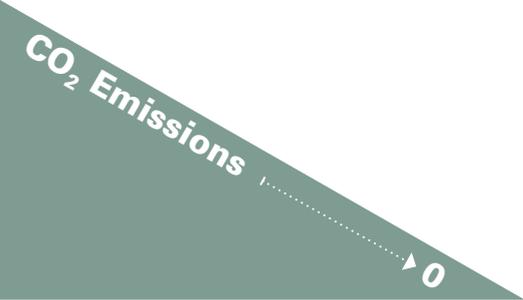


CO₂ Emissions

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Accelerating Britain's Net Zero Economy

The Chemical Industry: Combating Climate Change



Introduction

The impacts of climate change have not only been observed on our environment but also our societies and economies around the world. International action and co-operation is more vital than ever to successfully fight this global challenge. In line with the Paris Agreement, the global average temperature rise this century will need to remain well below 2 degrees Celsius and efforts will need to go further to limit the temperature increase to 1.5 degrees Celsius. Achieving this will require both technological and policy measures to be front-end loaded and to be delivered at pace. The UK has rightly made a commitment to net zero by 2050, one which our sector – the UK's biggest manufacturing exporter and one of its largest energy users – has already publicly stated its willingness and capability to support, subject to its international competitiveness and public investment in technology and infrastructure.

The chemicals sector is uniquely placed to provide both a direct and indirect contribution to achieving net zero by 2050. As we are continuously working to improve our emissions performance, indirectly, we are 'the builder' of a net zero economy with our solutions used in homes, at work and throughout everyday life, saving at least 2 tonnes of greenhouse gases for every 1 tonne we directly emit.

Looking ahead, UK chemical companies both independently and through cluster project plans are playing a central role to successfully decarbonising the UK economy whilst creating jobs in regions where they are most needed. If we are to sustain and grow this contribution, close cooperation between Government and business, data driven policy measures and a just transition are key to improving the UK's business environment for sectors such as ours who operate in global markets. The transformational technologies to reach net zero by 2050 are here in the UK. But the fundamental challenge is securing a policy framework and enabling successful decarbonisation, needed through achieving:

- **Secure and competitive energy supplies**
- **The next generation of climate policies and carbon reduction schemes**
- **Successful development and deployment of step change technologies and infrastructure**

This will not only ensure the UK avoids offshoring and importing carbon intensive goods and ultimately risk its leadership in the fight against climate change but, more positively, enable an innovative industry, such as ours to continue investing, creating and delivering low carbon solutions in the UK.

The fight against climate change is one that needs to be fought and one that cannot be fought without chemistry and chemicals.

