Impact of Oil and Gas Exploitation in the North Sea on UK Household Energy Bills

Oxford Smith School Rapid Analysis

March 2026

Nadia Schroeder, Anupama Sen, Cassandra Etter-Wenzel

Oxford Smith School Rapid Analysis

The Smith School of Enterprise and the Environment (SSEE) was established with a benefaction by the Smith family in 2008 to tackle major environmental challenges by bringing public and private enterprise together with the University of Oxford's world-leading teaching and research.

Research at the Smith School shapes business practices, government policy, and strategies to achieve net-zero emissions and sustainable development. We offer innovative evidence-based solutions to the environmental challenges facing humanity over the coming decades. We apply expertise in economics, finance, business, and law to tackle environmental and social challenges in six areas: water, climate, energy, biodiversity, food, and the circular economy.

SSEE has several significant external research partnerships and Business Fellows, bringing experts from industry, consulting firms, and related enterprises who seek to address major environmental challenges to the University of Oxford. We offer a variety of open enrolment and custom Executive Education programmes that cater to participants from all over the world. We also provide independent research and advice on environmental strategy, corporate governance, public policy, and long-term innovation.

For more information on SSEE please visit: www.smithschool.ox.ac.uk

Oxford Smith School Rapid Analysis

Impact of Oil and Gas Exploitation in the North Sea on UK Household Energy Bills – Analysis

March 2026

Nadia Schroeder [i,ii]
Dr Anupama Sen [i]
Cassandra Etter-Wenzel [i,iii]

[i] Smith School of Enterprise and the Environment, University of Oxford [ii] Department of Politics and International Studies, University of Cambridge [iii] Environmental Change Institute, University of Oxford

Overview

In the wake of the COVID-19 pandemic, full-scale invasion of Ukraine, and ongoing instability in key oil and gas-producing regions in the Middle East, households in the United Kingdom have been experiencing chronically high and volatile energy costs. The UK government is actively considering strategies to reduce energy cost burdens on households. Vulnerable and low-income households are a particular priority as increasing costs have a larger proportional effect on these groups (Etter-Wenzel et al., 2025).

One option that has repeatedly been raised as a key strategic consideration is whether to increase the extraction and production of the UK's remaining oil and gas resources in the North Sea, and to use domestically produced gas to mitigate energy bill increases. Given that oil and gas prices are determined by international markets, and the influence of geopolitical shocks on these prices (visible both in 2022 and today), utilising domestically produced oil and gas at internationally determined prices is unlikely to make a material impact on reducing UK household energy bills.

However, an alternative option is to utilise the government revenues from the "fiscal take" (i.e. taxes and levies) on North Sea oil and gas production and profits, by redistributing these to mitigate the wholesale costs of energy for UK households. This would require policy change and could take the form of direct transfer payments to households. At present, UK North Sea production is subject to a ring-fenced corporation tax, a supplementary charge, and an Energy Profits Levy (or windfall tax) (Office for Budget Responsibility, 2025). While the full headline rate is 78%, based on actual revenue collections, the effective rate has been closer to ~38%.

We analyse the viability of this option, comparing scenarios in which the UK continues to exploit North Sea oil and gas under 'realistic' fiscal take assumptions, versus continuing with the planned switch to renewable energy to meet the UK's statutory emissions

reduction obligations in the Climate Change Act, 2008. Results clearly show that a switch to renewable energy is significantly more financially beneficial for households, alongside additional benefits of reducing carbon emissions (e.g., ecosystem health and integrity, human health, energy security and many more).

This 'rapid analysis' uses published data and makes high-level assumptions (further detailed below) to explore three scenarios:

- To assess the impact on household bills of exploiting the UK's North Sea oil and gas reserves to their full extent, assuming that government revenue from a 'realistic' fiscal take is redistributed to households via transfer payments (effective rate of tax on upstream oil and gas activities at ~38% based on actual revenue collections). The assumed lifetime of remaining North Sea resources is set at ~20 years.

- To assess the impact on household bills of exploiting the UK's North Sea oil and gas reserves to their full extent, assuming the windfall tax Energy (Oil and Gas) Profits Levy (EPL) is removed. The EPL may be lifted to encourage market entry and enhance the global competitiveness of operators the North Sea. However, in this scenario, government fiscal take falls further to ~19% assuming actual revenue collection ratios remain similar. The assumed lifetime of remaining North Sea resources is set at ~20 years.

