



Policy Brief

A ‘Horse and Cart’ Challenge – the need to understand ‘who pays’ before the macroeconomic and distributional impacts of the net zero transition can be projected

By Karen Turner, Antonios Katris and Hannah Corbett

The danger of putting the cart before the horse in abstracting from ‘who pays’ questions

In November 2023 the Climate Change Committee (CCC) set out its [methodology for the UK's Seventh Carbon Budget](#), accompanied by a [Call for Evidence](#) by mid-January 2024. One crucial challenge emerging is that the CCC propose to report ‘a high-level analysis of the main macroeconomic dynamics of the transition’ⁱ, and to assess distributional impactsⁱⁱ, while noting that ‘It is for the Government to determine how the costs of the transition are met’ⁱⁱⁱ and abstracting from any consideration of who bears the costs, how and when. While it is of course for government to make such decisions, it is important that input regarding the impacts of different potential decisions is made available to policymakers. Here, CEP’s research has shown time and time again that **the macroeconomic and distributional impacts of any decarbonisation pathway, and specific actions therein, will be crucially dependent on who pays, how and when.**^{iv}

Thus, there is a danger that the CCC analysis does not provide all the necessary detail and rigour to accurately inform the Seventh Carbon Budget. In short, **it is necessary to determine how transition costs may be met before the macroeconomic and distributional dynamics can be assessed or projected.** On this basis, since 2020 CEP has argued the necessity of establishing a ‘Net Zero Principles Framework’ that puts questions of ‘who pays, how and when’ at the heart of policy decision making at national, regional, and local levels.^v

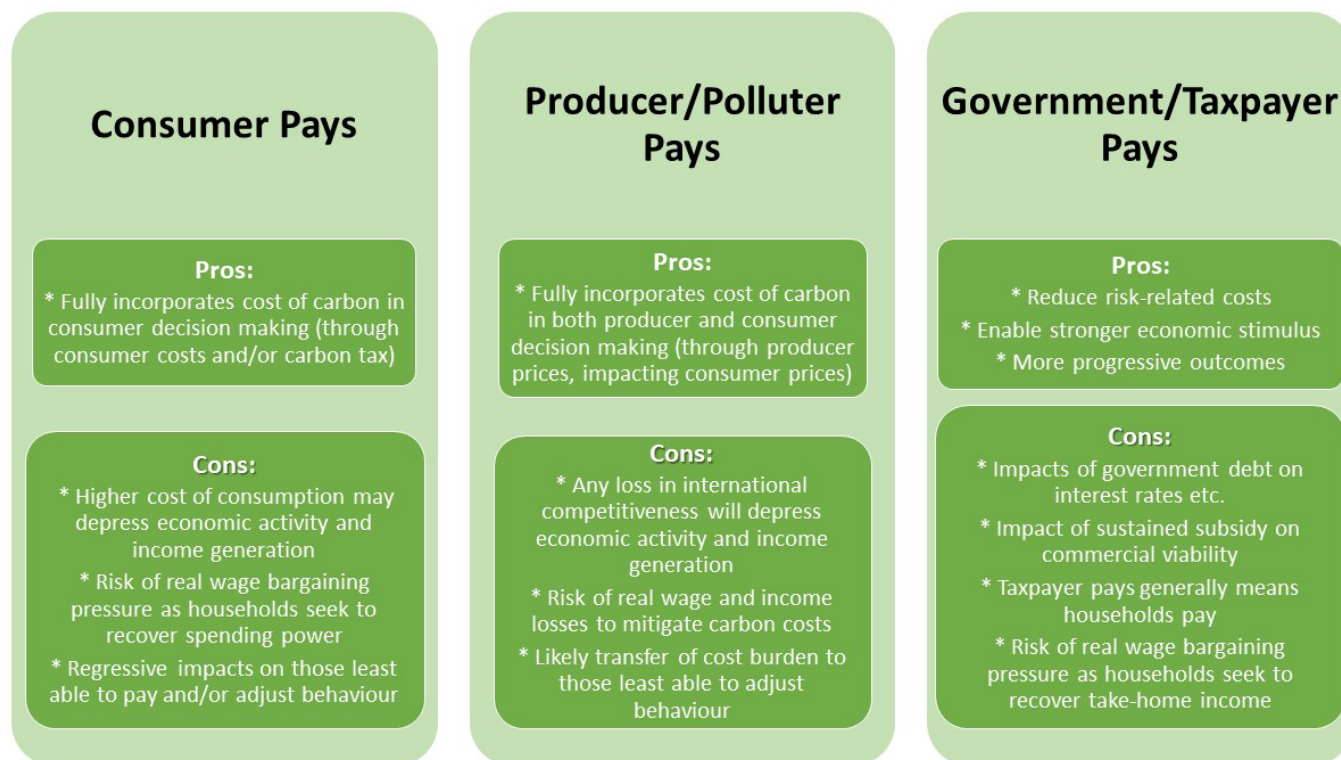
Cost, competitiveness and fiscal challenges are driven by economic responses to the impacts of ‘who pays’

It is necessary to put front and centre in the debate the fact that costs are likely to ultimately fall to households, one way or another.^{vi} That is, through changes in prices of goods and services, in income and related tax revenue generation, and through broader impacts on the public purse resulting from changes in both real and nominal spending requirements.

