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# **Economic impact of the Energy Profits Levy on UKCS investment projects**

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**Aberdeen Centre for Research in Energy Economics and  
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## **NORTH SEA ECONOMICS**

Research in North Sea Economics has been conducted in the Economics Department since 1973. The present and likely future effects of oil and gas developments on the Scottish economy formed the subject of a long term study undertaken for the Scottish Office. The final report of this study, The Economic Impact of North Sea Oil on Scotland, was published by HMSO in 1978. In more recent years further work has been done on the impact of oil on local economies and on the barriers to entry and characteristics of the supply companies in the offshore oil industry.

The second and longer lasting theme of research has been an analysis of licensing and fiscal regimes applied to petroleum exploitation. Work in this field was initially financed by a major firm of accountants, by British Petroleum, and subsequently by the Shell Grants Committee. Much of this work has involved analysis of fiscal systems in other oil producing countries including Australia, Canada, the United States, Indonesia, Egypt, Nigeria and Malaysia. Because of the continuing interest in the UK fiscal system many papers have been produced on the effects of this regime.

From 1985 to 1987 the Economic and Social Science Research Council financed research on the relationship between oil companies and Governments in the UK, Norway, Denmark and The Netherlands. A main part of this work involved the construction of Monte Carlo simulation models which have been employed to measure the extents to which fiscal systems share in exploration and development risks.

Over the last few years the research has examined the many evolving economic issues generally relating to petroleum investment and related fiscal and regulatory matters. Subjects researched include the economics of incremental investments in mature oil fields, economic aspects of the CRINE initiative, economics of gas developments and contracts in the new market situation, economic and tax aspects of tariffing, economics of infrastructure cost sharing, the effects of comparative petroleum fiscal systems on incentives to develop fields and undertake new exploration, the oil price responsiveness of the UK petroleum tax system, and the economics of decommissioning, mothballing and re-use of facilities. This work has been financed by a group of oil companies and Scottish Enterprise, Energy. The work on CO2 Capture, EOR and storage was financed by a grant from the Natural Environmental Research Council (NERC) in the period 2005 – 2008.

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**Economic impact of the Energy Profits Levy on UKCS investment projects**

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**Contents**

Section 1. Introduction ..... 1

Section 2. Data and Methodology ..... 3

Section 3. Results and Discussion ..... 7

    Section 3.1 Impact of EPL for different investment start up dates..... 7

    Section 3.2 Impact of EPL on new investment projects under different tax cases ..... 11

    Section 3.3 Impact of the EPL with capital rationing ..... 18

Section 4 Concluding remarks and observations ..... 19



# **Economic impact of the Energy Profits Levy on UKCS investment projects**

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## **Section 1. Introduction**

Oil and gas companies have reported record profits throughout 2022 owing to sharp increases in oil and natural gas prices<sup>1</sup>. This has resulted in Governments around the world being pressured to legislate for a windfall tax on extraordinary profits. The United Kingdom announced on 26 May 2022 the introduction<sup>2</sup> of an Energy Profits Levy (EPL) to tax profits of oil and gas companies operating in the UK Continental Shelf (UKCS). It passed it into law in July. The scheme involved a temporary 25% levy on oil and gas ring fence profits with an investment allowance of 80% in addition to the existing Ring Fence Corporation Tax (CT) and Supplementary Charge (SC). The levy was due to expire by December 2025. For the rest of the paper, we refer to this Levy as “EPL 1”.

However, the new UK government outlined changes to the EPL in the Autumn Statement on 17<sup>th</sup> November<sup>3</sup>. The new EPL increases the rate from 25% to 35% from January 2023 and extends its duration to 31<sup>st</sup> March 2028. The investment allowance has been reduced to 29% to maintain the same cash value of relief given through the allowance. Further, an investment allowance at 80% is given for expenditures relating to decarbonisation of oil and gas production. We refer to the updated scheme as “EPL 2”.

