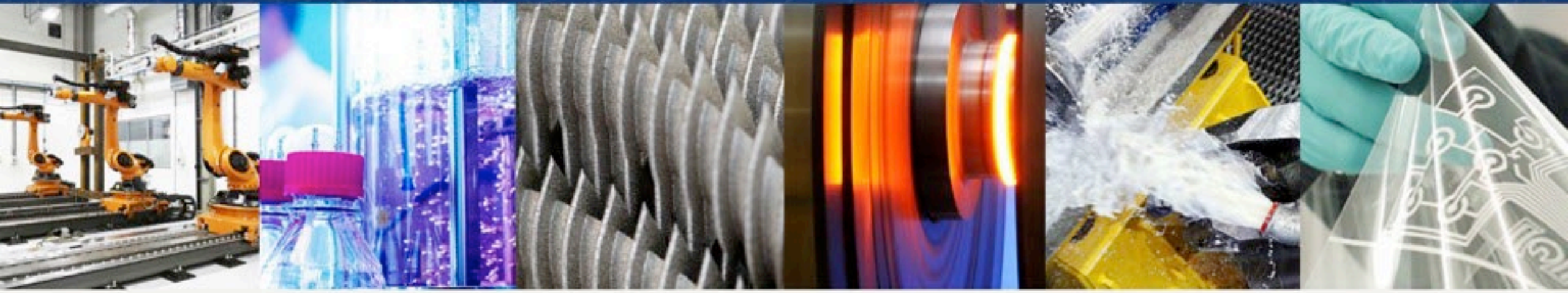
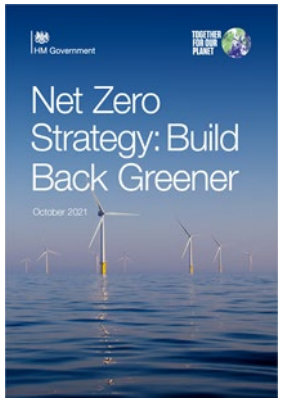
Exploring Current State of Embodied Emissions & ReDisCoveR value May 18th 2022

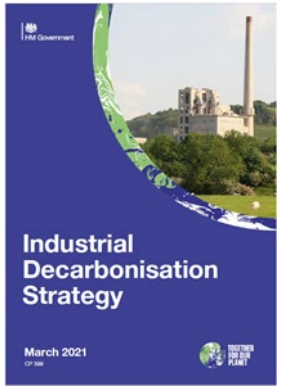
High Value Manufacturing Catapult
Paul Cantwell – Knowledge Exchange Fellow for the National Manufacturing Institute Scotland



Manufacturing Emissions- GHG Accounting

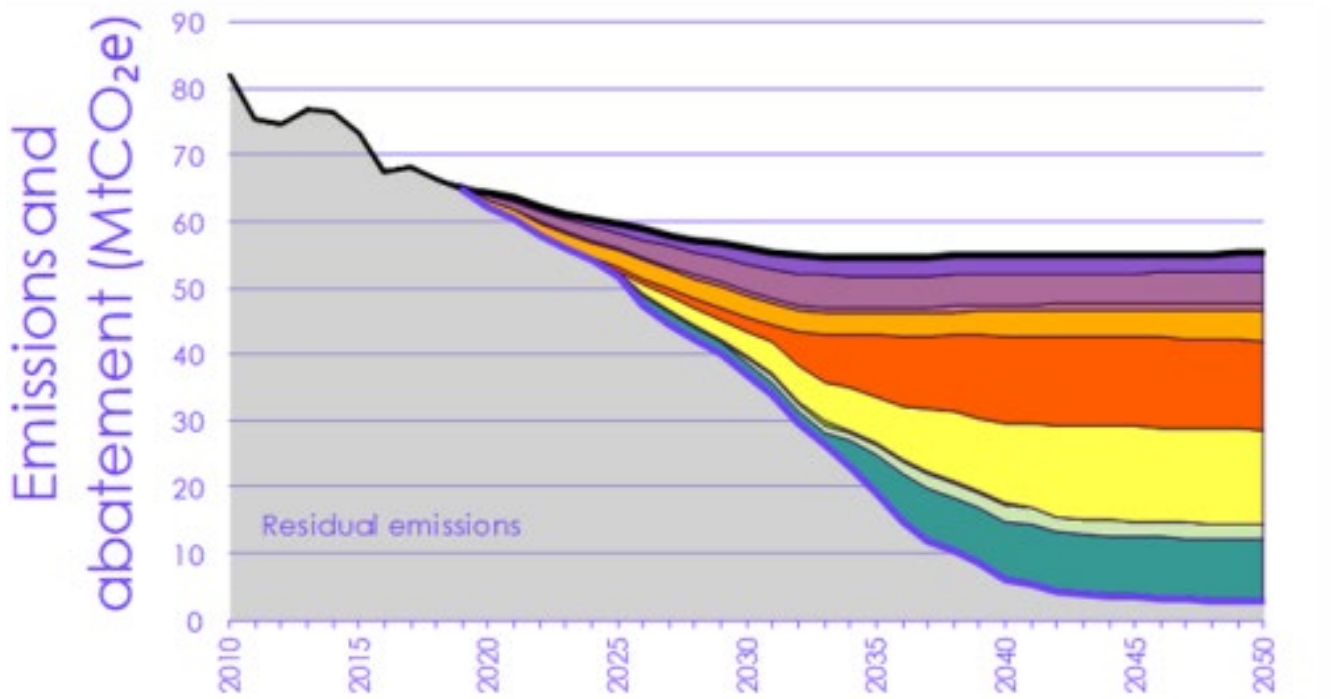
- Government strategy lays out a vision for Net Zero territorial emissions
- A recent Catapult study found that manufacturing accounts for up to 43% of UK consumption emissions
- We must reduce our manufacturing emissions footprint without offshoring manufacturing content
- Lack of visibility of scope 3 upstream emissions
- Clarity to support decision making for both policy makers and industry
- Need to treat decommissioned structures as material assets

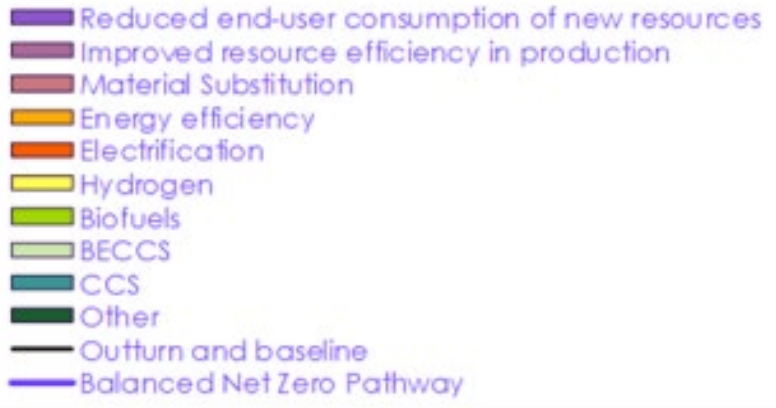




Can we make the UK a green shoring destination?

