



Policy Brief

The importance of building export capacity in a new Scottish CO₂ Transport and Storage industry: alleviating domestic funding pressures and securing green growth and jobs transition

Introduction and summary

In this brief we explore the role that export services can play in affecting wider economy outcomes associated with the introduction of a new UK CO₂ transport and storage (T&S) industry. [A previous briefing on CEP's work on the SNZI programme](#) considered how a new T&S industry initially focussed on servicing decarbonisation in the Scottish industry cluster at Grangemouth would interact with the wider UK economy. This included supply chain activity, which we identify as potentially replicating and, thus, contributing to sustaining and transitioning jobs and value-added currently supported by the Oil & Gas industry. However, the impacts of introducing new T&S industry activity also depend on who ultimately pays to guarantee demand for its output, involving a range of business model challenges. The central insight emerging was that introducing a new CO₂ T&S does have the potential to deliver economy wide gains such as increased GDP, employment, and earnings. However, gains will be eroded or entirely offset, risking wider economy contraction and employment loss, if socialising costs involved sacrificing household consumption in other sectors, or reducing the competitiveness of heavily traded production activity within the Scottish industry cluster.

This brief reports on the subsequent stage of our research, increasingly informed by insight and evidence emerging for the Scottish cluster case as the UK CCUS cluster sequencing process develops alongside the wider SNZI programme. Here we focus on further understanding the extent to which the economy wide picture and distributional impacts therein may change (or not) if the Scottish CCUS cluster services both domestic decarbonisation and potential export demand for T&S services.

We focus on two emerging questions:

1. What might the potential economy-wide impacts be if the T&S sector developed in Scotland was to service a mix of domestic demand within Scotland itself (i.e., the wider Scottish cluster) and export demand (initially from outside the UK rather than involving potential demand from other UK clusters)?
2. Could the T&S export services help to offset and/or alleviate some of the price and cost pressures emerging under different funding models?

The key findings emerging can be summarised as follows:

- Operation of T&S sector has potential to deliver wider economy growth with or without exports
- However, **servicing some extent of external (export) demand for Scottish T&S reduces the domestic funding requirement, thereby reducing the extent to which Government needs to draw on public budgets and/or transfer costs to UK households or clustered Scottish industry.**
- Ultimately, the combination of gains delivered by exporting T&S services and the consequent alleviation of cost and competitiveness challenges of a basic 'industry pays' approach is likely to help **mitigate wider economy contractionary pressure and regionally concentrated employment losses observed if costs must be met by Scottish cluster industries.**



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Assumptions of the economy-wide scenario simulations

Engagement with stakeholders within the Scottish cluster suggests that our scenario simulation analysis needs to focus on three important timeframes. In 2026, the commercial operation of the transport and storage begins with the commissioning volumes going through the system. In 2027, a total of 5 Mt of CO₂ (80.6% of the total capacity of the originally commissioned storage fields) are stored on an annual basis. By 2027, there is also an expectation that 40% of the stored CO₂ will be shipped in, either from international capture or from other UK locations. We assume that this equates to the new Scottish T&S industry exporting 40% of the services it provides. Finally, by 2029 the full capacity of the originally commissioned fields (6.2 Mt of CO₂ per annum) is being used. Using this information and investment and demand assumptions of our [original research work](#), we developed the following scenario:

- By 2025, £208million of additional T&S capital have been introduced to meet a demand of £184million for the services of the T&S sector. The entire demand is guaranteed by the UK Government, mapping here to government purchases, where the costs of these purchases may be met through some form of deficit funding, or by recovering costs from either UK households or from Scottish industries in proportion to the emissions subject to capture and T&S.
- By 2026, the additional T&S capital has increased to £347million, this time to meet a total of £307million of demand. £184million of them (60% share) are met by the UK Government and £123million (40% share) are exports to other countries.
- By 2029, the full £430million of additional T&S capital has been developed, servicing a total demand of £381million. This time £229million (60% share) are met via UK Government purchases and £152million (40% share) are exports.

Key findings

1. Understanding the wider economy impacts of T&S rollout

As we reported in our previous policy brief, the operation of the T&S sector can trigger sustained expansion across the economy, primarily through upstream supply chain activity, and this can lead to economy-wide growth, with or without the presence of export demand, but is most likely where government can guarantee the T&S demand via deficit funding.

Where the T&S industry can export its services, the long-run level of external demand depends on the evolution of prices. Crucially, any wider economy expansion is constrained by labour supply. Where the wage response triggers price pressures, export, and domestic demand for all kinds of output will be suppressed. However, in the case of T&S, with domestic demand guaranteed by government, the impact is slight suppression of export demand. This is reflected in a smaller wider economy jobs gain (2,631 full-time equivalent (FTE) jobs) than observed (2,721) in our scenarios where government guarantees domestic demand for all T&S output.