EPL 2 means that the overall headline rate for oil and gas companies operating in the UKCS will rise to 75%. The government expects to raise £40

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<sup>1</sup> See <https://www.theguardian.com/business/2022/may/05/shell-profits-windfall-tax>

<sup>2</sup> See remarks by the UK Government <https://www.gov.uk/government/news/millions-of-most-vulnerable-households-will-receive-1200-of-help-with-cost-of-living>

<sup>3</sup> See the revised Energy Profits Levy factsheet from November 2022 at <https://www.gov.uk/government/publications/autumn-statement-2022-energy-taxes-factsheet/energy-taxes-factsheet>

billion through to 2026. The objective of the investment allowance is to encourage investment in oil and gas extraction activities as the Government has stated it “wants to see the oil and gas sector reinvest its profits to support the economy, jobs, and UK’s energy security”<sup>4</sup>. This means that companies can potentially get a tax relief of 91.40 pence for every £1 invested (see Table 1 for a comparison of relief). The increased tax takes effect from 1 January 2023 with termination on 31 March 2028.

**Table 1. Overall tax saved for £1 of eligible investment by all allowances**

	CT	SC	I.A for SC	EPL	I.A for EPL	Total relief
Permanent system	0.30	0.10	(0.1 * 0.625)	-	-	46.25 pence
EPL 1	0.30	0.10	(0.1 * 0.625)	0.25	(0.25*0.80)	91.25 pence
EPL 2	0.30	0.10	(0.1 * 0.625)	0.35	(0.35*0.29)	91.40 pence

The introduction of the Levy has generated a strong debate over its possible impact on the UK’s oil and gas industry. The Government has claimed that the investment allowances will encourage new investments and support the country’s Energy Security Strategy. Some operators hinted that after-tax costs could fall significantly with the new investment allowance<sup>5</sup>. However, others announced cuts to investment in the UK North Sea<sup>6</sup>. Market analysts have pointed out that, while new projects undertaken before the end of Levy period, will benefit if they have existing production income, companies with no existing income or strong

<sup>4</sup> See bullet 4 in EPL Factsheet <https://www.gov.uk/government/publications/cost-of-living-support/energy-profits-levy-factsheet-26-may-2022>

<sup>5</sup> See the case of Orcadian and the Pilot field <https://www.energyvoice.com/oilandgas/north-sea/419127/cost-of-new-north-sea-pilot-oilfield-could-be-reduced-by-75-by-tax-incentives/#:~:text=Orcadian%20Energy%20expects%20costs%20to,the%20windfall%20tax%20last%20month>

<sup>6</sup> See the case of Total Energies at <https://oeuk.org.uk/oeuk-calls-on-government-to-rebuild-investor-confidence-after-windfall-tax-changes/>

project pipelines will suffer a higher tax burden<sup>7</sup>. Moreover, the incentive to reinvest in oil and gas production could delay decommissioning decisions<sup>8</sup>. Finally, Offshore Energies UK (OEUK) has expressed its concern at the sudden change in tax policy and called on the Government to “help build back investor confidence”<sup>9</sup>.

In this short note we develop a simplified economic model of three oil fields designed to be representative of UKCS assets of recent vintage to assess the impact of the Energy Profits Levy on the economics of UKCS investment projects. We contribute to the above debate by analysing post-tax net present values (post-tax NPV) and tax paid under the different tax conditions: permanent system, EPL1 and EPL2.

We begin by outlining the core assumptions of the modelling procedure. We then compare results between projects already in operation and greenfield projects. Afterwards, we examine how the investment allowance and Levy rate affects post-tax NPVs and cashflows. Notably, we present an analysis using a metric designed to measure return on investment in a capital constrained environment. Finally, we provide concluding remarks and observations.

## **Section 2. Data and Methodology**

Our assessment is underpinned by a Discounted Cash Flow (DCF) model for three oil fields designed to be representative of UKCS assets of recent vintage. Tables 2 show the cost and size assumptions used for each field based on different reports by the North Sea Transition Authority<sup>10</sup>. Production profiles for the three

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<sup>7</sup> See Wood Mackenzie view on the EPL <https://www.woodmac.com/press-releases/UK-government-swoops-on-North-Sea-windfall-profits/>

<sup>8</sup> See Phillip Whittaker’s take on decommissioning <https://www.linkedin.com/pulse/high-oil-gas-prices-could-threaten-decommissioning-philip-whittaker/>

<sup>9</sup> See comments from OEUK’s Chief Executive in <https://oeuk.org.uk/oeuk-calls-on-government-to-rebuild-investor-confidence-after-windfall-tax-changes/>

<sup>10</sup> The reports are the following: 2018 UKCS Projects Insights Report. <https://www.ogauthority.co.uk/media/6117/ukcs-projects-insights-report-2019.pdf>; UKCS operating costs report 2020 <https://www.nstauthority.co.uk/news-publications/publications/2021/ukcs-operating-costs-2020/>; UKCS decommissioning cost estimate 2021 <https://www.nstauthority.co.uk/news->

oil fields were designed to exhibit the typical behaviour of UKCS assets. During the initial years production increases until it hits a plateau and then decline begins. Smaller fields show faster decline rates while larger fields will have slower decline rates.