- To compare both North Sea exploitation scenarios to a scenario in which all UK households switch to renewable energy sources under the National Energy System Operator (NESO) 'Holistic Transition Scenario' in 2040, based on household energy bills. In this scenario, 'homegrown' renewable energy, rather than gas, sets the marginal price of electricity, via 'strike' prices in UK Contracts-for-Difference (CfDs).

This analysis was conducted using oil and gas prices as of January 31, 2026.[1] These values represent a low before price increases over recent months. Thus, this analysis represents a conservative scenario in which renewable energy competes against cheap fossil fuels. Even in this scenario, renewables are shown to be significantly more cost competitive. In other words, we show that regardless of the remaining lifetime of UK North Sea oil and gas, the continued use of this oil and gas over the decades to come will not reduce household energy costs relative to a scenario in which UK households switch to renewables. At a time of global volatility, this further reinforces the benefits of developing a renewable energy-led grid in the UK at pace.

1 Noting that January 31st was a Saturday, hence prices reflect spot prices on January 30th.

Results

This rapid analysis examines how different government policies could reduce household energy bills. We find that the exploitation of all remaining North Sea Oil and Gas resources yields substantially smaller annual savings to households than switching to renewable energy – around 5-7 times lower. The analysis finds estimated annual savings of ~£16 -£82 per household from North Sea fiscal revenues versus ~£105-£441 per household under renewables-led energy and electrification. Using the median dual-fuel household energy bill of £1,776 (Ofgem January 2026 Price Cap), North Sea fiscal transfers could reduce bills by ~1-5%, whereas the renewables-led savings range from ~6-25%.

North Sea exploitation scenarios (time-limited):

If remaining North Sea Oil and Gas resources were fully exploited, and the proceeds of fiscal revenues were distributed as direct transfers (i.e. from corporation tax, supplementary charges, and the Energy Profits Levy on upstream oil and gas which together make up the 'fiscal take'), households would save a modest ~£16 - £82 per household per year, depending on fiscal take assumptions.

Under a "realistic" fiscal take scenario (effective collection ~38%), annual savings are estimated at ~£82 per household. This is based on the revenue collected by the exchequer from taxes and levies on North Sea production and profits, and assumes the redistribution of fiscal take via direct transfers to households.

Under a "no windfall tax" scenario (which would lead to a lower fiscal take, effective collection ~19%), annual savings fall to ~£16 per household.

These savings are time limited, as they depend on continued extraction and would be expected to end when remaining fields are depleted (assumed to be around 2040).

Renewables-led scenarios (recurring and scalable):

In contrast, if all UK households switched to renewable energy, bills could be reduced by £105-£441 per household per year on average or ~6-25%, depending on the extent of electrification and bill design.

Importantly, the renewable energy savings are recurring annual reductions in bills once the system transition is achieved (with savings ramping up as renewables and electrification expand), and unlike North Sea extraction which is a finite resource.

Most households are not fully electrified today. Currently, only 30% of total household energy consumption comes from electricity, and 84% of households are on dual fuel (electricity and gas). If wholesale electricity prices fall because renewables set the

marginal electricity price, but gas prices remain unchanged, these households would initially see only partial benefits. Under this partial electrification case, average savings are estimated at ~£105 per year (around ~6% of the £1,776 median dual-fuel bill), with savings increasing as electrification expands.

A key determinant of households' savings under a renewables-led system is the extent of electrification. Full electrification means households meet both electricity and heating using electricity, typically by replacing gas boilers with heat pumps so that a larger share of household energy consumption benefits from lower renewables-based wholesale electricity pricing. Achieving this requires upfront investment (especially for heat pumps and insulation) and therefore depends on effective subsidy and financing mechanisms, particularly for low-income households.

If households are fully electrified (including heat) and the marginal price of electricity is set by renewables rather than gas, bills could be reduced by ~£330 per household per year on average (around ~19%).

Savings could be higher still if the structure of electricity bills were rebalanced. At present, a substantial share of electricity bills consists of non-wholesale costs (such as policy and network charges). If policy costs were moved to general taxation and wholesale costs increased to around 60% of the retail bill, average savings to households could rise to ~£441 per household per year (around ~25%). Bill rebalancing would make the relative components of the electricity bill more closely comparable to gas bills today, which are primarily set by gas pricing, not non-wholesale costs, and could further reduce retail electricity prices.