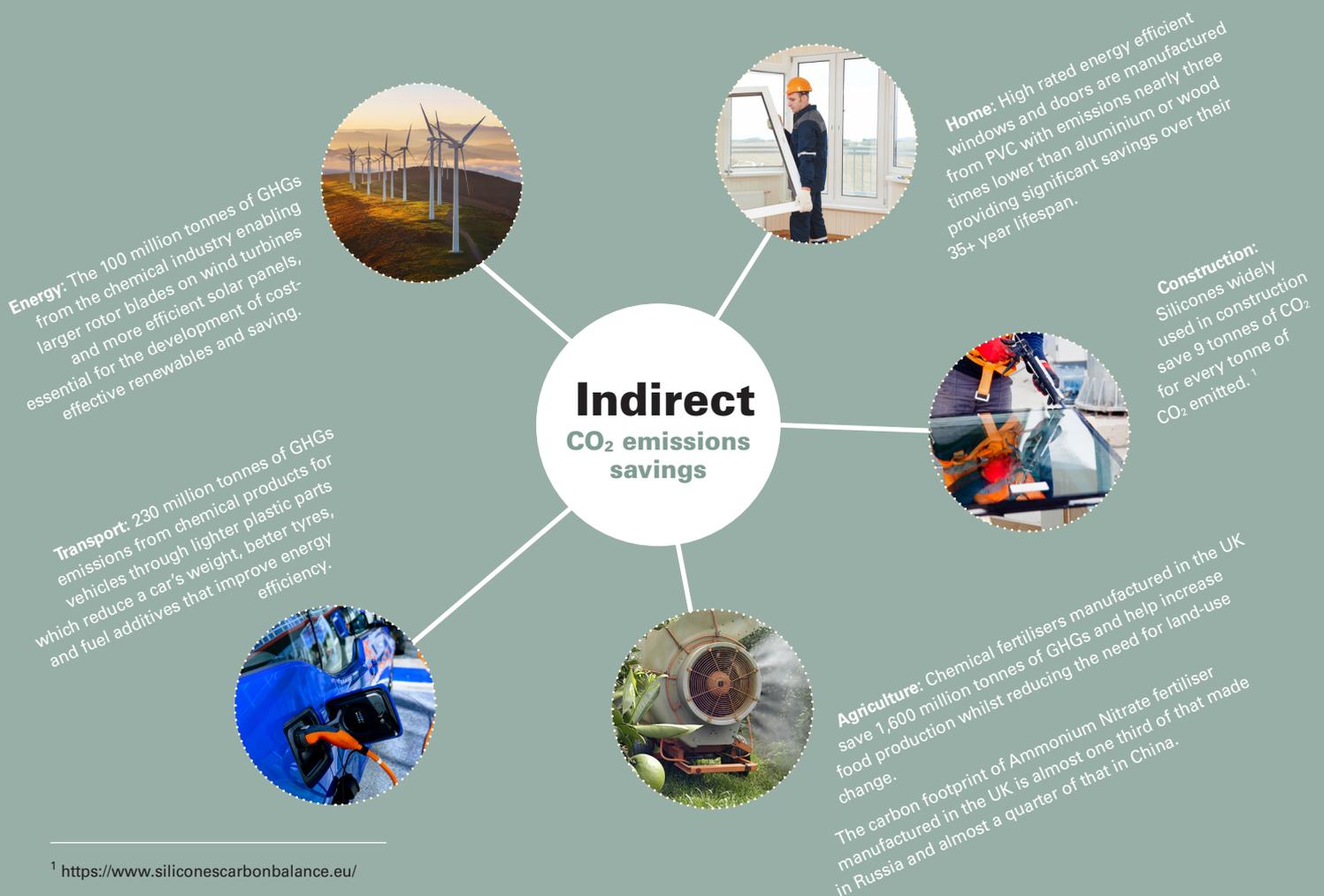
The UK's chemicals sector is...

A significant pillar of the economy bringing £18 billion of Gross Value Added on a turnover of £55.5 billion. It employs over 150,000 people in high quality, highly productive well-paid jobs, in regions of the UK targeted for growth, including South Wales, the North West, the North East, Humber Bank and Scotland. With some 3,600 businesses across the UK rooted in science and innovation, the sector represents 21% of total UK research and development spend. Our industry is the cornerstone of advanced manufacturing.

A foundation industry that is at the heart of UK manufacturing with chemistry and chemicals helping to ensure clean water, sufficient food, clean energy and many other essentials with 96% of all UK manufactured goods containing chemical industry content. A sector that has continued operations throughout the pandemic, in many cases repurposing production lines across the UK to help tackle Covid-19 challenges including the production of PPE and hand sanitiser.

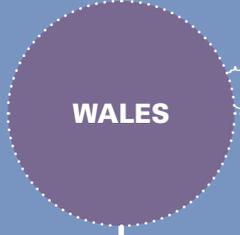
A natural innovator based on world class chemistry which sees the sector expenditure on research and development at £5.4 billion to commercialise sustainable innovations with business investment of £4.6 billion. With much of the industry in parts of the country well placed to deliver decarbonisation technologies such as the hydrogen economy as well as carbon capture, use and storage (CCUS), the sector is central to decarbonising industry at large and in turn delivering low carbon products and technologies to society.

A strong contributor to tackling climate change both directly and indirectly. Directly, the sector is continuously working to improve on emissions performance, with the past 30 years seeing a 80% direct emissions reduction. Indirectly for every tonne of greenhouse gas we emit, the products and solutions we provide deliver an average saving of 2.5 tonnes for our customer industries. The sector's main clusters already have plans to achieve decarbonisation of multiple facilities using shared infrastructure with other key industrial sectors. If all of these projects are deployed, almost 100 million tonnes of CO₂ could be abated, making a major contribution to net zero.



