



## Research Brief

# The implications of the projected decline in UK oil and gas extraction: economic losses or freed-up capacity?

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### Summary

The UK's upstream oil and gas (O&G) sector is facing an uncertain future due to low production levels and significant efforts to phase out fossil fuels. Due to the deeply and extensively embedded nature of the supply chain of the O&G extraction industry across communities and regions in the UK, with linkages and dependencies that have largely sustained over the last five decades, the decline of UK O&G extraction could have important ripple effects throughout the economy. These will affect many industries within the direct O&G supply chain and extend to other sectors because of the complex indirect links to the O&G sector. Furthermore, employment losses will impact how workers spend their wages and affect income generation, which impacts the communities where these workers live. Thus, a real policy challenge emerges in terms of how capacity created in and currently dependent on the upstream O&G sector can be repurposed. Crucially, can this shift deliver on just transition ambitions and prosperous 'green growth' based on exploiting the UK's resource base in renewable energy and capacity for activities like carbon sequestration?

In this brief, we employ a scenario simulation approach to investigate the economy-wide and sectoral impacts resulting from simultaneous demand and disinvestment shocks to the upstream O&G sector. Overall, our key finding is that, due to the extent and range of activity within and across the UK economy, government needs to take a holistic and timely approach to mitigate potential employment and capital losses associated with projected decline in the upstream O&G sector. Here, we highlight four key insights from our analysis:

- 1. Employment impact losses will be dispersed across the economy, with a number of sectors potentially experiencing greater absolute losses than the upstream O&G sector itself.** Our analysis shows that sectors like 'Construction', 'Services', 'Wholesale/Retail', and 'Transport' may face substantial impacts on employment as upstream O&G declines. This reflects the complexity of the O&G supply chain within the UK and the consequent complexity of the challenge in transitioning the full range of jobs involved. Extensive workforce planning and incentives will be required to engage a range of industrial actors in retraining and upskilling activities.

2. **There are challenges in terms of a potential mismatch in timing when the capacity freed-up in the declining O&G industry may be utilised in other activities.** In short, if capacity is not freed-up early enough, congestion and bottlenecks may emerge as different activities compete for resources. But, if freed-up too early, skills and infrastructure may be lost. Thus, government leadership in coordinating the timely delivery of net zero commitments will be crucial in ensuring a smooth transition of workers and infrastructure.
3. **Impacts in consumer-facing sectors, such as services and retail, will not be limited to supply chain linkages but also to effects on wage rates and consumer spending.** This reflects a challenging trade-off where workers in declining sectors accepting lower wages may limit the extent and impacts – including on employment - of wider economic contractionary pressure. On the other hand, reduced real wage rates affect consumer spending power, which will have an impact on local economies. Consequently, the government must develop a better understanding of labour market forces in the UK and embed that into its net zero workforce planning.
4. **Due to its capital intensity, the infrastructure that could be lost if not transitioned to other activity is fairly concentrated in and around the upstream O&G sector.** There is clear potential to repurpose the sector's offshore and onshore infrastructural assets such as pipelines and production platforms; if not, they must be decommissioned, which will be costly but could support additional transitory economic activity.

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## Introduction and context: the decline of the UK's upstream O&G sector

The UK's upstream oil and gas (O&G) sector faces an uncertain future. With the current low production levels and significant efforts to phase out fossil fuels, the O&G supply and demand projections have raised questions about the sector's future and, by implication, the impacts its decline may have on the wider UK economy. Such implications can extend to all industries in the O&G supply chain and other unrelated sectors. However, policymakers, quite rightly, have begun to consider how potentially negative economy-wide impacts could be avoided if the decline of O&G is viewed as a freeing up of economic capacity to other forms of energy supply and low carbon activity<sup>i</sup>, and how this could help enable a smoother and more just net zero transition.

The UK's upstream oil and gas (O&G) industry, concentrated in the North Sea offshore of Scotland, has a rich history of providing economic value to the country and the local communities where it operates. Today, the industry is navigating a challenging operational environment, leading it to a projected future decline.

