

Energy Systems Catapult Policy Briefing

Developing an innovation-friendly, economy-wide carbon policy framework for Net Zero

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In this briefing, we set out how the UK can build on its existing regime of carbon targets to create a framework of policies and governance capable of delivering Net Zero. We recommend a cohesive approach to Net Zero carbon policy design across emitting sectors, backed by robust carbon accounting and regulation, with carbon markets and emissions trading that develop over time to form the basis of a genuinely economy-wide policy framework for Net Zero. In doing so, the UK can also play a key leadership role on the international stage. These insights build on Energy Systems Catapult's thought leadership in Net Zero Carbon Policy.¹

- 1 Energy Systems Catapult (2021). Net Zero Carbon Policy. <https://es.catapult.org.uk/project/net-zero-carbon-policy>
- 2 Energy Systems Catapult (2019). Rethinking Decarbonisation Incentives: Future Carbon Policy for Clean Growth. <https://es.catapult.org.uk/report/rethinking-decarbonisation-incentives-future-carbon-policy-for-clean-growth>

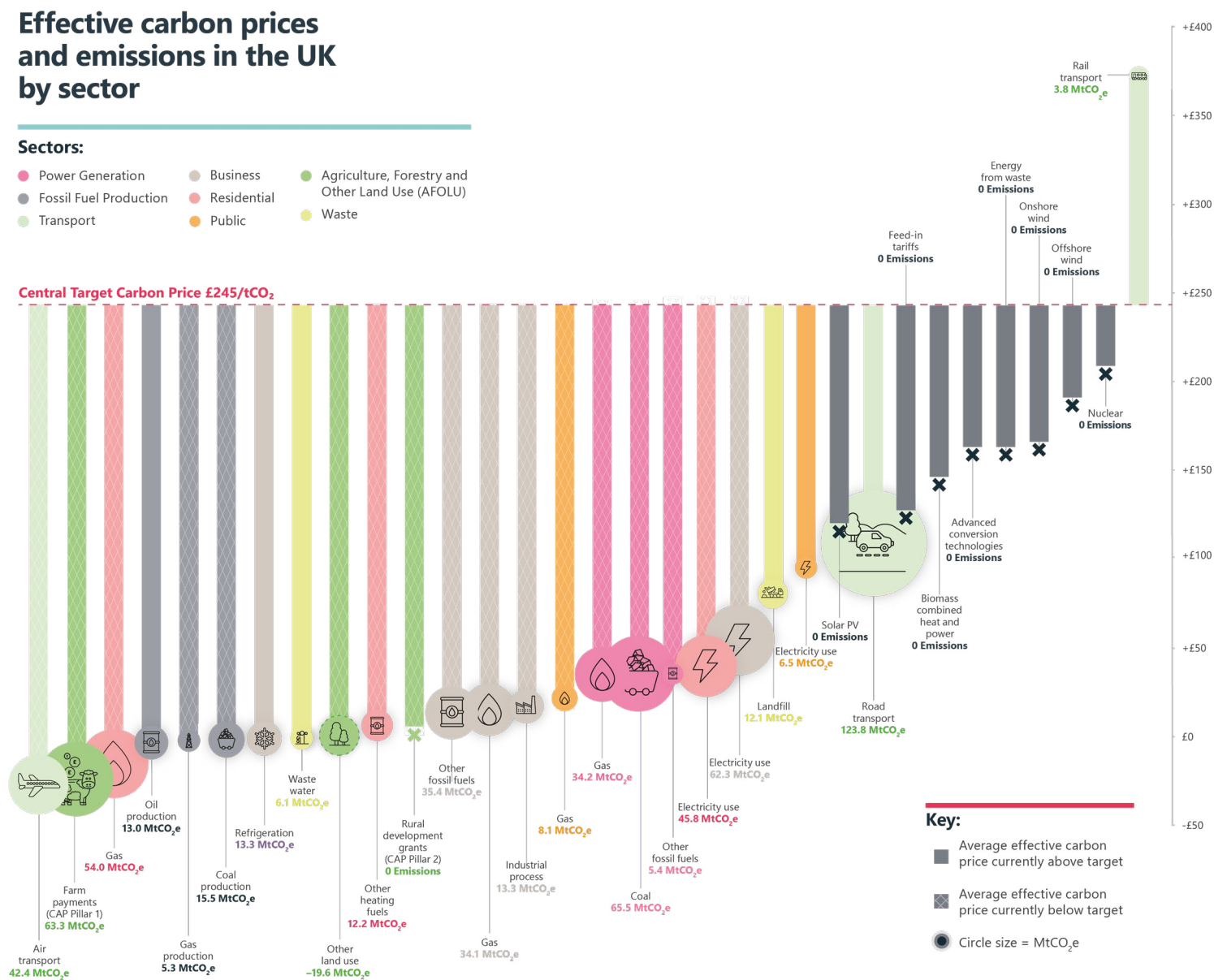
Summary of Recommendations

1. Implement tailored sectoral carbon policies, which progressively strengthen to drive the required pace of decarbonisation, and are integrated with packages of complementary policies that address sectoral barriers to change.
2. Ensure that the design of all sectoral carbon policies includes the potential for future linkages between sectors via carbon markets, including with the UK Emissions Trading Scheme (ETS).
3. Provide clarity around the intended role of the UK ETS for enabling decarbonisation in each sector, accounting for sectoral strategies.
4. Introduce a Carbon Regulator, economy-wide in scope, with regulatory oversight to enable effective coordination and adoption of carbon accounting and monitoring, reporting, and verification of emissions data.

A Sector Led Approach to Net Zero

Our work² highlights how current UK policies create incentives (or 'effective carbon prices') that are uneven and too weak to drive change for most emitting activities. The relative prices facing actors in many sectors continue to favour high rather than low/zero carbon choices (see Figure 1). For example, comparing the effective carbon prices of gas and electricity for heating homes shows that current policies discourage consumers from swapping gas boilers to low carbon alternatives, such as heat pumps.

Figure 1. The effective carbon prices and emissions in the UK by sector.