Building on progress

Many of the UK's large industrial clusters are critical to achieving net zero and have plans to deliver deep decarbonisation using shared infrastructure. Geographically located in parts of the UK that would enable them to deliver significant emissions abatement over the coming decades, these cluster projects will be creating highly skilled and well rewarded jobs in the regions where they are most needed.



Wales: Connecting together clusters from Newport to Milford Haven, a large-scale hydrogen infrastructure and CCS are in the pipeline, including establishing an international hydrogen and carbon shipping hub, and process solutions to reduce industrial carbon emissions. The project is aiming to eliminate over 16 million tonnes per year of CO₂ emissions.

Scotland: 'Project Acorn' is set to deliver a CCS programme for Scotland by 2024 and the production of hydrogen from natural gas in North East Scotland to decarbonise the gas network, transportation and industrial sectors. The first phase of the project could capture and store around 340,000 tonnes of CO₂ emissions with subsequent phases seeing larger volumes of CO₂ abated each year.

Teesside: The CCUS infrastructure project would capture up to 10 million tonnes of CO₂ emissions by 2030, the equivalent to the annual energy use of over 3 million UK homes.

Humber Bank: 'Zero Carbon Humber' looks to capture, transport and store CO₂ at scale (44 million tonnes of CO₂ each year). Enabling the decarbonisation for flexible power generation, this infrastructure would also support a hydrogen fuel switch with additional opportunities for hydrogen from renewable electricity which are also being developed within the cluster.

TEESSIDE

HUMBER BANK

NORTHWEST

Northwest: With all the elements to deliver a low carbon industrial cluster, key industrial sectors are working with both local and central Government on a number of projects such as HyNet to create hydrogen and CCS infrastructure capturing industrial emissions and supplying hydrogen. Combined, the projects could save over 10 million tonnes of CO₂, create supply chains worth over £4 billion and 33,000 new jobs.

CF Fertilisers: 40% reduction in carbon footprint and a further 9 million tonnes of CO₂ saved from nitrous oxide project.

Tata Chemicals: Investment in industrial-scale Carbon Capture & Utilisation ('CCU') Demonstration Plant capable of capturing up to 40,000 tonnes of CO₂ for utilisation in the healthcare sector.

Thomas Swan: Focus on plant and bio-derived products with on-site anaerobic digestion plant and investment in biomass boiler to move the company towards net zero carbon emissions by 2030.

Lucite: A £50 million investment to the site, including installation of a heat recovery plant resulting in a further 15-20% reduction in CO₂ emissions.

The challenge at hand

The chemical industry is no different to other users of energy – from household to transport – all needing reliable and affordable clean heat and power. However, the sector competes globally for market share and inward investment, and therefore cannot readily pass on the costs of decarbonisation to its customers.

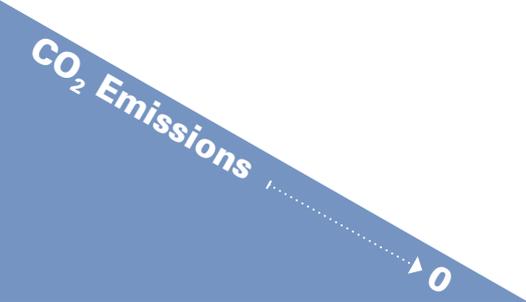
Energy and Climate-related policies (direct and pass on)	Cost to chemical sector
EU ETS direct (after free allocation)	£79 million (2019) ²
Gas transmission/Short Haul	£60 million/year
Climate policy pass through cost on electricity	£722 million (2019)
Network costs	£407 million (2019)
TOTAL	£1.27 billion/year

Achieving net zero and a significantly less than 2 degrees Celsius pathway will require close collaboration with supportive Government policy going beyond measures that have seen 80% direct emission reduction. Given this improvement, the sector's solutions are now critically dependent on:

- 1 **Secure and competitive energy supplies**
- 2 **The next generation of climate policies and carbon reduction schemes**
- 3 **Successful development and deployment of step change technologies**

The transformational technologies to reach net zero by 2050 are here in the UK but the fundamental challenge is securing a policy framework to enable successful decarbonisation to take place. In developing and deploying clean technologies and products for our sector and our customer industries across the UK, close cooperation between Government and the business community will be a vital tool in developing policies and business models that would see technologies such as CCUS and hydrogen make the UK a world leader in zero carbon manufacturing. This is imperative for the UK, but this is also an area where the UK can make a huge contribution beyond its borders, by outcompeting more carbon intensive goods in the global market. Spending on these technologies now could put us in a world leading position for net zero manufacturing creating a demand for low carbon goods.