**Table 2. Cost assumptions for model fields**

<b>Variable</b>	<b>Units</b>	<b>Field 1 - Small</b>	<b>Field 2 - Medium</b>	<b>Field 3 - Large</b>
Recoverable reserves	Million barrels (MMbbls)	10	50	100
Development costs (DEVEX)	USD/bbl	19	13	10
Annual Operating costs (OPEX)	% of DEVEX	8.75	7.75	7.25
Decommissioning costs (DECOMX)	% of DEVEX	10	10	10
No. of years to complete decommissioning	Years	1	1	3

The model incorporates the UK oil and gas permanent tax regime and includes EPL 1 and EPL 2 for comparison purposes. There are two main elements to the permanent regime: Ring Fence Corporation Tax at a 30% rate and the Supplementary Charge at a 10% rate. Both have capital allowances on 100% first year basis. An additional element for the SC is the Investment Allowance (IA) of 62.5% which further reduces taxable income starting when the related income commences. Regarding decommissioning, the UK Government published in 2013 the Decommissioning Relief Deed (DRD) which is a contract between companies and the UK Government that provides certainty on the tax relief that will be obtained when oil and gas assets are decommissioned. Decommissioning costs are allowed as deductions for RFCT, and SC on 100% first-year basis but are not allowed for EPL. We consider two tax cases: first the case where the

operator has existing ring fence income to set against their investment costs and claim immediate relief; second, the case where the operator has no other income available and must use the Ring Fence Expenditure Supplement (RFES)<sup>11</sup>.

Our market environment assumptions seek to be consistent with mid- to long-term price scenarios used by companies and investors when evaluating long term investment opportunities. Current oil price volatility and high inflation, while important in the short-term might not reflect the investment environment in 5 or 10 years. Table 3 sets out the assumed values for various market variables. The scheduling of development costs for each field over time is shown in Table 4.

**Table 3. Assumptions for market variables**

Variable	Value	Units
Real Brent oil price <sup>12</sup>	60	USD/bbl
Consumer price index	2	%
Discount rate	10	%
Exchange rate	1.21	USD per £

<sup>11</sup> See Taxation overview by the NSTA on the RFES <https://www.nstauthority.co.uk/exploration-production/taxation/overview/>

<sup>12</sup> See Shell's mid-price scenario on p.243 in <https://reports.shell.com/annual-report/2021/assets/downloads/shell-annual-report-2021.pdf>. See also BP's Annual Report and Form 20-F 2021, p.32, where the Brent price used for appraising investments is stated at \$60 in real terms to 2030 falling thereafter to \$55 in 2040 and \$45 in 2050.

**Table 4. DEVEX schedule (%) for representative fields**

Project year	Field 1	Field 2	Field 3
0	50	30	20
1	50	30	30
2		40	30
3			20

We introduce the Energy Profits Levy as designed in May (EPL 1) with the following main characteristics. First, a 25% tax on UK oil and gas profits in addition to the existing CT and SC. The headline rate rises to 65%. Second, an Investment Allowance of 80% against the EPL is available at the point of investment. As we model annual cashflows we assume that the tax takes effect in 2022 and finishes in 2025.

The current Energy Profits Levy scheme (EPL 2) is incorporated with the following characteristics. A 35% tax on UK oil and gas profits, increasing the headline rate to 75%. The investment allowance is reduced to 29%. We do not model the case of decarbonisation expenditures that qualify for the 80% allowance. We assume that the tax takes effect in 2022 and lasts through to the end of March 2028.

We model two start up dates for the projects. The first is where projects began in 2019, and the second case when they begin in 2022. The objective is to model the impact of the EPL on projects that have already undertaken investment expenditures compared to those with first investment when the EPL commences.

## Section 3. Results and Discussion

### Section 3.1 Impact of EPL for different investment start up dates.

We begin by discussing how the Energy Profits Levy affects the economics of oil and gas projects at different start-up dates. To isolate the impact of EPL 1 and EPL 2 we consider only the tax case where the operator has other income against which to claim immediate tax relief.