Conclusions

Finally, it is important to note that both pathways involve delivery challenges. Electrification and renewables deployment require supply chains, workforce capacity, grid buildout, and planning reform while materially expanding North Sea extraction also faces constraints and risks, including project lead times, fiscal policy choices, and liabilities, while also having the additional risk of exposure to internationally priced commodities.

Our analysis supports the argument that the UK can become far more resilient to future energy price shocks and improve household affordability by: a) accelerating renewables generation; b) electrifying homes and making them more energy efficient, and c) moving the policy costs of the transition off energy bills and into other measures such as general taxation.

In short, North Sea fiscal transfers can provide small, time-limited relief tied to a depleting resource, whereas renewables-led systems can deliver larger, recurring savings that continue beyond 2040.

Methodology

'Realistic' Fiscal Take Scenario

Summary statement
Under a **'realistic' fiscal take scenario**, savings amount to a ~4.6% gross reduction or ~£82 per household per year during the 20-year duration of extraction.

We estimated the remaining deposits of oil and gas in the North Sea using data from the North Sea Transition Authority (2025c). Using further North Sea Transition Authority (2025b) data, we benchmarked the cost of extraction at £19.49 per barrel of oil equivalent in 2024 (£19.49 per barrel of oil, £0.34 per therm of gas).

Oil and gas are sold to UK consumers at prices determined on international markets. Using the oil (Brent crude) and gas (NBP) price as of January 31, 2026 (Exchange Rates, 2026b, 2026a), we determined the total economic value of oil and gas deposits in the North Sea. January 31, 2026, was selected as a suitable date to capture market prices as this pre-dates instability in the Middle East caused by conflict between the US, Israel, and Iran, but still captures a global trend of lower prices over recent months. Note that as these prices are generally considered low, a global increase in prices would increase the fiscal take and economic value of North Sea oil and gas to households. Thus, this analysis represents what could be considered a conservative scenario where renewable energy competes against cheap fossil fuels. Even in this scenario, renewables are shown to be significantly more cost competitive.

While the rate of 'full' fiscal is set at the headline rate of tax on upstream oil and gas activities at 78% (HM Treasury, 2024), based on actual revenue collections the effective rate has been ~38%. With approximately 28.6 million households in the UK (Office for National Statistics, 2025), we can determine the value of the full fiscal take of exploiting the entirety of North Sea Oil and Gas if it were distributed across all households evenly over the lifetime of extraction.

These values amount to ~£82 per year, representing an approximately ~4.6% gross reduction in annual energy bill costs over the extraction lifetime.

Method, data sources, and assumptions
Taking the actual fiscal take revenue of North Sea oil and Gas in 2023/24 (HM Revenue & Customs, 2025), the barrels of oil equivalent extracted (North Sea Transition Authority,

2024), average global prices of brent crude in 2023/2024 and NBP gas futures for 2023/24, we are able to determine the actual take as a percent of profits was approximately 38%.

Assuming this rate is a representative 'realistic' fiscal take given tax optimisation practices, the total value of exploiting North Sea Oil and Gas if it were distributed across all households evenly over the lifetime of extraction can be determined. These values amount to ~£82 per year as transfer payments, representing a ~4.6% gross reduction in energy bill costs over a 20-year extraction lifetime common for North Sea fossil resources.

The following assumptions are applied:

- Energy demand of households stays constant over the period of analysis
- Oil and gas are sold to UK consumers at international market prices
- Number of households stays constant over the period of analysis
- Fiscal take stays at scenario-specified value, and includes a ring-fenced corporation tax, supplementary charges, and the Energy Profits Levy (or 'windfall tax')
- Costs of extraction, and cost of oil and gas remain the same
- 2025 HMRC green book discount rate applies
- Efficiency of power plants stays the same
- Extraction is spread evenly across the lifetime of the field
- We focus on the wholesale energy cost component of the bill; we hold all policy costs and network costs constant
- We did not distinguish between low-income and other households in this analysis, but worked across the total number of households without differentiation

'No Windfall Tax' Scenario

Summary statement
Under a '**no windfall tax' scenario**, savings lower to a ~1% gross reduction or ~£16 per year, per household during the duration of extraction.

Method, data sources, and assumptions
If the windfall tax on Energy (Oil and Gas) Profits Levy (EPL) were removed, the headline rate of tax on upstream oil and gas would be reduced to ~40% (North Sea Transition Authority, 2025a). Repeating the above calculation at this reduced fiscal take rate while keeping the rate of realistic tax collection the same, savings reduce to ~£16 per year or a ~1% gross reduction during the 20-year duration of extraction.