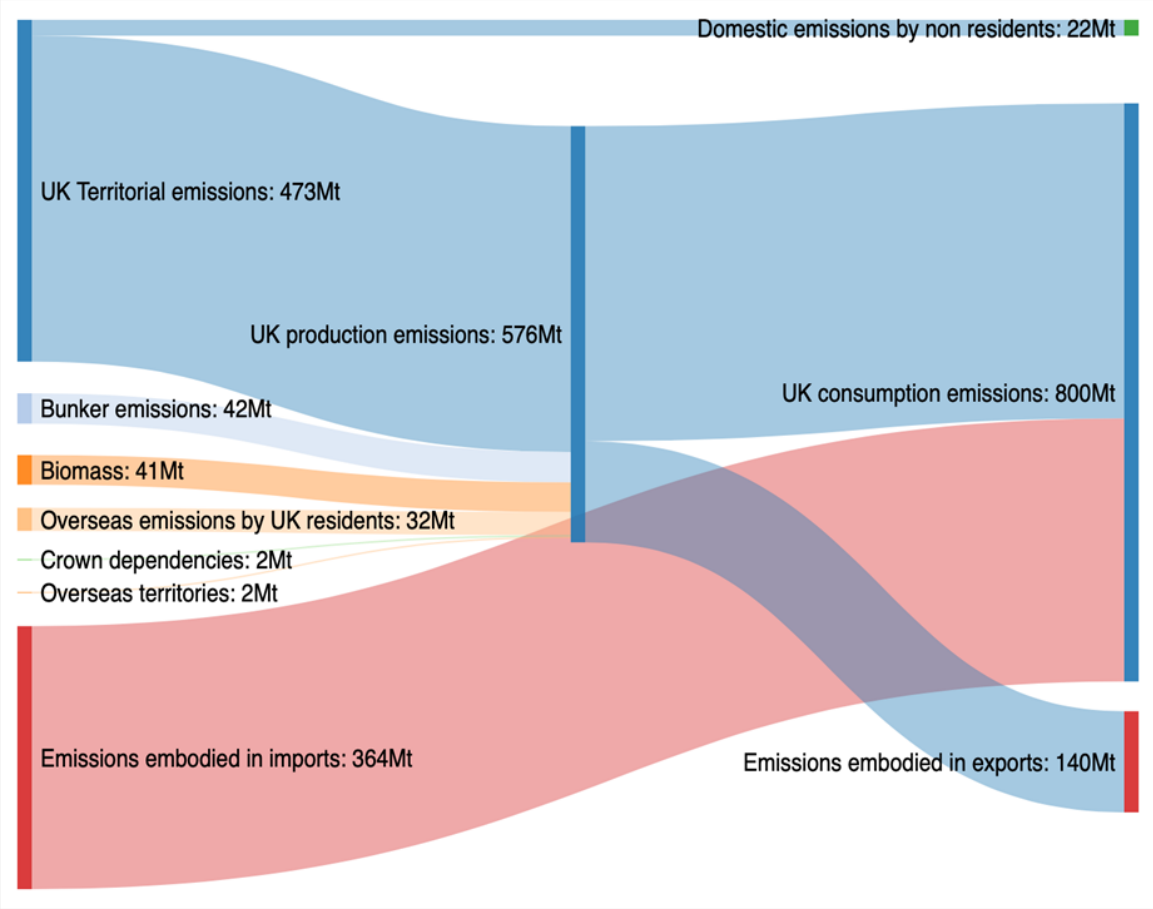
Industry Net Zero Pathways for Manufacturing

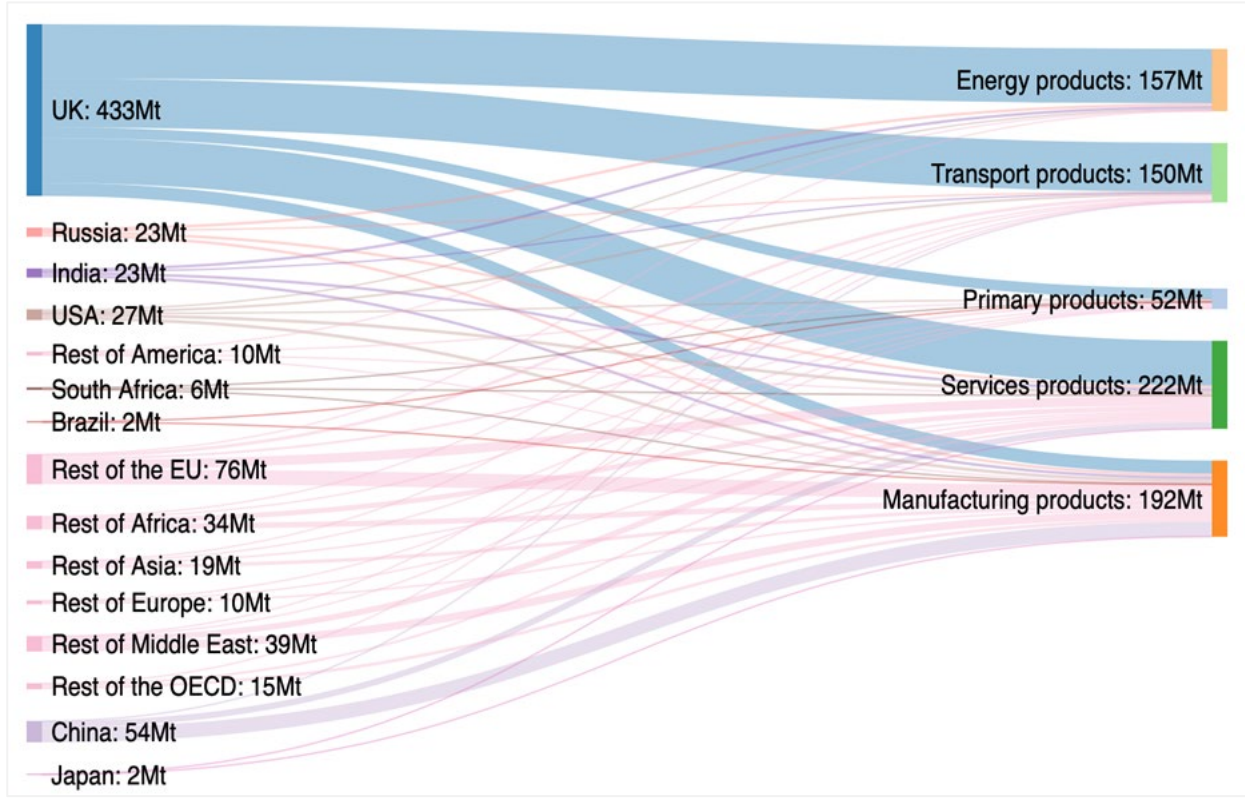




Source: CCC (2021)