Table 5 presents the post-tax NPVs for the three fields under the two EPL cases. As expected, the economic impact of the Levy is stronger in older projects compared to brand new ones. The 2019 projects cannot claim the additional tax relief from the investment allowances for the Levy. Further, the increased tax will apply for a larger share of the project's lifetime. For the Treasury, tax paid from older fields will be higher compared to new ones. For operators, it provided incentives to reinvest or incur capital expenditures such as infill drilling to be able to claim the higher tax relief during the Levy periods.

**Table 5. Post-tax NPVs (Real @10%) for the three fields by different investment start-up years with Energy Profits Levy.**

Field	EPL 1		EPL 2	
	2019	2022	2019	2022
Field 1 - Small	£51	£117	£31	£69
Field 2 - Medium	£338	£796	£184	£570
Field 3 - Large	£633	£1,368	£321	£998

\*All values in £million

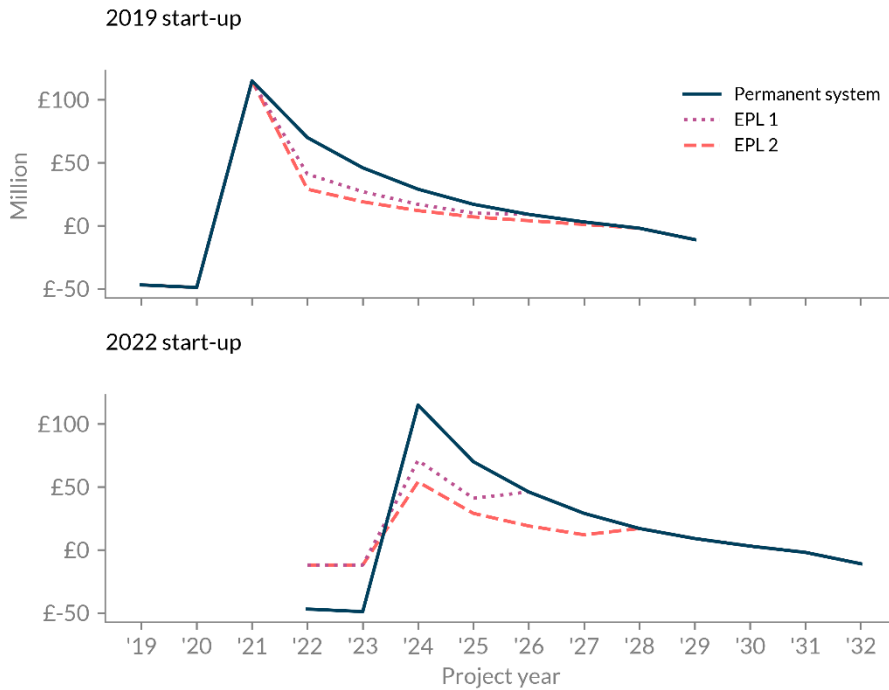
Note also that EPL 2 has reduced NPV values compared to EPL 1 and the permanent system. This is because EPL 2 has increased the Levy rate to 35% but the cash value of the investment allowance has remained the same.

Plotting the post-tax net cashflow through time is helpful to fully understand the comparative effects of EPL 1 and 2 by different investment start years. Figure 1 presents the post-tax net cashflows for the small field. If the project commenced in 2019, we see that earlier net cash flow losses are higher compared to the 2022 investment start-up. This is because in the 2019 case the operator is not able to make use of the investment allowances within the EPL. In the 2022 start-up case the post-tax net cashflow is close to zero in its early stages, which supports the Treasury's claim about the 91.40 pence tax savings for every £1 invested.