- 3 Ricardo (2018). Rethinking Decarbonisation Incentives Policy Case Study – Interaction of Climate Policies in California. <https://esc-production-2021.s3.eu-west-2.amazonaws.com/2021/09/California-Climate-Policies-Case-Study-FINAL.pdf>
- 4 EV Energy Taskforce (2020). Energising our Electric Vehicle Transition. <https://es.catapult.org.uk/report/energising-our-electric-vehicle-transition/>
- 5 Energy Systems Catapult (2020). Accelerating to Net Zero: A sector led approach to an economy-wide carbon policy framework. <https://es.catapult.org.uk/report/accelerating-to-net-zero-a-sector-led-approach-to-an-economy-wide-carbon-policy-framework/>
- 6 Energy Systems Catapult (2023). Local Area Energy Planning - The Time and Place is Now. <https://es.catapult.org.uk/report/laep-the-time-and-place-is-now/>

In a market economy like the UK, policies that reward or require emissions reduction are vital in channelling the investment and stimulating the innovation needed to achieve Net Zero. The Climate Change Act 2008 provides an essential economy-wide legal framework for emissions reduction, but it needs to be complemented by carefully designed policies to incentivise investment in emissions reduction across each of the emitting sectors.

Learning from International Experience

Analysis of international experience suggests that blanket approaches (e.g. a single carbon price or carbon tax across the economy) seem simple, but in practice are difficult to implement and are unlikely to deliver the policy stability and credibility required to meet our ambitious targets. The most ambitious jurisdictions have tended to apply a judicious mix of sectoral and more generic carbon policies (e.g. California³).

The UK's own experience in implementing carbon policies to date suggests that it is important to design policies that address sector specific challenges. This includes smoothing the transition for businesses within each sector, and addressing unintended distributional impacts.

Addressing Sector Specific Challenges

For example, energy-intensive industries could be disadvantaged against international competitors that do not face the same carbon price. In other sectors, carbon policy should account for the enabling investment required to decarbonise (e.g. the need for a widespread electric vehicle charging network to decarbonise road transport⁴). Carbon policies ultimately feed through to the charges paid by consumers. There is a need, for example, to understand how these policies may facilitate or hinder energy suppliers creating attractive consumer propositions, and whether there are implications for consumers in fuel poverty.