The challenges primarily stem from two dimensions: an ambitious climate policy aimed at phasing out fossil fuels (demand) and the anticipated decline in the UK’s natural hydrocarbon resources (supply). According to data published by the Department for Energy Security and Net Zero (DESNZ)<sup>ii</sup> in 2023, the UK’s domestic production of hydrocarbons had reached the lowest level since records began in 1948, down 66% on levels in 1999, when UK oil production peaked. The record low production levels were met by increased UK demand for O&G in the past year. However, this trend is expected to change, with demand forecasted to decline in the foreseeable future<sup>iii</sup>. In 2023, the UK Government recognised the need for an approach to support domestic production to mitigate the widening gap. It confirmed around one hundred new exploration and production licences in the North Sea. Still, the gap between supply and demand is predicted to remain wide, especially since O&G products are sold in the international markets to the highest bidders, without clear plans for how they can mitigate UK energy security challenges.<sup>iv</sup>

We have analysed data from the North Sea Transition Authority (NSTA) to understand the evolution of the UK O&G sector’s production and domestic demand during the timeframe in which other net zero projects develop and the potential for leveraging the sector’s freed-up capacity.<sup>v</sup>

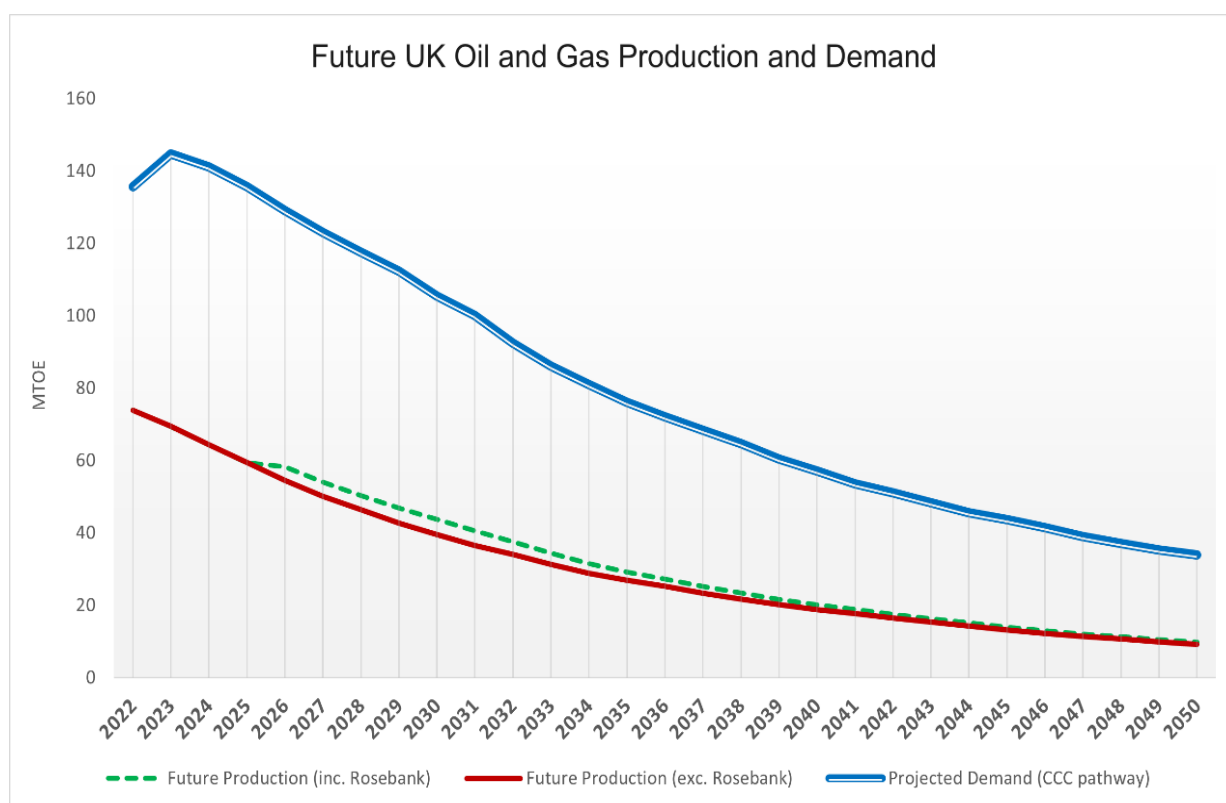


Figure 1 - Projections of UK O&G Production and Demand Between 2022 and 2050, utilising NSTA Data, in addition to the predicted production of the Rosebank field. Source: Authors (Centre for Energy Policy).