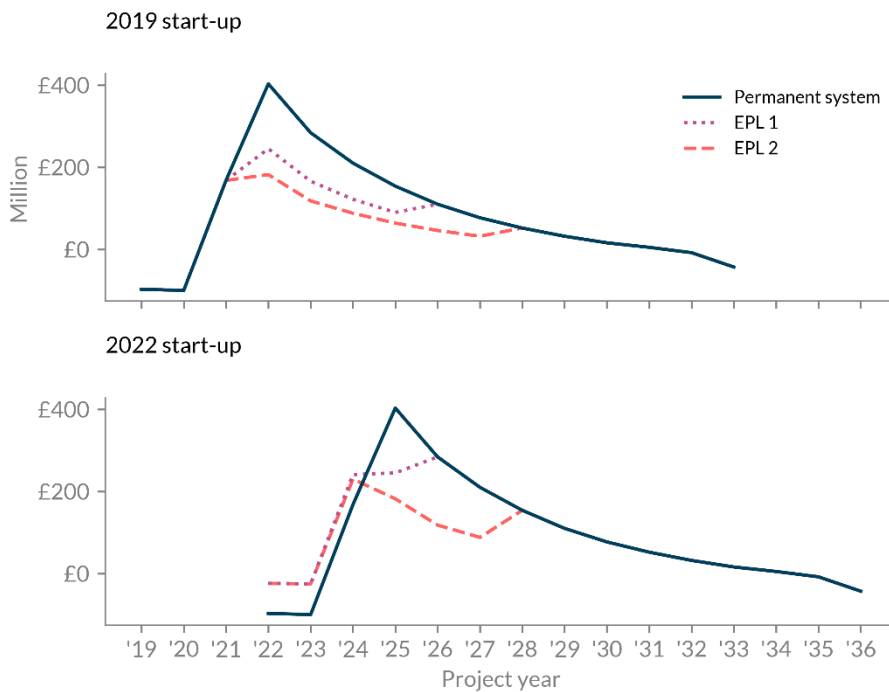
A second important point relates to the EPL's impact on post-tax net cashflows. For the 2019 project, the highest point of profit is outside the scope of the EPL and thus the annual net cashflow reaches a higher point compared to the 2022 case. However, the Levy has a stronger impact on the middle and late life profits of the 2019 field, resulting in lower annual cashflows compared to the 2022 case. A similar result is seen for the medium-sized field (See Figure 2).



**Figure 1. Net post-tax cash flows for the small field by different investment start-up dates assuming tax case where there is other income**

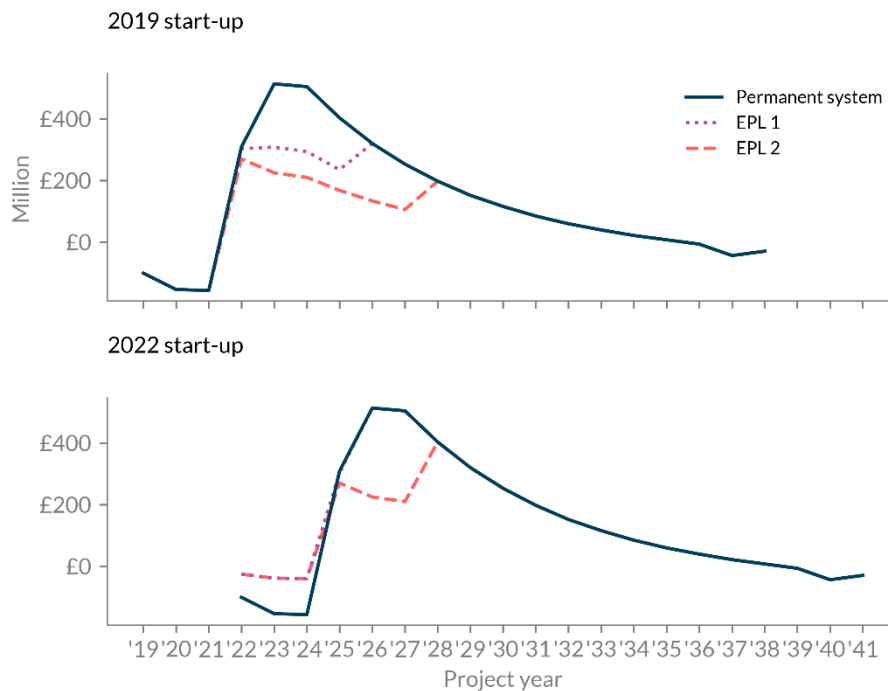


**Figure 2. Net post-tax cash flows for the medium field by different investment start-up dates assuming tax case where there is other income**



The impact of the EPL on the large field is shown in Figure 3. For the 2022 investment start-up tax relief is achieved for investment expenditures. Profits were not affected in EPL 1 but are taxed in EPL 2. Fields starting in 2019, however, are not able to claim tax relief for the investment expenditures and early profits are taxed in both EPL 1 and EPL 2. The implication is that the timing of investment expenditures and timing of first production determine the impact of the EPL.