This scenario applies the same assumptions as the 'realistic' fiscal take scenario.

'Switch to Renewable Energy' Scenario

Summary statement
if all UK households switched to renewable energy, bills could be reduced by £105-£441 per household per year on average or ~6-25%, depending on the extent of electrification and bill design. Importantly, the renewable energy savings are recurring annual reductions in bills once the system transition is achieved (with savings ramping up as renewables and electrification expand), and unlike North Sea extraction, which is a finite resource.

Partial electrification

Most households are not fully electrified today. Currently, only 30% of total household energy consumption comes from electricity, and 84% of households are on dual fuel (electricity and gas). If wholesale electricity prices fall because renewables set the marginal electricity price, but gas prices remain unchanged, these households would initially see only partial benefits. Under this partial electrification case, average savings are estimated at ~£105 per year (around ~6% of the £1,776 median dual-fuel bill), with savings increasing as electrification expands.

Switch to renewable energy

If all UK households switched to renewable energy by 2040, as given under the National Energy System Operator's (NESO) Holistic Transition Scenario, and additionally, if the marginal price of electricity were to be set by domestic of 'homegrown' renewables, rather than by gas, this could lead to energy bill savings of ~£330 on average per household per year for fully electrified households (approximately 19% of gross household energy bills).

Switch to renewable energy plus rebalancing structure of electricity bills

Savings could be higher still if the structure of electricity bills were rebalanced. At present, a substantial share of electricity bills consists of non-wholesale costs (such as policy and network charges). If policy costs were moved to general taxation and wholesale costs increased to around 60% of the retail bill, average savings to households could rise to ~£441 per household per year (around ~25%).

Bill rebalancing would make the relative components of the electricity bill more closely comparable to gas bills today, which are primarily set by gas pricing, not non-wholesale costs, and could further reduce retail electricity prices.

Method, data sources, and assumptions

We used the 2025 NESO Future Energy Scenarios Holistic Transition pathway to apportion energy sources from offshore wind, onshore wind, and solar to households (National Energy System Operator, 2025). We assume that, due to the quantity of electricity provided by these sources to the grid in 2040, these renewables will set the marginal cost of electricity in the UK. Using CfD strike prices for offshore wind in AR7 (UK Government, 2026a), onshore wind (UK Government, 2026b), and solar (UK Government, 2026b) in 2024 prices, a markup from CfD strike prices to prices paid by the consumer, and the same assumptions on household energy consumption and bills as in the above scenarios, we estimate a £330 saving per year per household on energy bills by 2040. Our analysis focuses on the ~40% of a UK household dual-fuel energy bill that comprises of wholesale energy costs – the part that is most exposed to spikes in international gas prices, which drive the price of electricity in the UK today.

We selected 2040 as our year of comparison in the NESO holistic scenario to capture a point in time by which renewable infrastructure can provide energy to all UK households.

This scenario remains sometime in the future, yet its savings of £300+ per year remain larger than savings of ~£16–~£82 per annum accrued over time by North Sea fossil fuel exploitation. Furthermore, in the ramp up of renewables prior to 2040, households would see a rapid rise of savings toward the ~£330 over time, rapidly overtaking savings from fossil fuel fiscal takes.

We also consider the fact that today, only approximately 30% of household energy comes from electricity. If just this proportion of bills were replaced with renewables by 2040 under the NESO holistic transition scenario, households would save ~£105 per year (~6% of gross energy bills). Again, this focuses only on the wholesale energy costs within household bills.

This scenario applies the same assumptions as the 'realistic' fiscal take scenario, as well as:

- We used a baseline strike price for renewables, using AR7 CfD allocation prices (some of the highest renewable CfD strike prices since the failure of AR5), from Ofgem
- We do not explicitly include the costs of intermittency from the switch to renewables
- For the partial electrification of households, we consider just the wholesale cost component of electricity bills (~40%) and hold other parts of the bill (~60%) constant
- We do not include the cost of decommissioning depleted oil and gas fields.

- For full electrification, we assume the replacement of gas with heat pumps. The efficiency gains of heat pump technology over gas and average energy use of heat pumps per household is drawn from NESTA. These NESTA figures are for an average household.