Crucially, the latter is affected by the consumer price index (CPI) pressures that are likely to occur even where net zero action results in ‘green growth’ and would seem relevant to the required consideration of fiscal circumstances and impacts under the Climate Change Act. However, the main point is that who *ultimately* pays may be broader than what may initially be proposed. See Figure 1 below.

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Figure 1: 'Pros and Cons' of different headline approaches to 'who pays' for Net Zero interventions (source: CEP research)



For example, in work considering the impacts of introducing new CO₂ transport and storage activity to the UK economy^{vii}, to service CO₂ sequestration requirements in selected industrial clusters, we find that if a full polluter pays approach is imposed from the outset, UK GDP could ultimately contract by just under £1BN per annum. This is due to the ripple effects of contractions in activity and employment across many sectors of the economy as energy-intensive industries lose international competitiveness due to higher production costs.

However, the net GDP impact could become a small gain of just under £0.8BN per annum and total UK job losses of up to almost 15,000 converted to a gain of around 3,500 if taxpayer funded public support is provided. The trade-off is that household consumption would contract a bit more (by about 0.1% rather than 0.04%), despite higher wage rates, and this is due to the greater income tax burden.

More generally, the main point is that **decarbonisation and other costs of living, doing business and providing public services are not fixed or exogenously determined factors**. Rather, costs accruing across the economy, including but not limited to decarbonisation costs, will be directly or indirectly impacted by a wide range of market responses (including via the labour market) to changes in the cost of living (and doing public and private sector business) and the real value of 'take home' incomes.^{viii,ix} Outcomes will also be conditioned by policy decisions regarding things like the use of new revenues generated and how impacts thereof interact with other transmission mechanisms, including labour market responses.^x

Similarly, as reflected in the industrial decarbonisation example above, **the competitiveness challenges highlighted by the CCC^{xi}, and the opportunities to develop or expand domestic industries, are not purely internationally or otherwise exogenously determined**. Here, outcomes related in the example above reflect the fact that the competitiveness of UK industry (and the risk of 'offshoring' not only emissions but value-added, jobs and investment) depends on how decarbonisation solutions are deployed, evolve and the funding models adopted in different timeframes, as well as the impacts on and in the UK labour market.^{xii}



The need for a framework that puts 'who pays' questions at the heart of net zero transition planning

This all points to a need to investigate the implications of different (explicit or implicit) 'who pays' approaches as a fundamental and central element of any carbon budgeting or any other net zero transition assessment, rather than as some form of *ex post* and separate analysis.

A useful **starting point would be developing a broad brush but shared understanding of the implications of different high level funding approaches.** For example, as reflected in Figure 1 and the industrial decarbonisation case study above, our work has demonstrated that adopting a polluter pays approach too early in deploying costly industrial decarbonisation solutions (e.g., carbon capture^{xiii}) could trigger an economic contraction and wide-ranging job losses if the result is a loss in international competitiveness.

Here, the research informing the example of our industrial decarbonisation case study demonstrates how some extent of taxpayer public subsidy could cushion the overall macroeconomic costs and enable efficiency gains and emergence of potential competitive advantage. However, it must be recognised **this will be at the cost of reduced household consumption.** That is, unless labour market conditions enable workers to mitigate real take-home wage losses through bargaining higher real wage rates (as is the case in our example above).

Of course, further trade-offs would then emerge if the consequent impact on producer wage costs acts to erode the cushioning impact of decarbonisation subsidies and drive further CPI pressure affecting all public and private sector actors (though this could be less than the CPI pressure triggered by a pure polluter pays approach, where producers are likely to attempt to pass costs through to consumers).