**Figure 3. Net post-tax cash flows for the large field by different investment start-up dates assuming tax case where there is other income**



The results in this section support criticism of the EPL in that it places a higher burden on projects that incurred investment expenditures in past years as opposed to new projects. Projects that began before 2022 will have less opportunity to claim the additional tax savings and will be highly exposed to the headline tax rate of 75%.

The results also suggest that the EPL promotes two behaviours. First, operators are encouraged to invest in new or incremental projects to claim tax relief immediately under the expectation that the EPL will not apply once the projects come online and production ramps up.

The second incentive leads the operator to phase investment expenditure and production to take advantage of the timing of the investment reliefs and the payments of the EPL. This can lead to a negative impact in the short run where some operators delay investment and first production to benefit from the expiration date of the EPL.

### **Section 3.2 Impact of EPL on new investment projects under different tax cases**

The two main objectives of the Government with the Energy Profits Levy are to increase reinvestment of profits via the investment allowance within the Levy, and to tax extraordinary profits brought by current high energy prices. In this section we present economic metrics that allow an assessment of these objectives. We focus on projects beginning in 2022.

Table 6 presents the post-tax NPVs of the three oil fields under the two tax regimes and EPL cases along with the pre-tax values. It is noteworthy that the pre-tax NPVs always exceed the post-tax values. For these realistic field sizes and costs there is no evidence of subsidy to investment.

In the case where the investor has other ring fence income against which to claim tax relief immediately, the results suggest that, with EPL 1 the net present values increase compared to the permanent system. This reflects the investment allowances for the EPL, which add tax relief to the savings from the first-year allowances for CT and SC. This is clear from an examination of the post-tax cashflows in Figures 4-6 below. Early losses are reduced significantly compared to the case without the Levy.

However, when EPL 2 is considered the post-tax NPV is lower compared to both EPL 1 and the permanent system. The investment allowance is not enough to offset the taxed profits given the increased rate and longer duration of the Levy. This is confirmed in Figures 4-6 where it is shown that the post-tax net cashflows under EPL 2 are the lowest amongst all the tax arrangements. In Figures 7-9 the results are shown for the case where the investor has no other income against which to set his allowances.

**Table 6. Net present values of three oil projects under different tax arrangements (Real NPV@10%)**

Field	Pre tax	Tax case –other income			Tax case – no other income		
		Permanent	EPL 1	EPL 2	Permanent	EPL 1	EPL 2
Field 1 – Small	£162	£105	£117	£69	£94	£69	£5
Field 2 – Medium	£1,024	£711	£796	£570	£606	£569	£294
Field 3 – Large	£1,692	£1,101	£1,368	£998	£1,001	£1,086	£643

Notes: All values in £million.

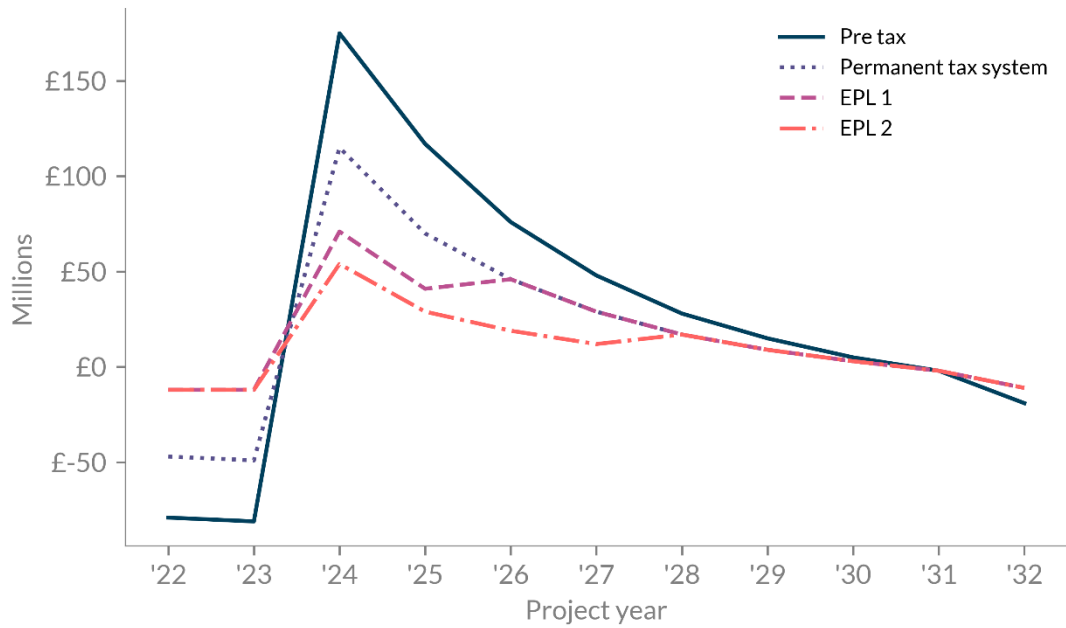
For the case where the investor has no other ring fence income against which to claim tax relief there is a major negative impact from EPL 2 on NPV. This is especially the case for the small field where the post-tax NPV has gone from £105 million in the permanent system to £5 million; the return is positive but certainly not attractive. This is due to a combination of: 1) the operator not being able to claim immediate tax relief and 2) much of the income generated by the field being within the duration of the Levy. The impact of EPL 2 on the