² For emissions data, 2019 verified emissions, less 2019 allocation, were used.



Policy drivers

Our industry is already on the journey towards net zero, but there is a narrow window of opportunity to act strategically across a range of policy measures and maximise progress in decarbonising the sector, whilst building the UK's economy. Building on our progress, the sector needs Government to use the full range of policy tools available to it, not only to accelerate the UK's pathway to net zero, but to ensure its foundation industries remain strong and competitive during the low carbon transition. Implementing the following strategic and technological changes will accelerate the sector's decarbonisation journey.

- 1 Internationally competitive energy markets with delivered billed costs of energy that are not disproportionately higher for UK industries holding decarbonisation solutions.**
- 2 Delivering the next generation of carbon reduction schemes that truly drive emissions reductions and do not undermine domestic manufacturers to compete internationally.**
- 3 Strategic and rapid policies designed to enable investment in industrial decarbonisation infrastructure projects which make a step change in reducing emissions from foundation industries.**

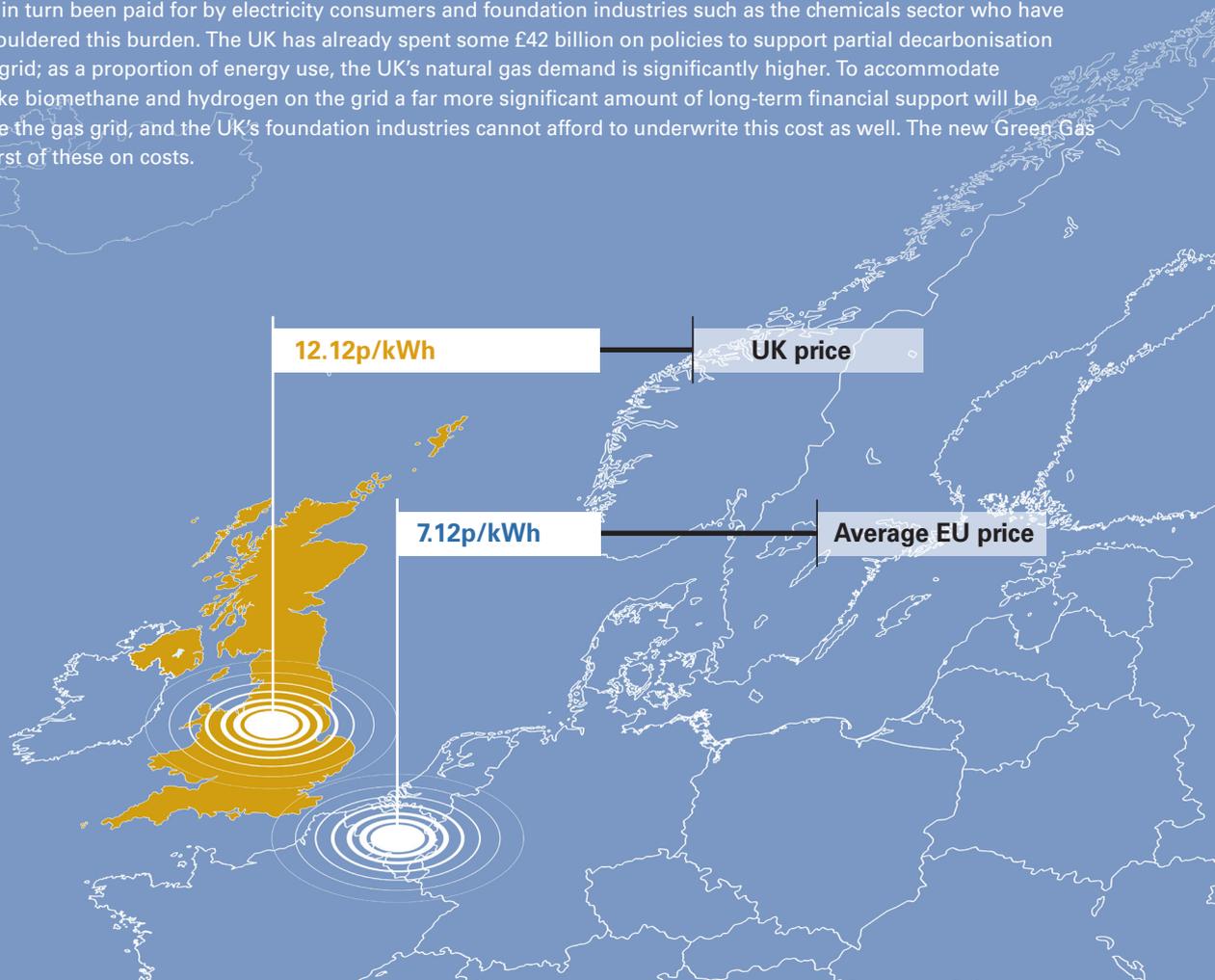
Moving from relief to measures driving a level playing field and supporting global climate ambition	
Tools to protect industry and maintain level playing field	Electricity and gas taxation exemptions and reliefs for trade-exposed industries (effectiveness reducing over time)
	Emission trading scheme with free allowances for exposed industries (effectiveness reducing over time)
Tools that stimulate decarbonisation investment	Grants for energy efficiency and industrial decarbonisation projects
	Subsidy support for H ₂ production and industrial CCUS
Tools that enable industry to remain internationally competitive through pass through of costs	Border adjustment mechanism { Reduce sectoral coverage as mandatory product standards are developed or global carbon market develops
	Developing product standards (disclosure and labelling) { Mandatory minimum standards
2020	2030