Figure 1 shows how the UK’s projected future demand for O&G products will experience a similar decline to that of O&G production, while the gap between the two remains wide. The forecasted demand projections align with a Net Zero Pathway scenario developed by NSTA based on the Climate Change Committee (CCC) Sixth Carbon Budget, published in 2020<sup>vi</sup>. We also add a forecasted projection of production with the

additional capacity brought by the Rosebank field, the largest development among the new licences given the green light by the previous UK Government in 2023<sup>vii</sup> but with some ongoing uncertainty around whether it will go forward. The increase in UK domestic production the Rosebank field introduces is marginal, with overall levels still far from meeting domestic demand, a trend expected to continue with current predictions.

The O&G upstream industry is a considerable part of the economy, generating over £14 billion of Gross Value Added (GVA) in 2023<sup>viii</sup>. Hence, its decline could translate into an economic shock, resulting in economy-wide ripple effects stemming from output size and price changes, such as employment, consumer prices, trade, government budget, and more. That is to say, the transition away from O&G extraction activity could lead to undesirable economy-wide impacts that may result in macroeconomic and socioeconomic challenges, affecting the equity aspect of the net zero transition. Such impacts may be directly or indirectly linked to two primary factors: capital and labour, bringing forward the need to understand potential capital and employment impacts so that to design appropriate industrial and transition policy responses.

According to the UK Government<sup>ix</sup>, the retiring infrastructure and job losses triggered by decline in the O&G sector may not necessarily be considered a negative outcome if these resources smoothly transition to establishing and operating other nascent sectors with similar production requirements. In other words, the capital and employment losses from the O&G sector's decline could be considered as freed-up capacity that can benefit the net zero transition. However, the complete transition of workforces currently directly or indirectly supported by O&G activity to other activities will be challenging, not least because of the complexity of how O&G is embedded in the economy but also due to dynamic issues around timing, size, wages, and costs.

We utilise UKENVI, a multi-sector economy-wide computable general equilibrium (CGE) scenario simulation framework<sup>x</sup> to explore the economy-wide impacts of a declining O&G sector, simulated as a simultaneous disinvestment shock in the O&G sector and a decline in demand for oil and gas. The results show a variety of impacts that may be important to policymakers, especially if considered through a holistic approach, where all parts of the transition are also considered. We particularly highlight and examine the changes in capital stock and employment that may occur across different sectors of the economy. In the subsequent sections, we report results trajectories through to 2050, when most of the net zero projects are expected to be completed. These projections allow us to explore the potential transition of the O&G sector's capacity to support other net zero developments in line with government's expectations.

### **Insight 1 – Employment impacts will be dispersed across the economy, with a number of sectors potentially experiencing greater absolute losses than the upstream O&G sector itself**

Policymakers often see the job losses from the O&G sector's decline as freed-up labour capacity<sup>xi</sup> that can be transitioned to support the establishment of various burgeoning green projects, highlighting the transferability of the sector's workers. While such considerations are rational, employment impacts linked to the sector's decline could be more complicated, due to the intricate nature of the UK's O&G supply chain and the workforce it supports across the economy.

**In contrast to the concentrated nature of capital stock decline, the bulk of employment losses would not be concentrated in the O&G extraction sector itself but rather in a range of direct and indirect supply chain activities and in those dependent on the spending of worker incomes, with potentially substantial impacts in sectors such as construction, services, wholesale/retail, and transport.**

The UK’s upstream O&G sector is reported to support a large workforce consisting of nearly 30,000 direct (own sector) and around 180,000 indirect (other sectors) full-time equivalent (FTE) employees<sup>xii</sup>. Our scenario simulations are based on these figures, with our results reflecting a complex picture also partially shaped by the impact of consumer spending on changes in wage rates and incomes.