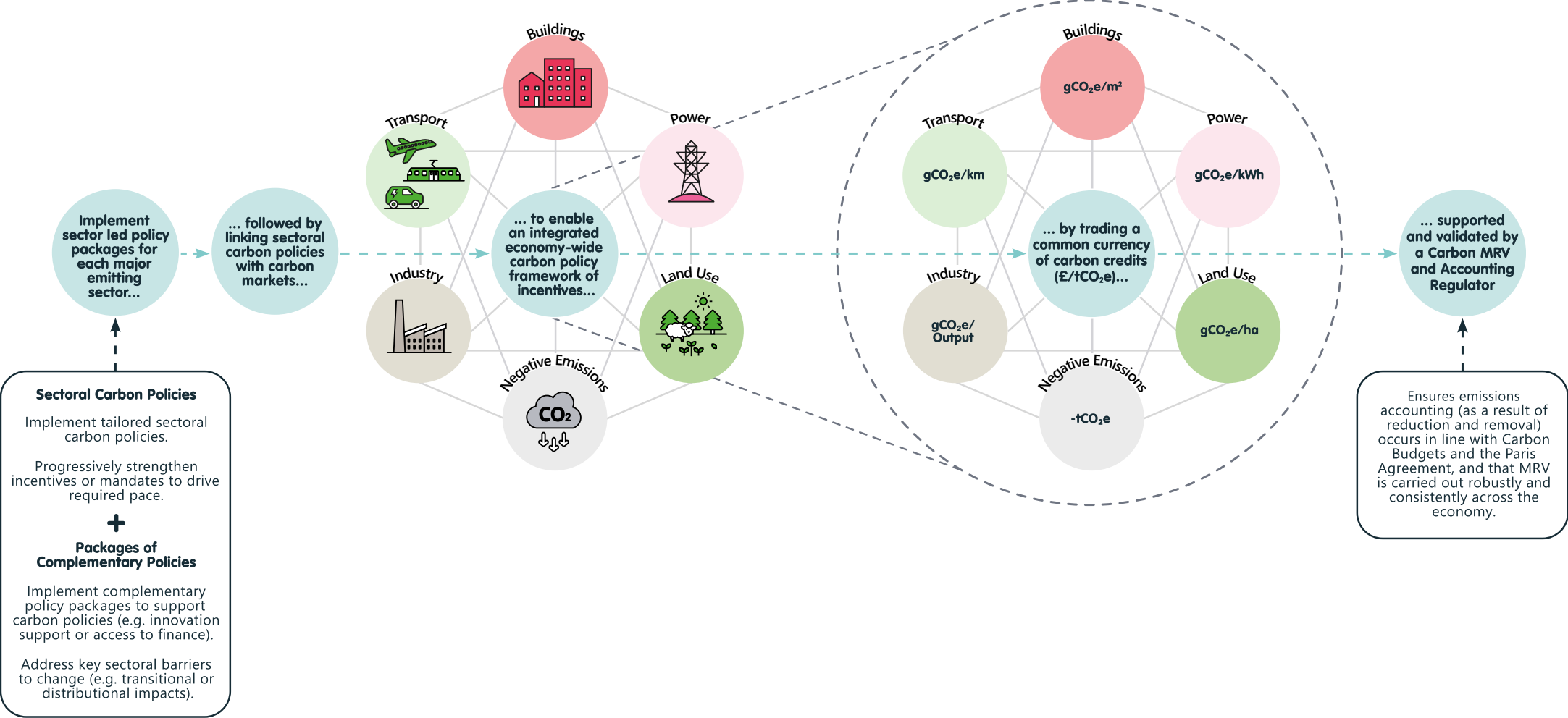
Sector Specific Carbon and Complementary Policy Packages

Therefore, a mix of sector specific carbon and complementary policies (as part of wider policy packages) within an enduring economy-wide framework is likely to be both more socially and politically acceptable as a route to Net Zero than a near-term blanket carbon price or tax.

We have set out how a sector led approach can open up a pathway to a genuinely economy-wide carbon policy framework (see Figure 2).⁵ This allows sector-level carbon policies to be designed to integrate efficiently with the complementary policies that are essential for addressing social and technological barriers specific to each sector. Sectoral policies can also be complementary with infrastructure regulation and Local Area Energy Planning⁶ to enable a whole systems approach to the transition. This enables market incentives and regulated investments to combine with infrastructure decisions that are consistent with Net Zero.

Sectoral policies can also be designed to align with principles around technology neutrality and long-term credibility. In the medium- and long-term, carbon markets and validated carbon credits can link across sectoral policies, providing a pathway to an enduring economy-wide framework. Eventually, this could provide a pathway to the emergence of a carbon price, and a wider market for validated carbon credits, that is applicable to all major emitting sectors.

Figure 2. A sector led approach to an economy-wide carbon policy framework.



- 7 Energy Systems Catapult (2021). Developing Carbon Credit Markets. <https://es.catapult.org.uk/report/developing-carbon-credit-markets/>
- 8 Energy Systems Catapult (2021). Rethinking Electricity Markets – EMR 2.0: A new phase of innovation-friendly and consumer-focused electricity market design reform. <https://es.catapult.org.uk/report/rethinking-electricity-markets-the-case-for-emr-2/>
- 9 Energy Systems Catapult (2020). Six Steps to Zero Carbon Buildings. <https://es.catapult.org.uk/report/policy-framework-to-decarbonise-buildings>
- 10 Energy Systems Catapult (2022). Developing the UK Emissions Trading Scheme. <https://es.catapult.org.uk/report/developing-the-uk-emissions-trading-scheme/>
- 11 Energy Systems Catapult (2021). The Case for an Economy-Wide Carbon Regulator. <https://es.catapult.org.uk/report/the-case-for-an-economy-wide-carbon-regulator/>
- 12 Energy Systems Catapult (2022). Carbon Accounting in Industry: A Framework for Innovation and Growth. <https://es.catapult.org.uk/report/carbon-accounting-and-standards-in-industry-a-framework-for-innovation-and-growth/>