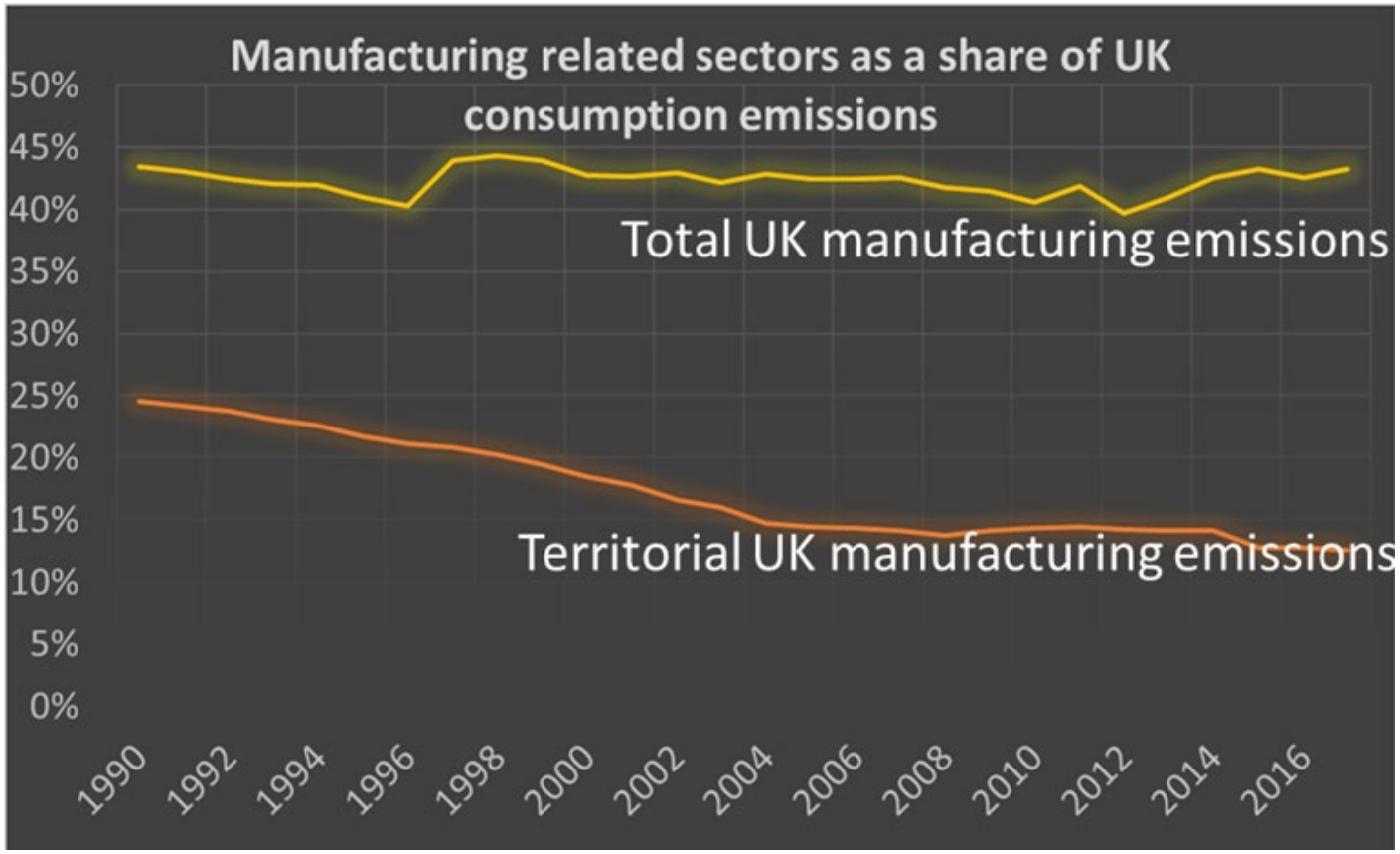
Consumption Base Emissions and International Supply Chains





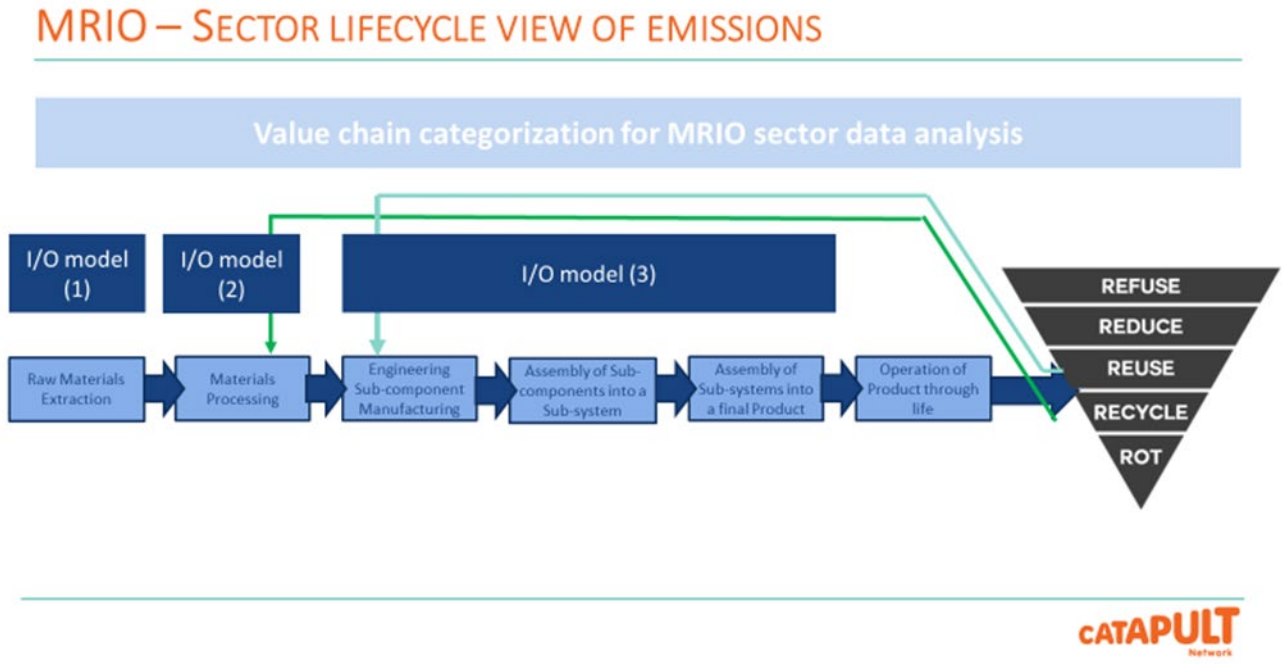
UK Manufacturing Emissions: Trends

- At the national level, emissions from Manufacturing could be as high as **43% of the total UK consumption emissions**
- UK Consumption emissions have flatlined while UK territorial Manufacturing emissions have halved
- A better understanding of upstream scope 3 emissions benefits business, as well as our understanding of the UK's consumption emissions at a national level



Intervention and innovation opportunities

Sector supply chain mapping will identify high emitting steps in the chain and opportunities for UK innovation and ‘Green-shoring’