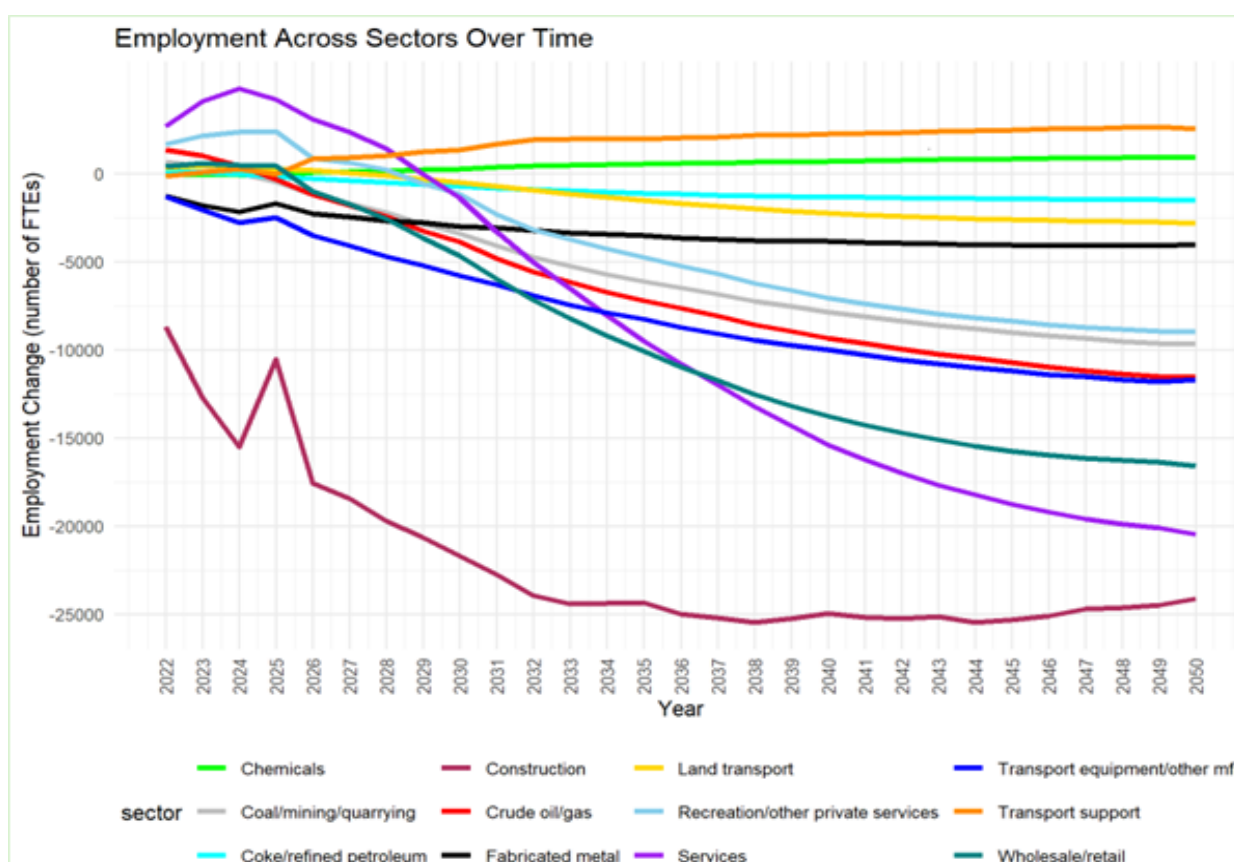


Figure 2 - Employment changes (full-time equivalent opportunities) due to a decline in the upstream O&G sector.

Unlike capital stock changes, employment changes are more dispersed across sectors and require careful interpretation. Figure 2 shows the trajectory of sectoral employment losses due to a decline in the O&G sector between now and 2050. The upstream O&G sector (in red) sees a steady loss of employment opportunities (FTEs) due to reduced activity. However, our scenario simulation results show that a few other sectors could experience higher employment losses.

Some sectors, like ‘Construction’ may be directly involved in the operations of the North Sea-based industry and job losses could be expected due to reduced activity. Still, other sectors may experience losses without having direct involvement in the exploration and production of crude hydrocarbons, such as the aggregated

‘Services’ and ‘Wholesale/retail’ sectors. These results show the relevance of understanding the underlying dynamics of employment changes across the economy, especially if they are to be seen as a “freed-up” labour capacity.