If such price sensitivity of export demand is not anticipated and compensated by government guaranteeing adjustment in domestic demand, lower returns in income from employment will also lead to a slight erosion in the household consumption gains. One trade-off in considering any marginal adjustment would be the trade balance, where reduced exports are balanced by lower import demand, with our results suggesting a slight overall trade balance improvement if slight under-utilisation of capacity is an acceptable risk in exposing the new T&S industry to trade opportunities.

Table 1. Key UK macroeconomic impacts by 2040 of introducing the CO₂ T&S industry servicing the Scottish cluster (all monetary values in 2016 prices)

	<u>No exports</u>		<u>40% exports</u>	
	Absolute change	% change	Absolute change	% change
GDP	£293million	0.017%	£286million	0.016%
Employment	2,721 FTE	0.009%	2,631 FTE	0.009%
Real household spending	£327million	0.028%	£315million	0.027%
Consumer Price Index (CPI - indexed to 1)		0.020%		0.020%
Exports	-£183million	-0.038%	-£32million	-0.007%
Imports	£250million	0.048%	£243million	0.047%
Net gain (loss) to government budget	-£293million		-£144million	

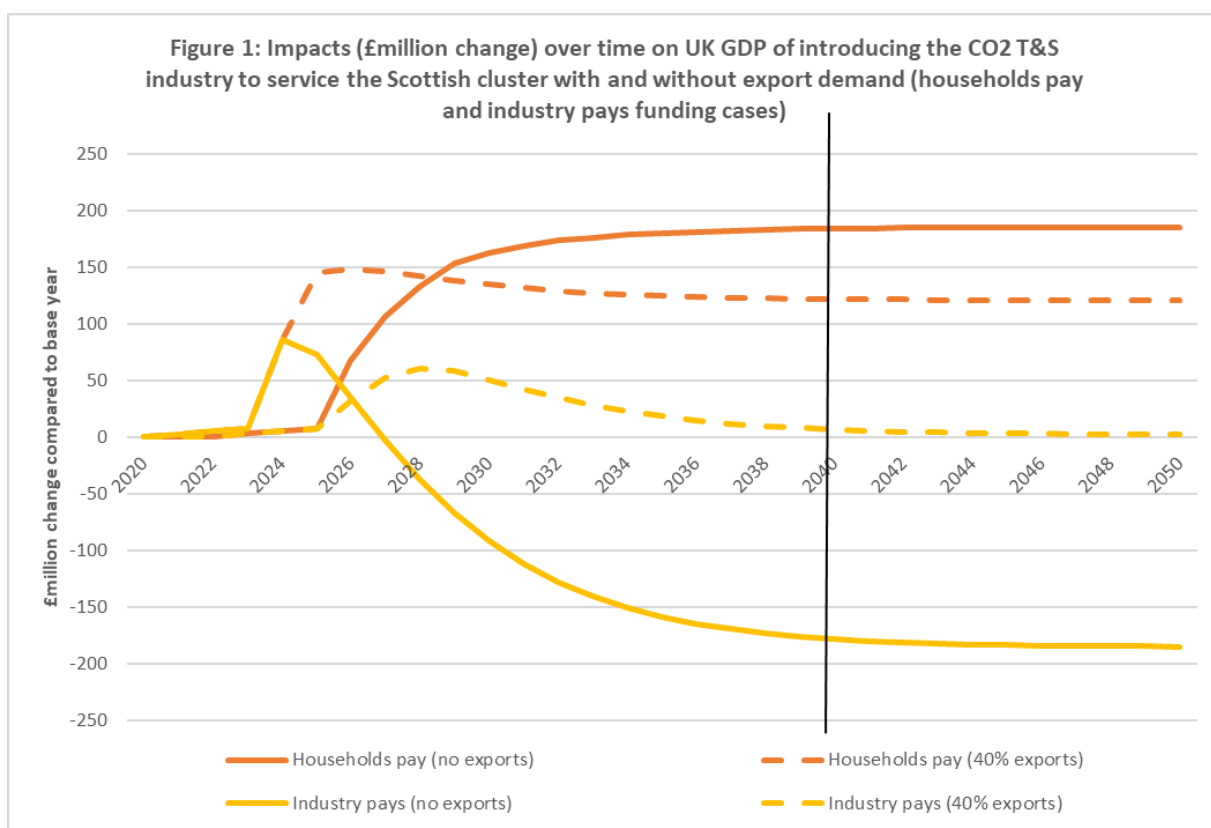
The key contribution of exports is the fact that they alleviate some of the pressure on the UK public budget in guaranteeing demand for the services of the T&S sector. At full deployment, if the new industry can aim for 40% of its output going to export demand, the government only has to cover 60% of the total demand. An immediate impact is the difference in the budget deficit outcome, where the presence of exports helps reduce this to £144million, compared to £293million in the absence of exports