1 Internationally competitive energy costs that are not disproportionately higher and enable the sector to compete whilst progressing its transition to a net zero economy.

UK manufacturers face electricity prices 71% higher than the EU median for large users, far higher than the prices faced by our main industrial competitors³. This price disparity represents:

- 1) the pass-through of costs from the UK-only Carbon Price Support;
- 2) subsidies for renewable power (Contracts for Difference, Feed-in Tariffs, the Renewables Obligation, Capacity Market), and;
- 3) the increase in network capacity needed to balance volatile and distributed renewables.

These subsidies have in turn been paid for by electricity consumers and foundation industries such as the chemicals sector who have disproportionately shouldered this burden. The UK has already spent some £42 billion on policies to support partial decarbonisation of the UK's electricity grid; as a proportion of energy use, the UK's natural gas demand is significantly higher. To accommodate decarbonised gases like biomethane and hydrogen on the grid a far more significant amount of long-term financial support will be needed to decarbonise the gas grid, and the UK's foundation industries cannot afford to underwrite this cost as well. The new Green Gas Levy represents the first of these on costs.



To allow UK manufacturers to benefit from the clean energy transition, UK energy prices that are internationally competitive are fundamental. The following measures would enable the UK to forge a clean industrial base, keeping high-skilled jobs and advanced manufacturing capability.

