

Current Economic Signals for Decarbonisation in the UK

Rethinking Decarbonisation Incentives

The 'Rethinking Decarbonisation Incentives' (RDI) project aims to take a fresh look at how the UK could improve incentives to cut emissions efficiently across the economy.

This involves stepping back to look at:

- the current economic incentives for investing in decarbonisation across different sectors,
- learning lessons from case studies of policies used in other countries,
- developing credible options for market and incentive design for emissions reduction and/or carbon prices or trading.

The project will adopt a whole-system perspective (building on Energy Systems Catapult's extensive experience and capabilities in strategic analysis), placing this in the wider context of the Industrial Strategy and Clean Growth. The aim is to develop options which are credible over a medium-term time-frame (i.e. capable of initiation within five years), taking account of the practical challenges associated with reform, and to promote a broader strategic debate among stakeholders.

In later stages of the project, policy options will be analysed in detail, taking account of industrial strategy, economic competitiveness concerns and potentially competing policy objectives in different sectors.

This report summarises the current pattern of economic signals in the UK for decarbonisation in different economic sectors and activities. This provides a baseline from which to assess in more detail the different sector drivers, and future options for policy reform.

Key findings

The analysis shows that the 'effective carbon prices' arising from current UK policies vary widely across different sectors and activities. In simple terms, this suggests we may be over-rewarding some kinds of emissions reducing activity, while under-rewarding it in other activities or sectors.

Some big sources of carbon emissions, including natural gas usage and agriculture, have 'effective carbon prices' which are too low.

The table below summarises how 'effective carbon prices' for emitting activities (and low carbon alternatives) compare against the government's estimated range for carbon prices consistent with meeting targets.

Effective carbon price currently below target		Effective carbon price currently above target	
Emitting activity (CO ₂ emissions currently 'under-taxed')	Low carbon alternative (CO ₂ savings currently 'under-subsidised')	Emitting activity (CO ₂ emissions currently 'over-taxed')	Low carbon alternative (CO ₂ savings currently 'over-subsidised')
<ul style="list-style-type: none"> • Agriculture. • Air transport (assumes that passenger duty is not a pure energy/carbon tax). • Coal and gas based electricity generation. • Natural gas consumption by all main end users. • Electricity use by households and large business. • Oil and gas production • Fuel use by business and industry. • Land use change. 	<ul style="list-style-type: none"> • Lowest cost PV schemes. 	<ul style="list-style-type: none"> • Road transport (if congestion and other externalities not subtracted). 	<ul style="list-style-type: none"> • Rail transport (to replace road transport). • Historical renewables projects. • Nuclear power.

Sectors where current effective carbon prices are broadly aligned with expected target prices for 2030 include:

- solar PV and the most recent offshore wind bids of CfD auctions,
- possibly road transport (if the value of congestion and other externalities is offset against tax receipts).

View the effective carbon prices and emissions by sector in the [full report](#).

Methodology

The economic signals comprise of taxes or subsidies on fossil fuel use or low carbon alternatives, that produce an 'effective carbon price'. Specifically, positive carbon prices arise either from **taxes on emitting** activities (such as fuel use in road transport), or from **subsidies to low carbon** alternatives (such as rail). Conversely, negative carbon prices arise when **emitting activities are subsidised**, or **low carbon alternatives are taxed**. Some taxes and subsidies are applied with climate change policy goals explicitly in mind (e.g. renewable energy subsidies in power generation), whereas in other cases they are in place for other reasons (e.g. reduced VAT rates on domestic electricity and gas consumption). The aim here is to try to provide a consistent approach across all sectors, by applying the following principles:

- as far as possible, all taxes and subsidies that affect the volume, the price or the carbon-intensity of a particular sector activity or output should be included.
- incentives are evaluated at the point at which they influence behaviour and investment decisions by different groups and sectors in the economy.
- for upstream energy sectors (i.e. electricity generation and oil and gas production), the analysis includes direct pricing signals which affect the price of their outputs. For downstream end-use sectors, the analysis includes both direct price signals on their own direct emissions, as well as indirect signals from the pass-through of carbon prices to the final energy price.

- we consider that sectors should in principle be self-sustaining financially in public expenditure terms, with tax receipts considered net of public expenditure in each sector. e.g. in road transport, public expenditure on roads is netted off the tax receipts from fuel and vehicle excise duties when calculating the implicit "tax" placed on carbon.
- VAT at the standard rate (20%) is assumed to be neutral (neither tax nor subsidy) for carbon. Reduced VAT rates (such as the 5% rate for household gas and electricity consumption), are treated as subsidy by OECD, but not by the UK Government. We apply both approaches to show sensitivity to this assumption.

We compare resulting 'effective carbon prices' against the level calculated by BEIS as being required by 2030 to be on track for mid-century decarbonisation targets. BEIS use a carbon price range of between £40-119 tCO₂, reflecting uncertainty over the cost of abatement and the global pathway to 2050.

The full report is available in our publications section at es.catapult.org.uk.