Where the public budget burden is passed to UK households or the polluting industries in Scotland, the presence of exports can help mitigate and/or offset the negative impacts from the households pay and industry pays approaches observed in the previous round of our research.

2. The mitigating effect of exports on outcomes under alternative funding models

In all cases, the main mitigating force is the fact that the government needs to spend less on T&S services and therefore has to recover less from the households or the industries.

When the cost burden is passed to households (here via a simple non-distortive lump sum tax), the presence of exports allows the retention of a greater part of the GDP gains (£184million instead of £122million without exports – see Figure 1) and secures more of the associated employment gains (1,202 FTE jobs rather than 325 FTE jobs in the absence of exports).



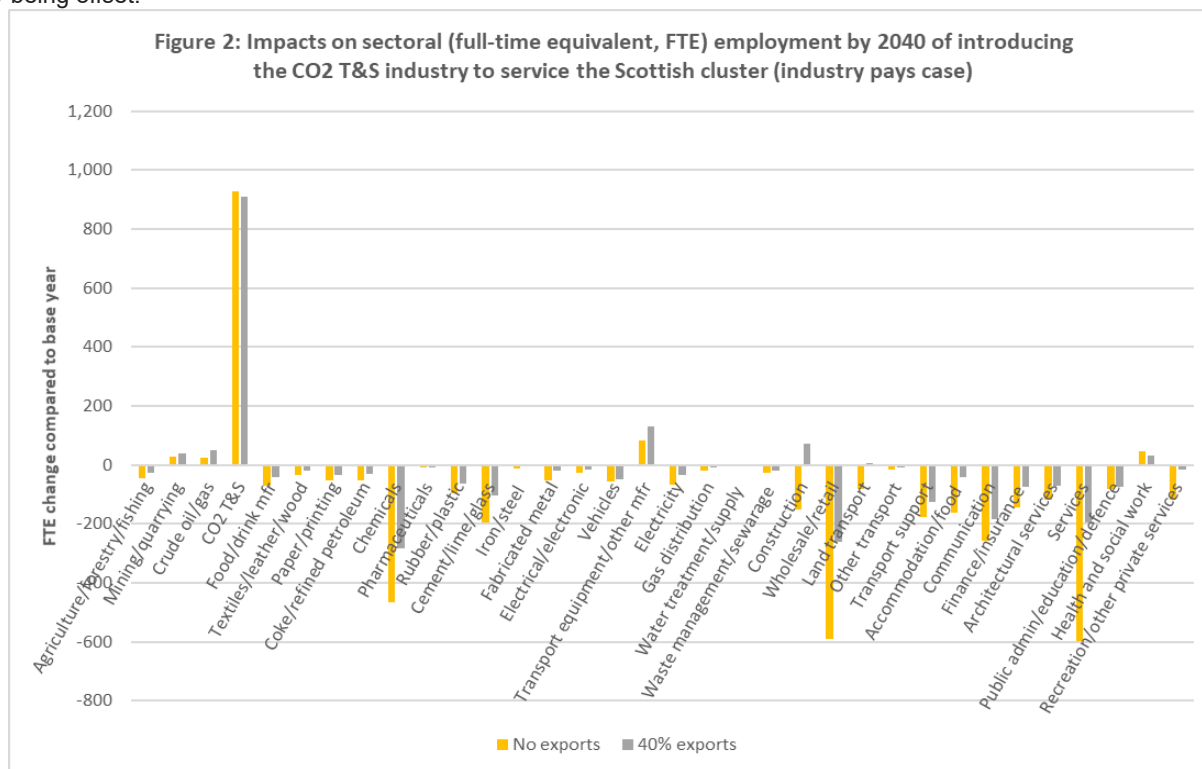
The mitigation of the negative impacts to households is reflected in smaller, £33million, household spending losses instead of £253million where there is no T&S export demand, albeit in the context of a slightly larger impact on the CPI (0.009% increase compared to 0.002% where the T&S industry does not export).