<p>Both Government and independent regulators to ensure final end cost matches that of competing nations. Benchmark final cost of delivered energy relative to competitor nations and correct any material distortions for those facing international competition.</p>	<p>Cost and carbon effective energy assets relative to 'firm' provision. Future asset investment in decarbonisation schemes must be cost-effective and technology neutral, as per Dieter Helm's Review⁴.</p>	<p>Improve the transparency of energy supply costs. Improve the clarity, accessibility and simplicity of all elements of cost associated with the provision of energy.</p>	<p>Ensure effective competition in energy retail and the services around the supply of electricity, including demand management services, data collection and provision.</p>
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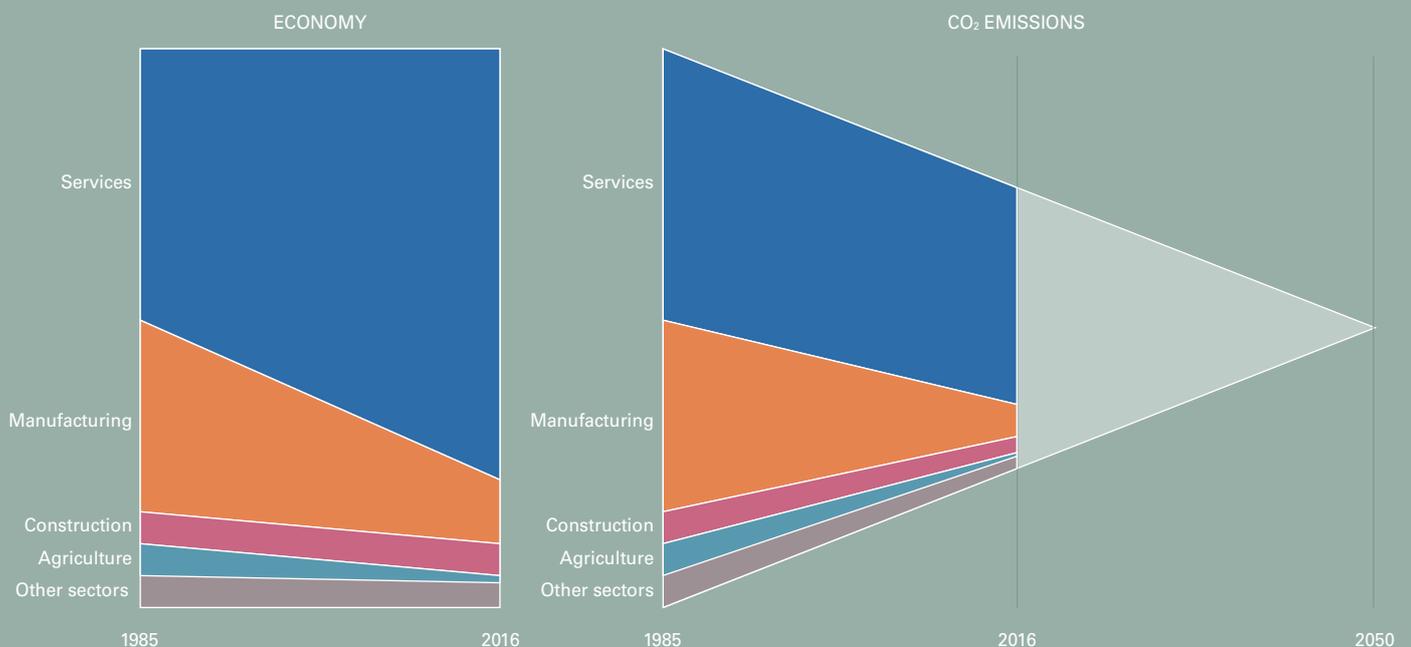
³ https://ec.europa.eu/eurostat/statistics-explained/index.php/Electricity_price_statistics#Electricity_prices_for_non-household_consumers

⁴ <https://www.gov.uk/government/publications/cost-of-energy-independent-review>

2 Delivering the next generation of carbon reduction schemes that truly drive emissions reductions and do not undermine domestic manufacturers' ability to compete internationally.

The sector competes globally for market share and inward investment, and therefore cannot readily pass on costs. Given the improvements the sector has already made in the energy efficiency of its existing production assets, its contribution is now critically dependent on secure and competitive energy supplies and 'step change' carbon reduction schemes which do not leave the sector internationally exposed by further exacerbating the current situation. The illustrations below, taken from the recent Office of National Statistics (ONS) report on 'The decoupling of economic growth from carbon emissions', depict the need for reliable and competitively-priced energy supplies, as well as carbon reduction schemes that take into account consumption emissions, to both rebalance and decarbonise in the UK.