## **Insight 2 – There are challenges in terms of a potential mismatch in timing when the capacity freed-up in the declining O&G industry may be utilised in other activities**

Another important factor to consider if workers losing their jobs are to be considered as “freed-up” capacity is the timing under which the losses occur while other greener projects are developed. Based on government plans, various projects currently in the development or planning stages may offer an opportunity for freed-up labour capacity to support the net zero transition, minimising employment losses and other economy-wide impacts. However, to unlock this opportunity, the freeing-up of those workers should occur in time and line with the plans put forward for the different projects in consideration.

The UK Government provides examples of green projects where freed-up labour could be employed. For instance, the projected creation of 10,000 jobs a year in the offshore wind sector (68,000 total) until 2030, as part of the Offshore Wind Net Zero Investment Roadmap. Another example is the 12,000 jobs predicted to be added to the economy due to the government’s aim to increase the country’s Hydrogen capacity to 10GW by 2030 in the UK’s Hydrogen Strategy. A third (potentially related) is the development of the CCS Transport and Storage (T&S) sector, aiming to create an additional 50,000 jobs by 2030.

The new UK Government has pledged to create up to 650,000 new jobs in green sectors by 2030. However, our results show that the overall number of jobs lost in construction and the upstream O&G industry in the same period would be around 250,000. This comparison reflects a potential congestion challenge faced by the government’s plans to transition the “freed-up” labour capacity into nascent green sectors. The demand for labour for developing net zero projects could prove to be much bigger and faster than the number of FTEs made available by declining sectors<sup>xiii</sup>. Hence, policy considerations regarding the swift retraining and upskilling of workers, while expanding the UK’s workforce to service the net zero transition, are required to avoid labour shortages and achieve a fair and equitable transition.

## **Insight 3 – Impacts in consumer-facing sectors, such as services and retail, will not be limited to supply chain linkages but also to effects on wage rates and consumer spending**

While a substantial part of the job losses could be directly or indirectly linked to the effects of the declining O&G sector on the wider supply chain, other job losses could be related to the relationship between income and consumption in the economy. For instance, if more workers from a particular sector lost their jobs, their disposable income would decrease, which would reduce their consumption from other sectors and eventually lead to further job losses across the economy.

It is important to reinforce the fact that wages play a critical role in determining labour demand and supply in the economy. We obtain different economy-wide employment results when we assume workers engage in a wage bargaining process in our CGE model. The difference in results reflects the important relationship



between wages and consumer prices. If wage bargaining is assumed to be higher, our analysis shows that overall employment impacts would be smaller. When labour demand declines, workers, through a wage bargaining process, can opt to accept lower wages to keep their jobs, which reduces job losses in the economy and the subsequent decline in consumer spending. However, when real wages are fixed, employment impacts are expected to be bigger, mainly due to reduced consumer spending related to workers losing their jobs, leading to employment losses in different sectors due to shrinking overall economic activity.

As the drivers behind the economy-wide employment changes are straightforward and do not only affect workers directly or indirectly linked to the O&G sector or its supply chain, the policy makers should consider the complexity of the situation and aim to design a more bespoke approach to mitigate job losses across all sectors of the economy.

On the one hand, workers losing their jobs in the crude oil/gas and construction sectors as a direct result of the diminishing O&G activity could find a place in the nascent green-economy sectors currently under planning, both in the short-run in the development phase and the long-run when they start to operate. Here, however, lies a primary challenge regarding the reskilling and training of these workers transitioning from one sector to another. To be considered as a freed-up capacity, these workers need to be retrained to join the new industries in a timely manner to transition them smoothly to net zero industries.

On the other hand, job losses in sectors like 'Services' and 'Whole/sale retail' due to the induced wage and consumption dynamics could only be mitigated if workers in directly linked sectors are transitioned smoothly and without complications. Nonetheless, there is still a potential for further job losses across the economy during the transitioning process of workers from emissions-intensive to cleaner industries. Hence, policy mechanisms to support the retention of jobs in the wider economy would be required.