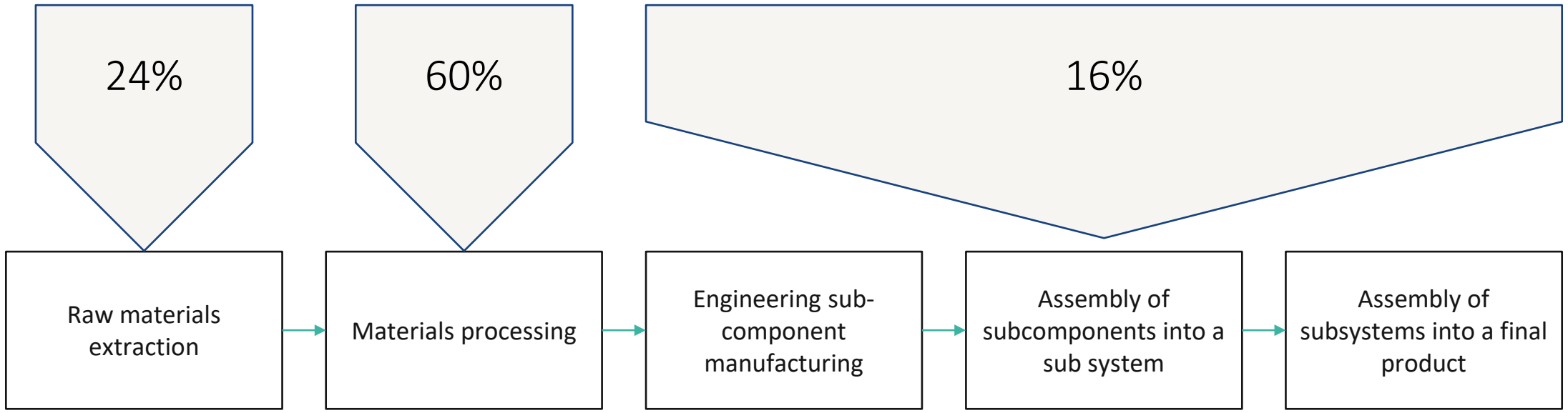
Anchoring and Green Shoring manufacturing content

- **Primary materials processing is where the bulk of manufacturing emissions occur**
- Analysis shows that locating primary materials processing in the UK can reduce consumption and scope 3 emissions (eg steel)
- Evidence shows that regions that locate primary processing, anchor down stream manufacturing (eg Russia – titanium, China- rare earths, WMG report- steel & aluminum recycling UK, CPI analysis on chemicals and pharma supply chain post ICI)
- **High Value Design locks in materials and manufacturing lifecycle**
  Retention in the UK can reduce emissions and secure value

UK Manufacturing Emissions: Sector Level

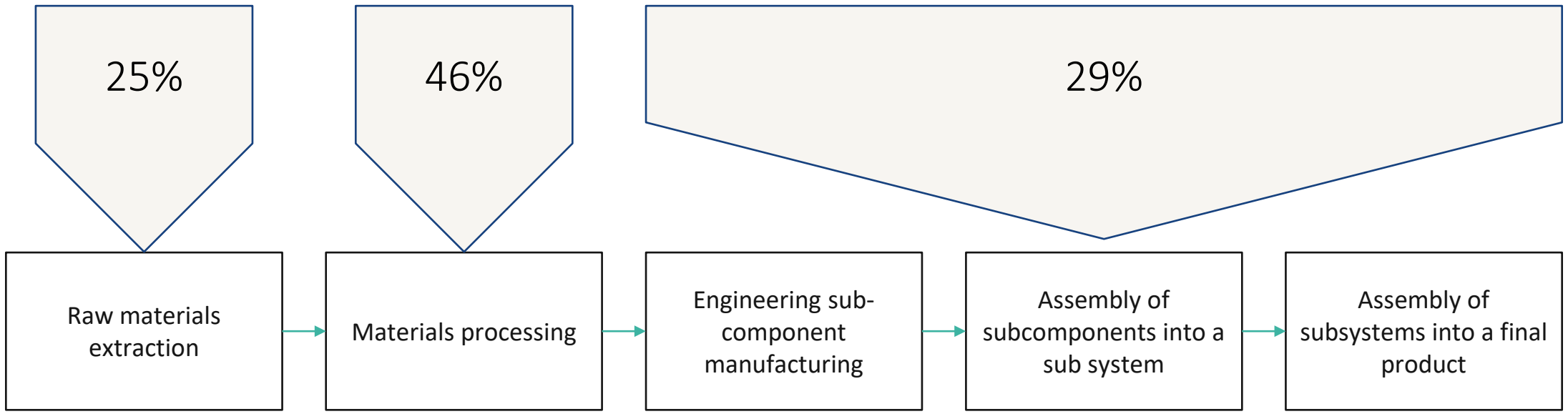
Emissions relating to the production of goods is often dominated by the upstream supply chain

For example, Aerospace sector emissions (cradle-to-gate) (MIRO model top 20 SIC codes):



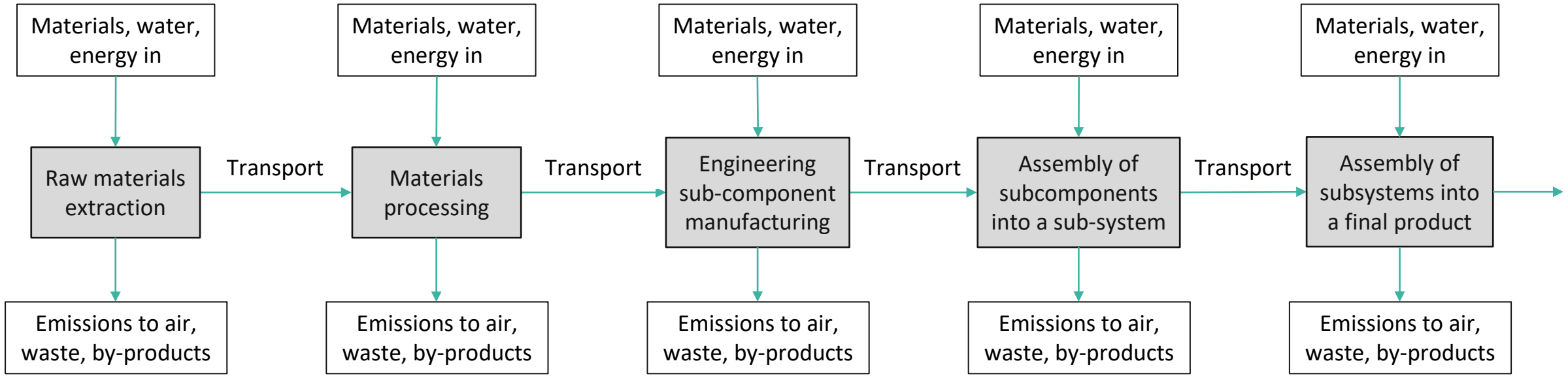
UK Manufacturing Emissions: Sector Level- Automotive

Automotive sector emissions (cradle-to-gate) (MIRO model top 20 SIC codes):