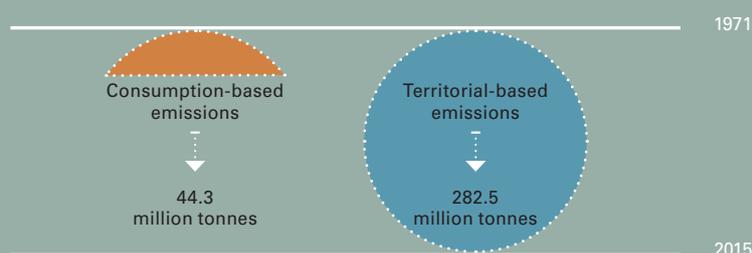
The economy has grown as carbon emissions have declined but the UK has offshored carbon emissions along with key manufacturing sectors.



Source: Bank of England, 2019

Most importantly, the demand for manufactured goods continues resulting in the UK importing more carbon intensive goods from around the world.

Decoupling of GDP per head from CO₂ emissions seems to have happened at the expense of outsourcing manufacturing



Source: Eora, 2018, World Resource Institute, 2017 and Department for Business, Energy and Industrial Strategy, 2019b

Designing the next generation of climate policy and carbon pricing schemes with the cost of emitting carbon to be equal to both our EU and international competitor nations can be achieved through:

<p>Tools that enable industry to compete internationally and pass through cost initially through internationally consistent product labelling and border adjustment mechanisms transitioning to low carbon product standards.</p>	<p>Climate policy cost mitigation measures including offsets, benchmark adjustment and cost containment measures for those sectors which are exposed to carbon leakage to give transitional support until CCS and other technologies become viable in the UK.</p>	<p>Streamline monitoring, reporting and verification pricing regimes including applications for compensation under these regimes.</p>
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<p>Policy enabler solution – Streamlining to achieve consistency and eliminate duplication Policy and implementation of related legislation should complement each other, working together rather than against. The current policy regime comprises complex, overlapping requirements: the Energy Saving Opportunity Scheme (ESOS), Streamlined Energy and Carbon Reporting (SECR), Climate Change Agreements (CCAs), the EU Emissions Trading System (EU ETS), the Carbon Price Support (CPS) and the Climate Change Levy (CCL). Complying with</p>	<p>numerous schemes drains staff resources and creates significant expenditure, disproportionate to the value added. These policies also do not complement one another, as the scope of reporting differs between them. Multiple policies can also create perverse incentives when it comes to the net zero target, e.g. EU ETS participants are being encouraged to fuel-switch to low-carbon electricity, but if they did they would be penalised under the current framework because doing so would shift their reporting and carbon price obligations into the CCA scheme.</p>
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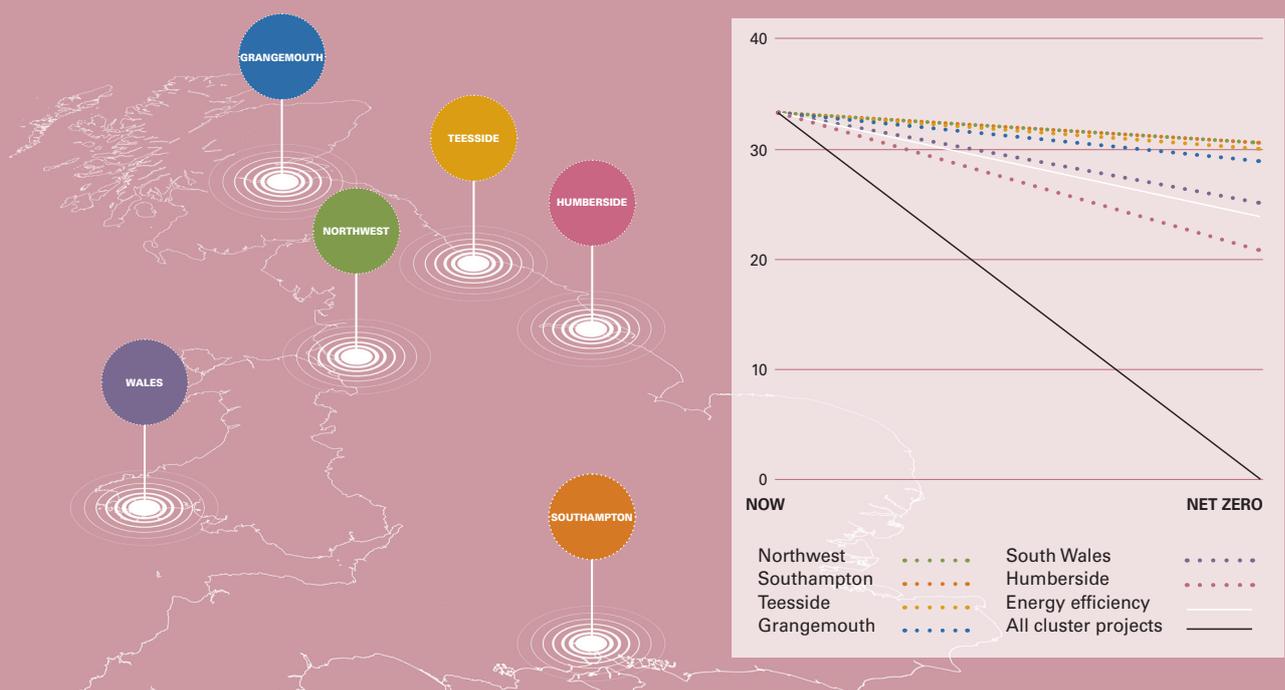
<p>Policy enabler solution – UK-only Carbon Price Support (CPS) was brought in in 2013, to supplement the prevailing low price in the EU Emissions Trading System. It sought to create a more meaningful price signal that would drive coal off the grid. However, the price of carbon allowances under the EU Emissions Trading System have since increased by 5-6 times and now effective without additional support. Coal is well on its way off</p>	<p>the grid, representing about 2.1% of power demand in 2019. Therefore, this additional cost burden on UK generators, which is simply passed through to industry, should also be removed. The alternative is to ensure sectors remain eligible for support in the UK.</p>
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3 Strategic and rapid policies designed to enable investment in industrial decarbonisation infrastructure projects for step change reduction in emissions from foundation industries.