#### **Insight 4 – Due to its capital intensity, the infrastructure that could be lost if not transitioned to other activity is fairly concentrated in and around the upstream O&G sector**

The O&G extraction industry uses substantial amount of capital in the form of infrastructure in its operational activity. The industry uses various infrastructure including drilling rigs, production platforms, subsea pipelines, and floating storage units. Large parts of these elements can be effectively repurposed to serve other industries. For example, pipelines and storage facilities, can be repurposed for carbon capture and storage (CCS) to transport and store captured carbon dioxide. Additionally, offshore platforms can be adapted for renewable energy production, such as wind or wave energy installations.

Nonetheless, concerns have been raised about the future of the upstream O&G sector's infrastructure on the offshore economy, in particular the UK Continental Shelf (UKCS). In line with its projected future decline, **the offshore extraction sector itself could lose vast amounts of capital in the form of infrastructural capacity, with some knock-on impacts on the capital stocks of other sectors.** These resources cannot simply be abandoned as this would constitute an environmental hazard, but decommissioning them may prove expensive, especially if the costs are passed down to the government. On the other hand, such resources could be re-utilised to enable the development of nascent net zero sectors like Hydrogen and CCS. This would require policy to support and optimise the process of repurposing retiring O&G infrastructure to service other sectors and unlock further net zero opportunities.

Here, we investigate the sectoral capital stock changes based on our CGE modelling analysis according to our simulations for the predicted decline in the O&G sector between 2022 and 2050.