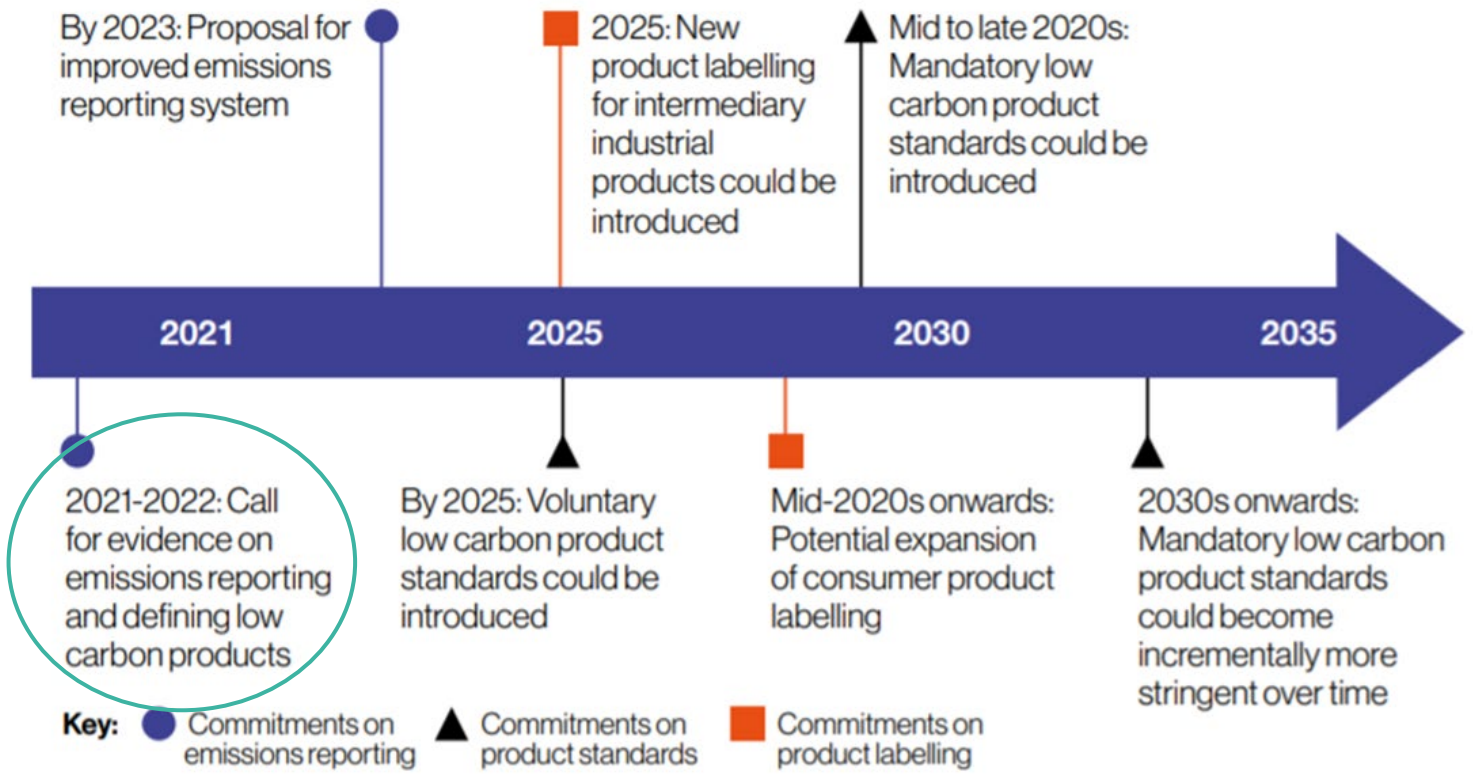


UK Manufacturing Emissions: Product Level & Scope 3

- UK business is increasingly starting to tackle their Scope 3 emissions – pressured by investors and customers
- Scope 3 emissions can be the most complex and challenging to understand
- Organizations often rely on life cycle assessment (LCA) data to quantify supply chain emissions where more specific supplier emissions information is not available



UK Industrial Decarbonisation Strategy



Source: https://www.gov.uk/government/publications/industrial-decarbonisation-strategy

UK leadership

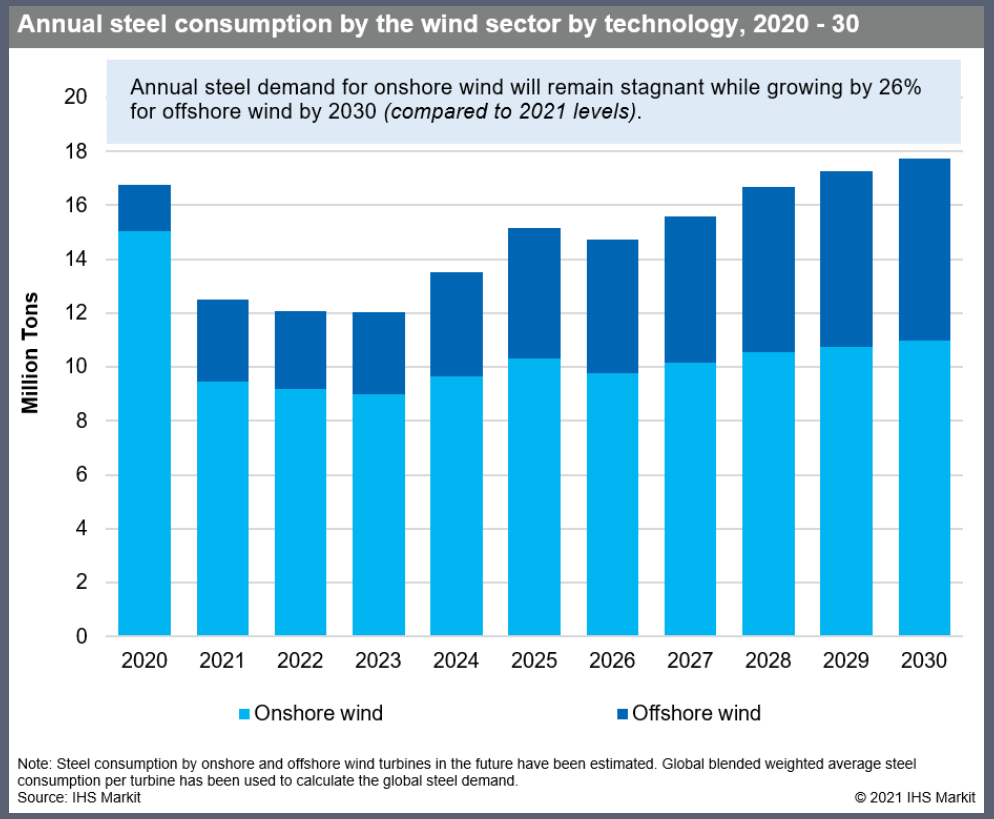
The UK has 1.1% of global emissions & offshore 89% of manufacturing emissions

The impact can be much greater as a leader and exporter of technology & standards

Lead the way in accounting for scope 3 or consumption emissions to amplify impact- Lead the green industrial revolution just as we led the first…