Linking Sectors with Carbon Markets

Linking sectoral policies through trading can play a key role in opening a pathway to an economy-wide carbon policy framework as part of a sector led approach.⁷

This approach has a number of advantages for achieving Net Zero:

- Trading enables a cost-effective and efficient balance of emissions reduction across sectors and among emitters to emerge over time, including the development of negative emission technologies.
- Linked markets will place a more coherent value on emissions reduction across the economy, ensuring better optimisation of the use of low and zero carbon energy vectors – such as biomass and hydrogen – across different sectors.

The aim of linking sectors is not to impose an economy-wide carbon price, but to prevent the emergence of large carbon price differences between sectors that could distort investment choices across sectoral boundaries. The detailed metrics of tradeable carbon credits in each sector could vary depending on the design of sectoral obligations or regulations. For example, we recommend an outcome-based decarbonisation obligation for the electricity sector,⁸ and have also made the case for carbon performance standards applied to buildings.⁹ To enable linkages via trading, sector specific carbon metrics and standards can be converted into a common 'currency' of £/tCO₂e (pounds per tonne of carbon dioxide equivalent).

Sectors can begin to link as soon as the associated carbon markets allow, but this requires carbon policy design to consider linkages from their inception. In this way, sectoral carbon policies can remain tailored to the associated challenges and opportunities that arise within each sector. The UK ETS could provide the backbone of this new framework.¹⁰

Introduce a Carbon Regulator

Underpinning a sector led approach and building on the UK ETS with the eventual linking of sectors with carbon markets, is the requirement for accurate and coherent monitoring, reporting, and verification (MRV) of emissions. We have made the case for regulatory oversight to provide this.¹¹ Regulatory oversight provides clarity, and innovation-friendly regulation can ensure a level playing field for innovators, cut investment risks, and build business and consumer confidence. An independent Carbon Regulator, economy-wide in scope, could play a pivotal role in supporting:

- Streamlining of reporting – disclosing once reduces the administrative burden of reporting emissions.¹² This can be supported by the development of a distributed, scalable digital infrastructure to underpin emissions data exchange.
- Credibility of emissions data – regulation can help maintain the integrity of a system, while driving demand for credible emissions.
- Transition to improved emissions data – over time, regulation can improve access for consumers of emissions data to more comparable and complete data sets.
- A level playing field for competition – independent regulation can mitigate conflicting claims between sectors that provide different products, but serve the same function.

13 Energy Systems Catapult (2023). Addressing Carbon Leakage: Maximising Innovation and Minimising Competitiveness Impacts. <https://es.catapult.org.uk/report/addressing-carbon-leakage-maximising-innovation-and-minimising-competitiveness-impacts/>

14 Carbon leakage can occur if the competitiveness impacts that arise from carbon policies leads to emissions reduction from domestic firms combined with increases in emissions in other jurisdictions where carbon policy is either less ambitious or does not exist. This can lead to a net increase in global emissions.

The Monitoring, Reporting, and Verification of Emissions

The MRV of emissions – both positive and negative – can be straightforward when directly measured from an industrial flue or when proxied through energy use, but challenges arise for sectors such as agriculture and land use where such measurements are not possible. Consumption-based emissions (i.e. those that result from the embodied emissions of imported goods and services) yield additional complexity due to the international supply chain life cycle analysis required. This has implications for future policies imposed at the border, such as a Carbon Border Adjustment Mechanism (CBAM) or mandatory product standards,¹³ and for addressing concerns pertaining to carbon leakage.¹⁴

Currently, investor confidence is dampened – in part – by uncertain shifts in policy and incoherent MRV and accounting practices domestically and internationally. Implementing robust, economy-wide MRV can improve this, remove barriers to innovation, and ensure that policy incentives encourage technologies and processes that genuinely reduce emissions.

A suitably empowered Carbon Regulator can ensure that emissions are measured and reported coherently across all emitting sectors. This can provide a strong basis for policy design, standard-setting, and reporting. Such a body could enforce civil financial penalties to emitters and should have operational independence from Government.

Crucially, any devolved or policy specific administrative responsibilities should sit alongside this addition of economy-wide oversight. Responsibilities could also extend beyond the UK's territorial emissions to include consumption-based emissions. There are difficult technical areas and conventions for carbon accounting still to be defined and agreed internationally. A UK Carbon Regulator could play a key role in unlocking the global debate around robustness of emissions reduction claims.



If you would like to learn more about our Net Zero Carbon Policy thought leadership, please get in contact or visit our [website](#) to access the [full reports](#).