Network and policy costs (included in the other 60% of energy bills) have increased in retail household energy bills over time, as clean infrastructure investment has expanded, and the UK has required new power plants for growing electricity needs. This is an investment that will bring a substantial return: Smith School research in 2024 showed that 80–87% of low-carbon investments reduce overall costs to consumers over technology lifetimes, due to the far lower operating costs of renewable technologies (Sen et al., 2024).

In a final scenario, we consider that if network and policy costs were shifted to general taxation and the wholesale proportion of bills were to rise to ~60%, annual household savings from full electrification using renewable energy increase to £441 or ~25% of household energy bills.

Our analysis supports the argument that the UK can become far more resilient to future energy price shocks by: switching to renewables; making homes more energy efficient; and, moving the policy costs of the transition off energy bills and into other measures such as general taxation.

For a link to the full numerical analysis, sources and assumptions, see the appendices to this document at:
https://www.smithschool.ox.ac.uk/sites/default/files/2026-03/North_Sea_Rapid_Analysis_Output_and_Calculations_March2026_OxfordSmithSchool.pdf

Acknowledgements

With thanks to Professor Sam Fankhauser for review of an earlier draft, who bears no responsibility for errors or omissions. We would also like to thank the Oxford Smith School comms team Tom Pilsworth, Lucy Erickson, and Liliana Resende for their support and input.

References

Etter-Wenzel, C., Sen, A., & Fankhauser, S. (2025). *UK electricity bills must be fairer, not just lower*. Smith School of Enterprise and the Environment. https://www.smithschool.ox.ac.uk/sites/default/files/2025-11/UK-electricity-bills-must-be-fairer-not-just-lower.pdf

Exchange Rates. (2026a, March 5). *Live Brent Oil Price*. https://www.exchangerates.org.uk/commodities/live-brent-crude-oil-prices/BRT-GBP.html

Exchange Rates. (2026b, March 5). *Live Natural Gas Price*. https://www.exchangerates.org.uk/commodities/live-natural-gas-prices/NG-GBP.html

HM Revenue & Customs. (2025). *Government revenues from oil and gas production September 2024*. GOV.UK. https://www.gov.uk/government/statistics/government-revenues-from-uk-oil-and-gas-production--2/government-revenues-from-oil-and-gas-production-september-2024

HM Treasury. (2024, July 29). *Changes to the Energy (Oil and Gas) Profits Levy*. GOV.UK. https://www.gov.uk/government/publications/july-statement-2024-changes-to-the-energy-oil-and-gas-profits-levy/changes-to-the-energy-oil-and-gas-profits-levy

National Energy System Operator. (2025). *Electricity Supply Data table (ES1) 2025*. https://www.neso.energy/data-portal/future-energy-scenario-electricity-supply-data-table-es1/electricity_supply_data_table_es1_2025

North Sea Transition Authority. (2024). *UK Oil and Gas Reserves and Resources*. https://www.nstauthority.co.uk/media/vtjkyqnf/uk-reserves-and-resources-report-as-at-end-2023.pdf

North Sea Transition Authority. (2025a). *Taxation*. https://www.nstauthority.co.uk/regulatory-information/exploration-and-production/taxation/

North Sea Transition Authority. (2025b, September 7). *2024 Benchmarking Dashboards—Production Efficiency and Unit Operating Cost*. https://www.nstauthority.co.uk/news-publications/2024-benchmarking-dashboards-production-efficiency-and-unit-operating-cost/

North Sea Transition Authority. (2025c, October 17). *Reserves and Resources as at end 2024*. https://www.nstauthority.co.uk/news-publications/reserves-and-resources-as-at-end-2024/

Office for Budget Responsibility. (2025). *Oil and gas revenues*. https://obr.uk/forecasts-in-depth/tax-by-tax-spend-by-spend/oil-and-gas-revenues/

Office for National Statistics. (2025, July 23). *Families and households in the UK*. https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2024

Sen, A., Lightfoot Brown, H., & Fankhauser, S. (2024). *Getting a Good Deal on Net Zero*. Smith School of Enterprise and the Environment. https://www.smithschool.ox.ac.uk/sites/default/files/2024-05/Getting-a-Good-Deal-on-NetZero.pdf

UK Government. (2026a). *Contracts for Difference Allocation Round 7 results*. https://assets.publishing.service.gov.uk/media/6966861de8c04eb2919f773a/contracts-for-difference-allocation-round-7-results-.pdf

UK Government. (2026b). *New auction delivers unprecedented clean, homegrown power*. GOV.UK. https://www.gov.uk/government/news/new-auction-delivers-unprecedented-clean-homegrown-power