The chemicals sector plays a critical role in delivering a successfully decarbonised economy, whether that be providing raw materials for the hydrogen economy or delivering carbon capture and use technologies. Given the high capital and operational costs, the challenge is that UK policies are set up to secure and incentivise investment and deployment of any project aimed to make significant contribution in the UK opposite other competing nations. The UK needs to be aware of the competition on its doorstep with the EU agreeing on a €750 billion green recovery package enabling national governments access funding for projects, many of which are focused around decarbonisation. Establishing cost effective business models to support the roll-out of step change technologies and products will be critical not only to the UK chemicals sector but others such as transport (including maritime) and domestic heating to reach net zero. Hydrogen and CCUS development alone for broad-based decarbonisation is a significant job creator, leading to 43,000 jobs for industrial decarbonisation alone, reaching 221,000 jobs if the UK becomes a major hydrogen exporter ⁵. With a potential to unlock £17.8 billion/year in GVA and as an enabler to capture an estimated 260 MtCO₂/year, it is an opportunity the UK cannot afford to miss. Much of the sector in parts of the country is well placed to deliver projects to achieve net zero but it will require all parts of Government and business to work together to achieve a just transition through:

<p>Effective business models to be deployed for decarbonisation projects as a priority. These must provide a reasonable payback and provide mitigation against the cost of carbon pricing.</p>	<p>Investment signals Significant and long-term grants or tax incentives are needed to encourage companies to invest in the UK with support to test, upscale, and manufacture so that the UK reaps the reward of the economic and societal return. Access to grants to consider both direct and indirect job creation.</p>	<p>Strategic planning will be needed on infrastructure, e.g. the storage and transport of hydrogen through interconnectors, ports, transmission and distribution networks, safely and efficiently.</p>	<p>Effective competition Once established the market must be subject to effective competition and incentivising demand to help drive down prices.</p>
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Net zero will require decarbonisation of all UK industrial clusters. The graph illustrates the need for business models, investment decisions and strategic planning to encompass decarbonisation of all industrial clusters as well as dispersed sites in the UK.



⁵ <https://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/compendium/economicreview/october2019/thedecouplingofeconomicgrowthfromcarbonemissionsukevidence>

⁶ <http://www.element-energy.co.uk/wordpress/wp-content/uploads/2019/11/Element-Energy-Hy-Impact-Series-Study-1-Hydrogen-for-Economic-Growth.pdf>

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