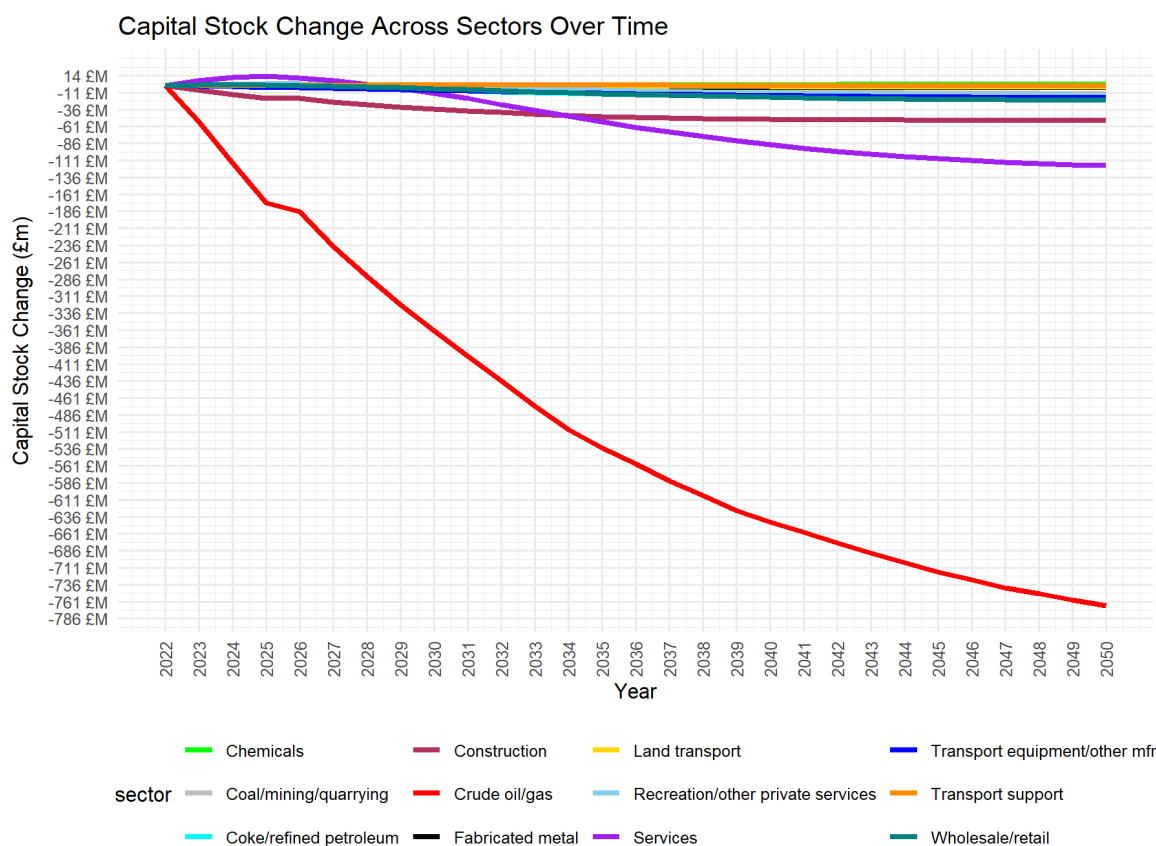


Figure 3 - Capital Stock changes (fixed assets) due to a decline in the upstream O&G sector.

As reflected in Figure 3, the capital stock changes across sectors are in line with expectations<sup>xiv</sup>. The divestment shock in the upstream O&G industry leads to a rapid and sharp decline in the sector’s overall capital stock. This depreciation is mainly due to the capital-intensive nature of the industry, which involves drilling equipment, pipe infrastructure and more. Out of all sectors, only ‘Services’ and ‘Construction’ may experience a subsequent reduction in capital stock, though relatively small compared to the changes affecting the O&G sector.

The no longer fit for purpose O&G infrastructure must be decommissioned according to the 1998 Petroleum Act<sup>xv</sup>. Still, reusable infrastructure must be leveraged to mitigate any economy-wide negative impacts. This issue is addressed within the broader context of the government’s North Sea Transition (2020)<sup>xvi</sup> deal, which outlines plans to manage the decommissioning of ageing O&G infrastructure while transitioning to net zero emissions. However, one of the primary concerns is the significant cost of decommissioning old infrastructure. The Green Alliance has highlighted that taxpayers might bear a substantial financial burden for these costs, estimated to reach £18.3 billion<sup>xvii</sup>.

In some cases, policy makers have stated that there would be potential for repurposing the existing O&G infrastructure to ease costs and support the development of other net zero projects. For instance, in 2020, the UK Government issued a response to the “Re-use of Oil and Gas Assets for Carbon Capture and



Storage Projects”<sup>xviii</sup>. It stated, “*There is potential for significant cost savings for some initial CCUS projects which can re-use existing oil and gas infrastructure. The re-use of strategic assets can also help meet the government’s stated ambition to deploy CCUS in the UK across this decade, putting us on a firm pathway to our net zero ambitions*”<sup>xix</sup>. However, the NSTA highlights that although re-using oil and gas infrastructure (reservoirs, wells, platforms and pipelines) may lead to capex savings in the case of CCS, Wind and Hydrogen projects, the potential for re-use needs to be evaluated on a case-by-case basis and is heavily reliant on technical planning and ownership rights, which can prove difficult in the UK’s slow-paced regulatory environment<sup>xx</sup>.

In this respect, both decommissioning and repurposing the O&G infrastructure in the UK will require rigorous planning and may be more costly than initial expectations. Yet, if decommissioning and repurposing plans are implemented correctly, they could mitigate the negative impacts on the wider economy, potentially turning them into positive freed-up capacity and limiting impacts to O&G firms alone, as they transition to net zero. The negative economy-wide impacts would only occur if decommissioning and/or repurposing the sector’s infrastructure resulted in unnecessary government spending, which would ultimately be passed on to the public.

## Conclusions and policy implications

Using a holistic approach, **economy-wide employment and capital losses due to the declining O&G sector could be seen as a “freed-up” capacity with the potential to ease labour shortages and capex costs in other net zero projects.**

**There is a pressing need to understand the various factors involved in leveraging these resources for different projects**, especially regarding their suitability and the timing and quantity dynamics between the lost and newly created capacities in terms of retrofitting infrastructure and transitioning labour.

**Our analysis highlights the potential bottlenecks and potential opportunities in the UK’s labour market alongside the significance of repurposing retiring infrastructure, focusing on key constraints surrounding decommissioning costs and workers’ wage responses in an economy-wide context.**

Overall, the losses expected from the declining UK’s upstream O&G industry – both infrastructure and labour – can free up capacity if concrete and all-encompassing government plans are implemented to benefit the wider net zero transition. The leveraging of the UK’s extensive O&G infrastructure and skilled workforce could prove to be a more complex task than it is currently perceived, requiring further policy consideration and action.