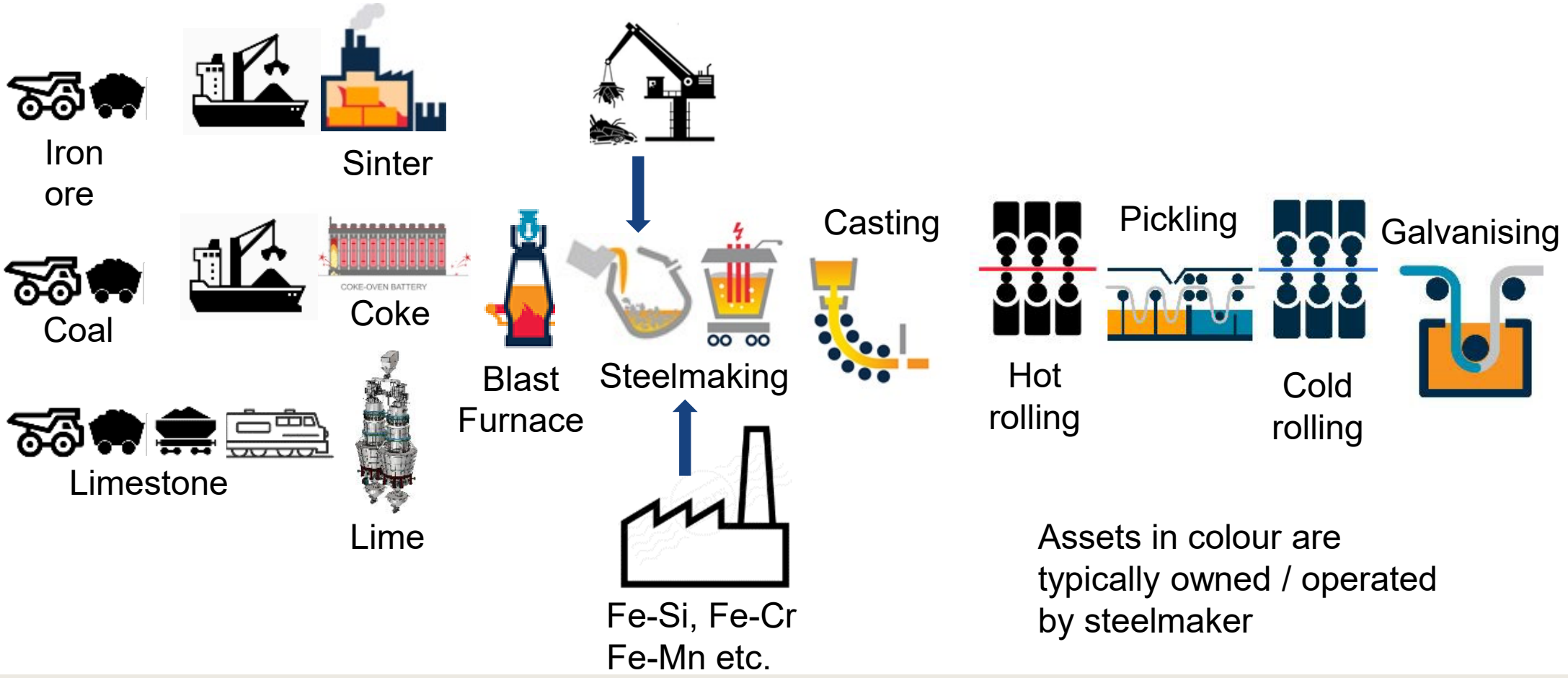
…& become a global supply chain destination for sustainable manufacturing

Steel Sector



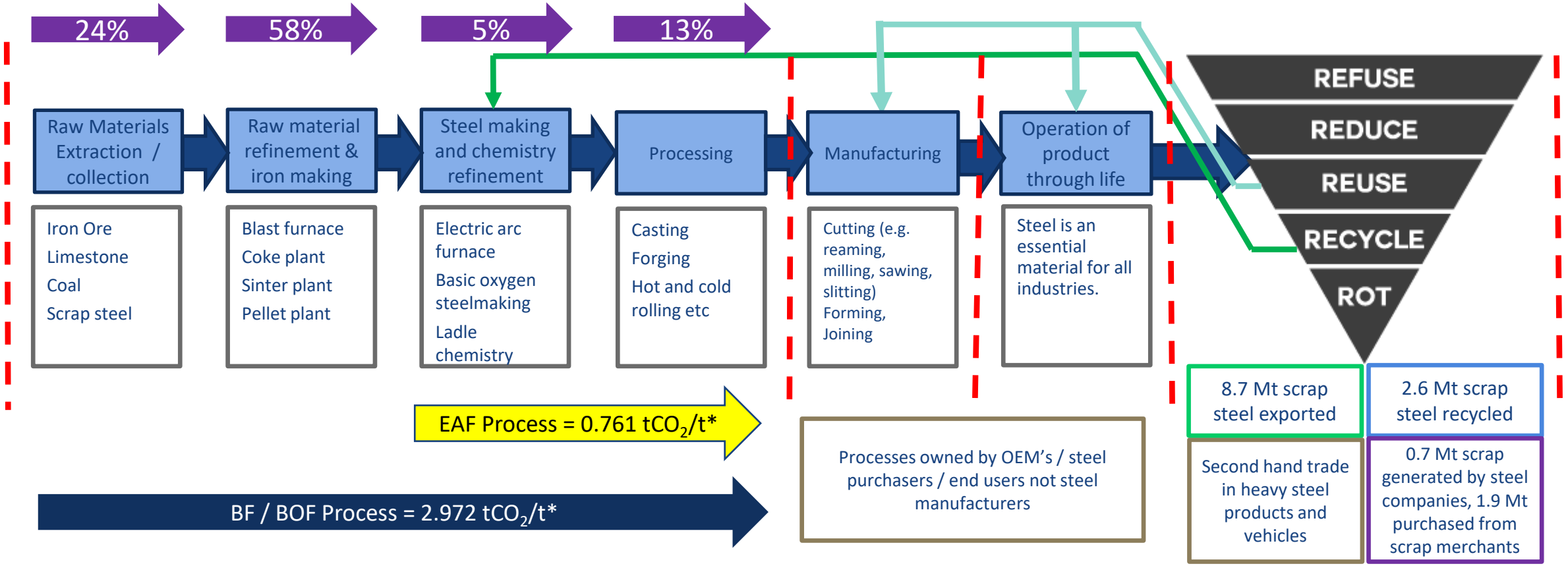
Source: Annual steel consumption by the wind sector by technology, 2020-30