The most significant impact from introducing export demand for T&S services occurs in the ‘industry pays’ approach, where the UK government covers the costs of guaranteeing demand for T&S output through business taxes paid by the emitting industries serviced. Again, the driver here is the fact that a reduced cost to the domestic public budget needs to be recovered from the polluting industries and, thus, has a smaller negative impact on their prices and international competitiveness.

Indeed, the initial scenario simulations carried out here, suggest that if the Scottish T&S industry can secure export demand for its services equating to 40% of its capacity being used to store CO₂ shipped in from overseas, the negative GDP impact observed in the ‘industry pays’ case with no exports can be entirely offset. See Figure 1. This is due to a combination of the smaller impacts on the polluting industries but also the fact that T&S exports themselves generate value added.



However, not all negative impacts are reversed. Given the relative capital-intensity of the growing T&S industry relative to other sectors of the UK economy, total employment losses are only reduced (to 572 from 2,667 FTE by 2040). Figure 2 shows the distribution of employment gains and losses in the ‘no exports’ and ‘40% exports’ cases for industry pays. The crucial point to note is that while the reduction employment losses in the Scottish cluster industries directly paying (e.g., Chemicals) are more marginally reduced, there is a more marked impact in sectors like ‘wholesale/retail’ and the wider Services industry due to contractionary pressure across the wider economy being offset.



Another key effect is that the presence of exports for T&S output helps significantly reduce the budget deficit under an industry pays approach. Essentially, this is due to the offsetting of the revenue losses given the offsetting of a net wider economy contraction, combined with the mitigation of the CPI pressures driven by higher costs in cluster industries, which maps to a reduced need for government to compensate other real spending/transfer levels.

CONCLUSION AND WAY FORWARD

Our initial analyses suggest that export demand can enable economy wide gains, albeit of a smaller magnitude compared to the case where government guarantee the entire demand for the Scottish T&S output. However, the presence of exports can help mitigate/offset the negative pressures across the economy in the case that the government passes the costs to households or the polluting industries. Our initial analysis here suggests that the key drivers of the outcomes observed is the fact that the export demand helps relieve the pressures on government budget deficit compared to the case where the government acts to secure the demand for the T&S sector.

However, there are still price pressures within the economy, driven by the increased demand for workers that leads to higher labour costs or by higher output prices in the industries that have to cover the cost for T&S services. These price pressures affect all production sectors across the UK economy, increasing the general price levels (as reflected in the CPI) and reducing the potential gains from the operation of the T&S industry. Crucially, not all sectors are affected in the same way, with some being negatively affected by increasing costs, especially when they are labour-intensive or heavily rely on exports. Moreover, where impacts are linked to industries within Scotland paying for T&S services, these may be expected to be more regionally concentrated within that nation of the wider UK economy modelled here.

A key point to highlight is that our findings depend on the assumed level of export demand. Especially, in the industry pays case, a smaller share of exports could potentially not be sufficient to offset the GDP losses due to passing the T&S cost to the polluting industries. The quantitative outcomes of our analyses then depend on the magnitude of export demand that could be in place for the Scottish T&S sector. This also brings forward a different set of policy challenges around how the regulatory framework for CCUS accounts for external (non-UK) demand for T&S services, and whether different pricing structures might exist.

It is therefore important, as the policy landscape evolves, to revisit the analyses and indicative results we present here in light of any new announcements regarding the operating framework of T&S sectors in the domestic and export markets. This way we can take into consideration how the regulations that will be in place might affect both the nature and magnitude of modelled outcomes, not least in terms of how the scenarios themselves are designed.



References

- Alabi, O.; Katris, A.; Turner, K.; Race, J. and Stewart, J. (2021) Could the Introduction of a New CO₂ Transport and Storage Industry in Scotland Service Decarbonisation, 'Green Growth' and 'Just Transition' Agendas? CEP Policy Brief. Available to download at <https://strathprints.strath.ac.uk/78261/>
- Turner, K.; Race, J., Alabi, O.; Calvillo, C.; Katris, A.; Stewart, J. and Swales, K. 'Could a New Scottish CO₂ Transport and Storage Industry Deliver Employment Multiplier and Other Wider Economy Benefits to the UK Economy?' *Local Economy: The Journal of the Local Economy Policy Unit* 36, no. 5 (31 October 2021): 411–29. <https://doi.org/10.1177/02690942211055687>
- Turner, K.; Stewart, J.; Katris, A.; Race, J.; Alabi, O. and Calvillo, C. (2021) 'Moving Early in Carbon Capture and Storage: Opportunities and Challenges for Delivering Green Growth and Just Transitions'. Report. Glasgow: University of Strathclyde. <https://doi.org/10.17868/78347>

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