The main message is that **there is a need to understand the main 'moving parts' in the economy that govern the likely macroeconomic, distributional and competitiveness outcomes of net zero actions** before any reliable projections of likely macroeconomic and distributional outcomes can be made. For example, our work on carbon pricing (and associated implicit transfer of costs to the required price of goods and services) has shown that the labour market is a crucial and central mechanism driving all economy-wide outcomes.^{xiv}

Persisting worker and skills constraints in the UK labour market are clearly an important consideration which means that the economy is likely to be sensitive to the multitude of changing pressures that will emerge through the transition. Thus, we highlight the importance of the labour market a key moving part across most of CEP's decarbonisation and net zero transition studies, elucidating the trade-off between ambitions to increase real wage rates and incomes and mitigating impacts of decarbonisation on total production costs by managing labour cost pressures.^{xv}



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The need to understand the challenges of estimating the impacts of nascent low-carbon activity in the economy

A central focus of the methodology for considering the economy and competitiveness in the November 2023 CCC paper is understanding the differences in capital and operational spending associated with new low carbon options and nascent (new) sectors relative to higher carbon incumbents.^{xvi}

Cutting across different 'who pays' models, CEP research shows that there is a need to understand the challenges involved in assessing the impacts of very nascent activities, even where similar and potential benchmark activity is already occurring and detailed in national input-output^{xvii} and other publicly available accounting data. Where nascent sectors are central to economy-wide impact analyses, we would encourage careful consideration of the following three recommendations emerging from CEP research (in addition to all the considerations discussed above, particularly labour market challenges):

1. It is crucial **to account as accurately as possible the capital (and labour) intensity of the nascent activity in question** as this determines the level of new output (and employment) directly supported by initial investment in capacity.^{xviii,xix}
2. Shifting to lower carbon options/activities that are likely to involve similar or greater reliance on domestic supply chains compared to higher carbon incumbents could provide a source of sustained 'green growth'. However, **it is essential to consider how the low carbon supply chain may evolve over time, and the infrastructure costs involved in enabling the shift.**^{xx}
3. Where nascent activity provides an opportunity to repurpose and transition existing supply chains and infrastructure, it is necessary to identify and consider what further investment (including retraining of workers) would be involved in aligning timelines to ensure such a transition. However, it is also crucial to identify and consider **what the differences would be in terms of the extent and nature of market demand for the output produced.**^{xxi}

Concluding remarks

In terms of nascent sector challenges in particular, CEP's research on the potential economy-wide impacts of investment and deploying CO₂ transport and storage to support industrial decarbonisation - an obvious candidate to contribute to the transition of existing oil and gas industry capacity and supply chains - exemplifies all three of the above findings. However, more generally, it also demonstrates the importance of considering 'who pays' questions up front, in this case because the potential similarities to oil and gas are all on the supply rather than the demand side, where CO₂ sequestration will not share the same mature international market opportunities as oil and gas.

The key point is that CO₂ transport and storage represents an example of a nascent low carbon activity where **incentives to induce private investment are likely to involve extensive and quite complex public intervention over a substantial period of time.** Crucially, this includes transitory action to **effectively guarantee demand for the output of a nascent local carbon sector – or utilisation of the capacity created.**

Thus, considering nascent sector challenges elucidates why the question of 'who pays, how and when' becomes crucially important in driving both project and wider economy costs and benefits. However, this brief has more generally attempted to highlight how a range of examples from our research – cutting across funding models for energy efficiency, decarbonising heat and transport etc. – demonstrate how macroeconomic and distributional impacts in different timeframes will be crucially dependent on 'who pays' decisions. Thus, the aim of this brief has been to reinforce the need to 'put the horse before the cart' in understanding the potential macroeconomic and distributional dynamics of proposed net zero actions and pathways.



Acknowledgements and author notes

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[Professor Karen Turner](#) is the Director of the Centre for Energy Policy at the University of Strathclyde.

[Dr Antonios Katris](#) is a Research Fellow and Head of Economic Modelling at the Centre for Energy Policy.

[Hannah Corbett](#) is a Senior Knowledge Exchange Fellow at the Centre for Energy Policy.