Current Steel Production Processing

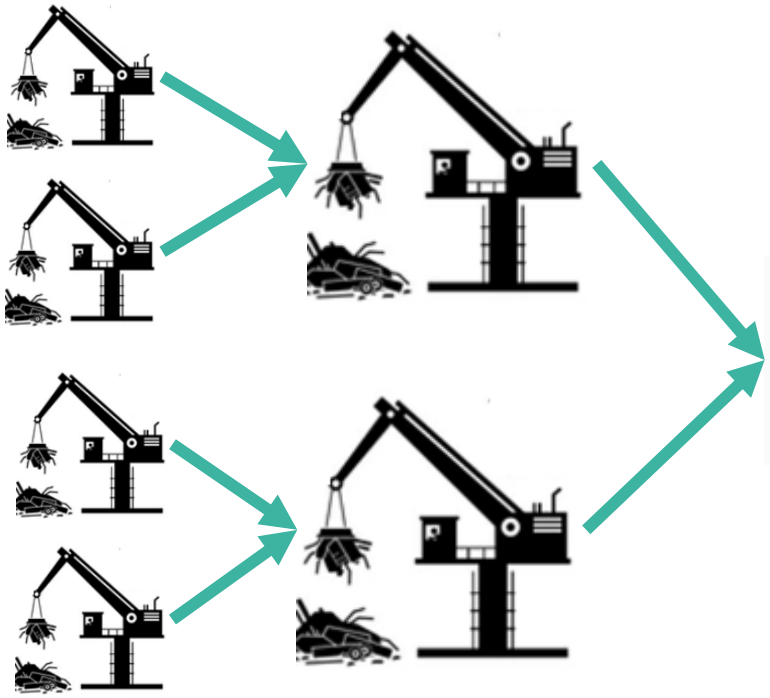


Assets in colour are typically owned / operated by steelmaker

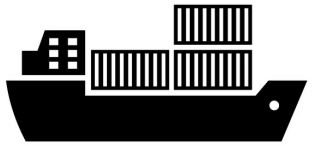
Steel: End to End CO_2 MAP



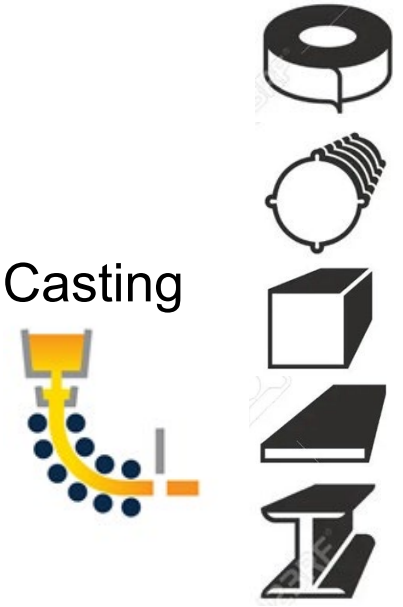
Current Scrap Steel Scenario Recycling Processing



Scrap collected & sorted at multiple sites



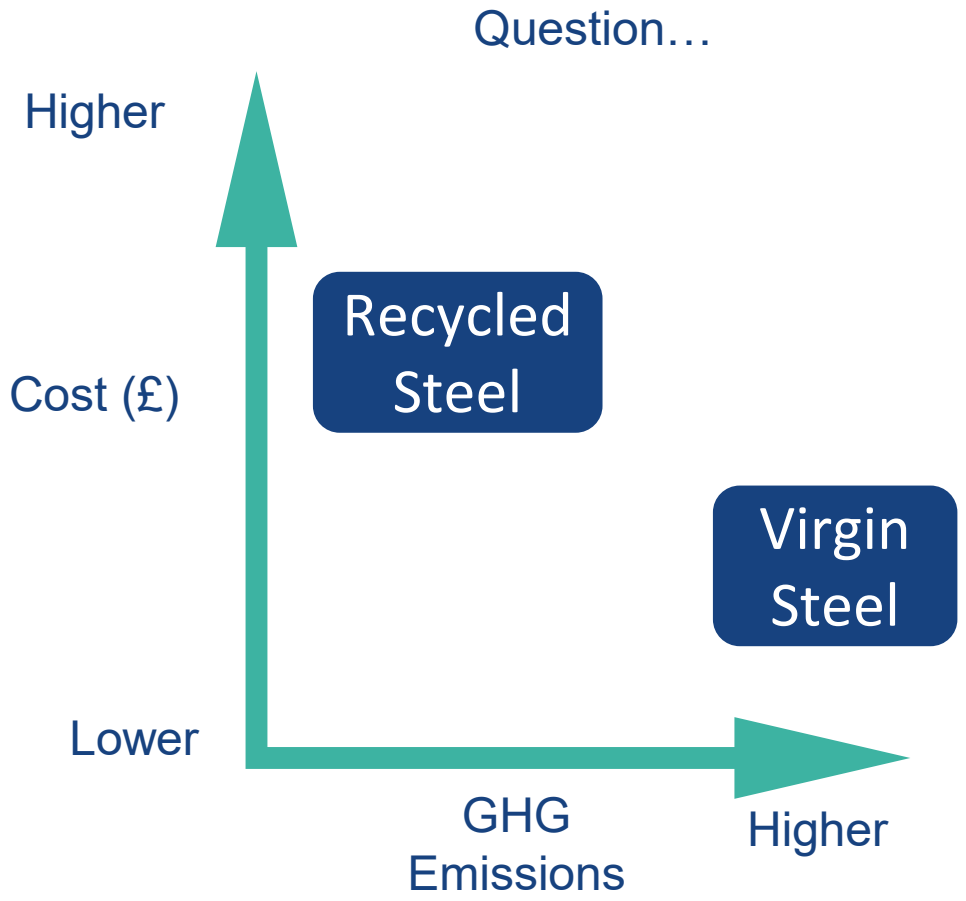
Scrap is loaded into containers and exported



Non-UK steelmaker recycles steel through EAF into new steel products

Steel as an Asset

Oil & Gas Steel Grades	Wind Turbine Steel Grades
Construction Grades - S355 - S420 - S460	Construction Grades - S355 - S420 - S460
Gear Box Steels	Gear Box Steel
Stainless Steels	Electrical Steels
Nickel based Alloys	