Based on the findings discussed in this briefing, we conclude that the decline in the UK’s O&G industry could free up reusable infrastructure and labour with relevant skills and capabilities with the capacity to support the development of net zero nascent sectors such as CCUS or Hydrogen. However, UK Government will require timely planning and programs focusing on providing a supportive regulatory environment for repurposing the O&G infrastructure, as well as mapping and retraining programs for the freed-up workforce that consider wage response mechanisms and the potential decommissioning costs.

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## End-notes and references to underlying research

- i For example, see <https://www.gov.uk/government/news/new-plans-to-make-uk-world-leader-in-green-energy>, <https://www.gov.uk/government/news/plans-unveiled-to-decarbonise-uk-power-system-by-2035>, and <https://gov.uk/government/publications/north-sea-transition-deal/north-sea-transition-deal-one-year-on-accessible-webpage>
- ii <https://www.gov.uk/government/collections/energy-trends>
- iii The NSTA's demand projections <https://www.nstauthority.co.uk/data-and-insights/insights-and-analysis/production-and-expenditure-projections/> are based on the CCC's balanced net-zero pathway scenario. <https://www.theccc.org.uk/publication/sixth-carbon-budget/>
- iv Bridge, G. & Weszkalnys, G. (2023). UKERC: Offering oil and gas licences every year distracts from the challenge of winding down UK North Sea. From: <https://ukerc.ac.uk/news/offering-oil-and-gas-licences-every-year-distracts>
- v <https://www.nstauthority.co.uk/data-and-insights/insights-and-analysis>
- vi <https://www.theccc.org.uk/publication/sixth-carbon-budget/>
- vii <https://www.nstauthority.co.uk/data-and-insights/insights-and-analysis/production-and-expenditure-projections/>
- viii <https://www.ukeiti.org/sector-data>
- ix For example, see the Green Taskforce report (2021): <https://www.gov.uk/government/publications/green-jobs-taskforce-report/green-jobs-taskforce-report> and the North Sea Transition Deal (2020): <https://www.gov.uk/government/publications/north-sea-transition-deal>
- x For more details on the CGE model we use here – referred to as UKENVI – check our latest peer-reviewed work published in the Journal of Cleaner Production, <https://doi.org/10.1016/j.jclepro.2023.140084>, where we use the same model to simulate the economy-wide impacts of rolling-out the CCS Transport and Storage industry.
- xi See <https://www.gov.uk/government/news/north-sea-deal-to-protect-jobs-in-green-energy-transition> and <https://www.gov.uk/government/publications/green-jobs-taskforce-report/green-jobs-taskforce-report> and <https://www.gov.uk/government/publications/green-jobs-taskforce-report> and <https://www.gov.uk/government/news/hundreds-of-new-north-sea-oil-and-gas-licences-to-boost-british-energy-independence-and-grow-the-economy-31-july-2023>
- xii <https://www.ukeiti.org/oil-gas#:~:text=The%20sector%20is%20directly%20responsible,supported%20in%20the%20wider%20economy>
- xiii For example, see pages 3 and 4 in our recent Policy Brief <https://strathprints.strath.ac.uk/88382/>
- xiv <https://www.gov.uk/government/publications/offshore-wind-net-zero-investment-roadmap>
- xv <https://www.gov.uk/government/publications/uk-hydrogen-strategy>
- xiv <https://www.gov.uk/government/publications/north-sea-transition-deal>
- xvii <https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-a-vision-to-establish-a-competitive-market>
- xviii <https://labour.org.uk/change/make-britain-a-clean-energy-superpower/>



**xix** Such concerns are addressed within the broader context of the [North Sea Transition Deal](#), which outlines plans to repurpose and/or decommission ageing O&G infrastructure while transitioning to net zero.

**xx** Knights, A., Lemasson, A., Frost, M., & Somerfield, P. (2024). The world must rethink plans for ageing oil and gas platforms. *Nature*, 627(8002), 34-37.