End-notes and references to underlying research

- i. Paragraph 3.1.3 on p.37 of the main CCC November 2023 document at <https://www.theccc.org.uk/wp-content/uploads/2023/11/CCC-Proposed-methodology-for-the-Seventh-Carbon-Budget-advice.pdf>.
- ii. Paragraph 3.2.2 on p.38 of the main CCC November 2023 document at <https://www.theccc.org.uk/wp-content/uploads/2023/11/CCC-Proposed-methodology-for-the-Seventh-Carbon-Budget-advice.pdf>.
- iii. Paragraph 3.2.1 on p.38 of the main CCC November 2023 document at <https://www.theccc.org.uk/wp-content/uploads/2023/11/CCC-Proposed-methodology-for-the-Seventh-Carbon-Budget-advice.pdf>.
- iv. For example, see work on: residential energy efficiency in Energy Policy at <https://doi.org/10.1016/j.enpol.2021.112375>; on industrial decarbonisation in Ecological Economics at <https://doi.org/10.1016/j.ecolecon.2021.106978> (carbon capture) and <https://doi.org/10.1016/j.ecolecon.2022.107547> (CO₂ transport and storage).
- v. See our paper published in Local Economy at <https://doi.org/10.1177/0269094220984742> and a linked CEP Policy Brief at <https://doi.org/10.17868/78032>.
- vi. HM Treasury's Net Zero Review already recognises the likelihood that costs will ultimately fall on households, as reflected in Chart 3A on p.44 of the document available at <https://www.gov.uk/government/publications/net-zero-review-final-report>.
- vii. See our paper published in Ecological Economics at <https://doi.org/10.1016/j.ecolecon.2022.107547>.
- viii. For example, see our investigation of the importance of wage bargaining responses in the supply-constrained UK labour market on the wider economy impacts of electricity network expansion to support the EV rollout in the paper published in Energy Economics at <https://doi.org/10.1016/j.eneco.2022.106001>.
- ix. Also see our initial work considering the potential impacts of enabling the heat pump deployment in the UKERC policy brief at <https://ukerc.ac.uk/publications/benefits-heat-pumps-role-electricity-gas-prices/>. In addition to demonstrating the central importance of the price of electricity relative to gas in governing household and wider economy outcomes, this work establishes that - even before specific funding models are considered - wage bargaining responses in the UK's supply constrained labour market will play a governing role in determining the net cost of living impacts to all households throughout this net zero transition pathway.



- x. For example, see our investigation of the potential wider economy impacts of extending carbon taxation in the UK, focussing on the importance of labour market responses, competitiveness impacts and revenue recycling decisions in Energy Economics at <https://doi.org/10.1016/j.eneco.2022.106393>.
- xi. Paragraph 3.1.4 on p.37 of the main CCC November 2023 document at <https://www.theccc.org.uk/wp-content/uploads/2023/11/CCC-Proposed-methodology-for-the-Seventh-Carbon-Budget-advice.pdf>.
- xii. Also see our investigation of different potential outcomes under a 'polluter pays' approach to deploying carbon capture in industrial decarbonisation in Climate Policy at <https://doi.org/10.1080/14693062.2022.2110031> and our work on carbon pricing in Energy Economics at <https://doi.org/10.1016/j.eneco.2022.106393>.
- xiii. See the paper published in Climate Policy at <https://doi.org/10.1080/14693062.2022.2110031>.
- xiv. Non-technical policy briefs on our carbon pricing work can be found at <https://doi.org/10.17868/strath.00081038> and <https://doi.org/10.17868/strath.00081698>.
- xv. For example, see summary discussion of labour market issues and implications in the CEP policy brief at <https://doi.org/10.17868/strath.00082451>.
- xvi. Section 3.1.1 on pp.26-37 of the main CCC November 2023 document at <https://www.theccc.org.uk/wp-content/uploads/2023/11/CCC-Proposed-methodology-for-the-Seventh-Carbon-Budget-advice.pdf>.
- xvii. For example, industry-by-industry input-output accounting data published by the Office for National Statistics – <https://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/ukinputoutputanalyticaltablesindustrybyindustry> - help economic analysts understand the structure of up and downstream supply chains.
- xviii. CEP research conducted in collaboration with the National Infrastructure Commission and Ofgem – see CEP policy brief at <https://doi.org/10.17868/strath.00086711> (cited in the recent second National Infrastructure Assessment Technical Annex Hydrogen Heating - <https://nic.org.uk/studies-reports/national-infrastructure-assessment/second-nia/hydrogen-for-heat-annex/> (see pg.23)) demonstrates the potential for very wide-ranging of jobs and GVA estimates dependent on assumptions as the capital-intensity of new hydrogen transmission activity relative to current electricity or gas distribution.
- xix. Also see the paper published in Local Economy at <https://doi.org/10.1177/02690942231203932> on the impact of incorrectly estimating the capital intensity of CO₂ transport and storage activity benchmarked to existing oil and gas industry activity.
- xx. For example, our work on the planned EV rollout identifies the shift away from import-intensive petrol and diesel towards already established stronger domestic electricity supply chains may be a key source of sustainable 'green growth'. However, the evolution of benefits needs to be set against the need for investment spending and cost recovery in electricity network upgrades to enable increased demand for electricity to be met – e.g., see the paper published in Energy Economics at <https://doi.org/10.1016/j.eneco.2022.106001>.
- xxi. See our work published in Ecological Economics at <https://doi.org/10.1016/j.ecolecon.2022.107547> on the need for government to guarantee demand for CO₂ transport and storage capacity under different broad brush 'who pays' scenarios.