Source:
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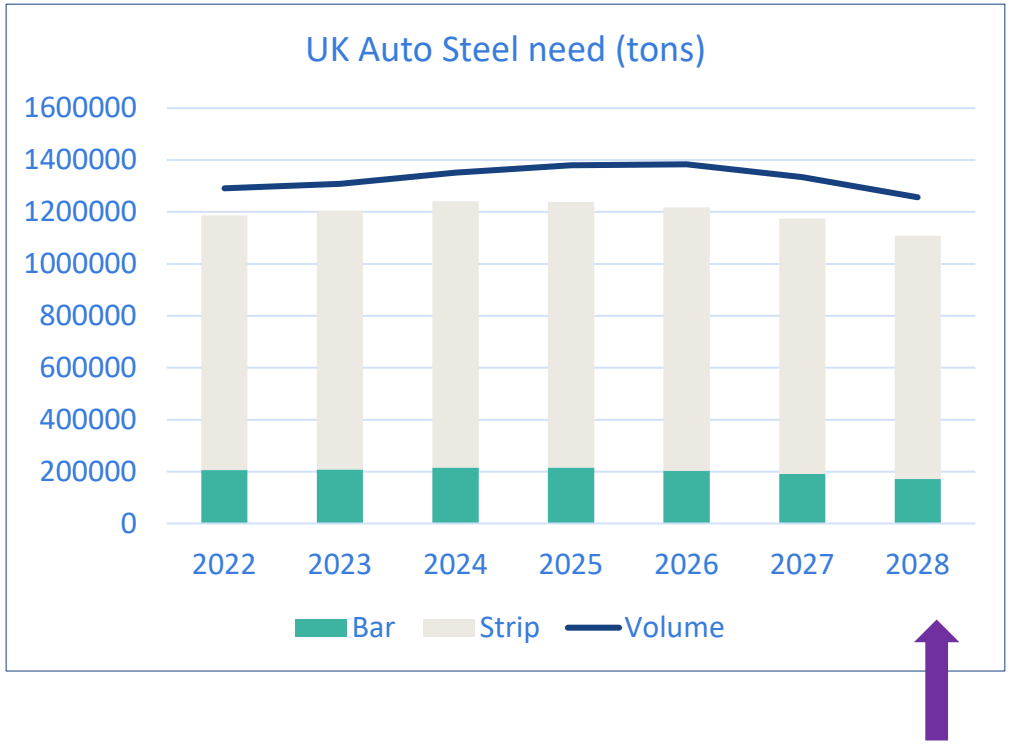
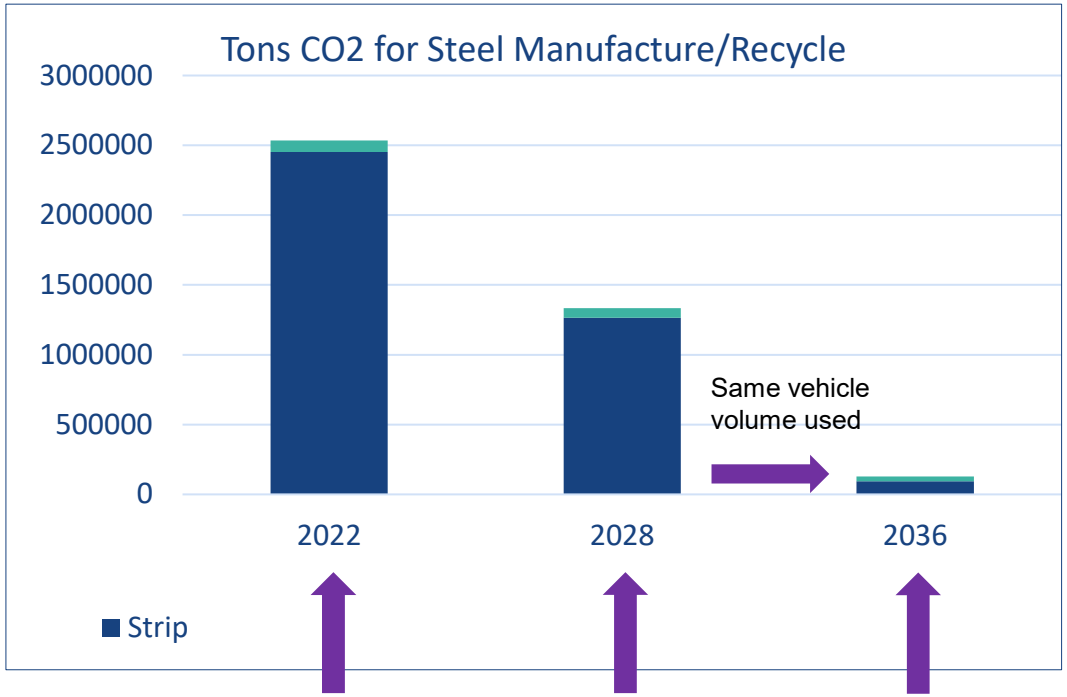
https://www.stalforbund.no/steel_offshore.htm
https://iopscience.iop.org/article/10.1088/1742-6596/753/9/092013/pdf

UK Auto Steel Requirements & CO_2 Produced



All new cars are EV's so less bar steel for gearboxes etc



Today, all strip steel is BF, while bar is EAF

Assume that strip steel will be 50% EAF

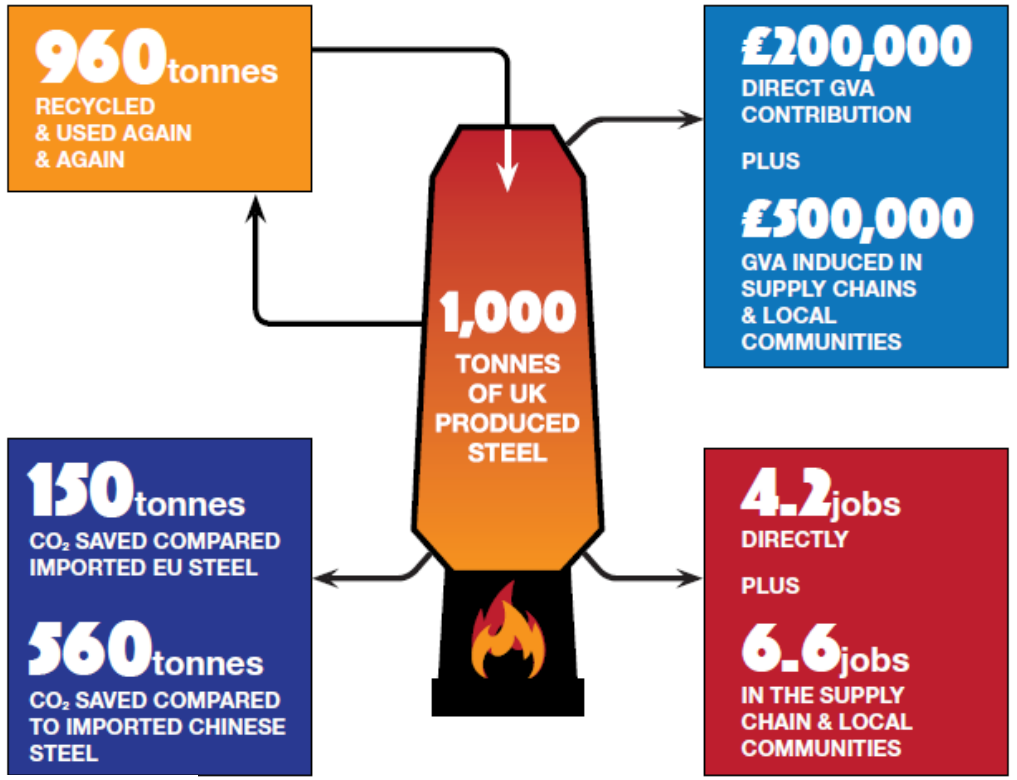
Assume that all steel will be EAF

BF = Blast Furnace

EAF = Electric Arc Furnace

Source: Material Investment Strategy for the UK Automotive Sector (2022)

Benefits of a Net Zero UK Automotive Steel Sector



- Opportunity to show global leadership as first country to commit to decarbonised steel sector
- Transforming jobs into *green jobs* in areas the Government want to level up
- Provides £2.5 billion to UK economy with significant growth opportunity (in excess of 650k tonnes annual production – 450k domestic & 200k export)
- New production methods and innovation will lead to significant competitive advantage
- Anchors industrial innovation here in the UK (ultra high strength steel)

2,730 Direct Jobs Plus 4,290 Indirect – Total 7,020

Source: Material Investment Strategy for the UK Automotive Sector (2022)

Steel Sector

What would be the impact for the energy sector to adopt green steel?

- Wind Turbines
- Hydrogen

Proposal of A ReDisCoveR Program

The ReDisCoveR project was set up by the High Value Manufacturing Catapult (HVMC) to build a community to interrogate the major challenges faced by composite materials at end of life.

From this, a series of 24 projects have been scoped around four streams (Recycling, Disassembly, Circular Materials, and Reuse) that have the potential to capitalise on these opportunities and begin to solve the issues faced by composites at end of life.

Proposed second wave, focused on metallic materials at end of life.

- Recycling
- Disassembly
- Circular Materials
- Reuse

Engaging with key organisations in the supply chain to identify the perceived largest value opportunities in metallic materials at end of life.

Thank you for joining