medium and large fields is still strong but doesn't lead to the loss of value of the proportion seen for the small field.

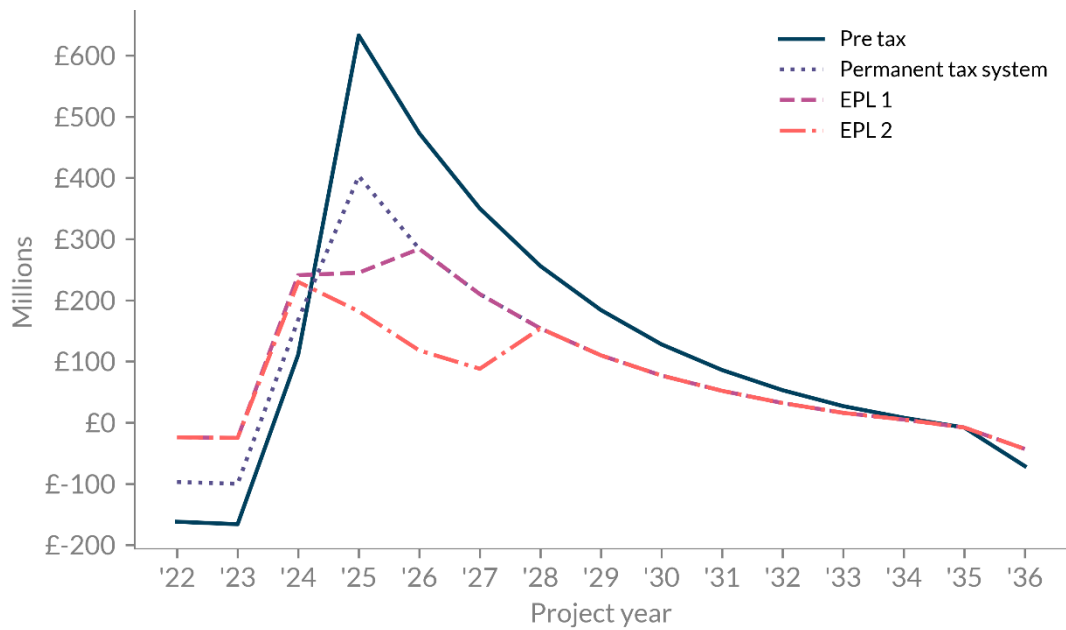
Taken together, the results indicate that:

1. Where other income is available, EPL 2 has reduced the post-tax NPV compared to the permanent system. Moreover, the increased rate and longer duration of the Levy negates the positive impact of EPL 1 where the profitability of the projects was increased because of the investment allowance. All this assumes that the capital rationing facing investors is not increased.
2. If the company does not have other income available to claim immediate tax relief, EPL 2 will severely impact the profitability of small projects and significantly reduce the value of medium and larger projects. Under these conditions there is no inbuilt incentive to increase capital expenditures and the value of projects are significantly diminished.
3. It follows that companies with small-sized reserves may well be deterred from investing when no other ring-fence income is available to offset losses. Medium and large-sized projects with no other ring-fence income available to offset losses will clearly be worse off with EPL 2.

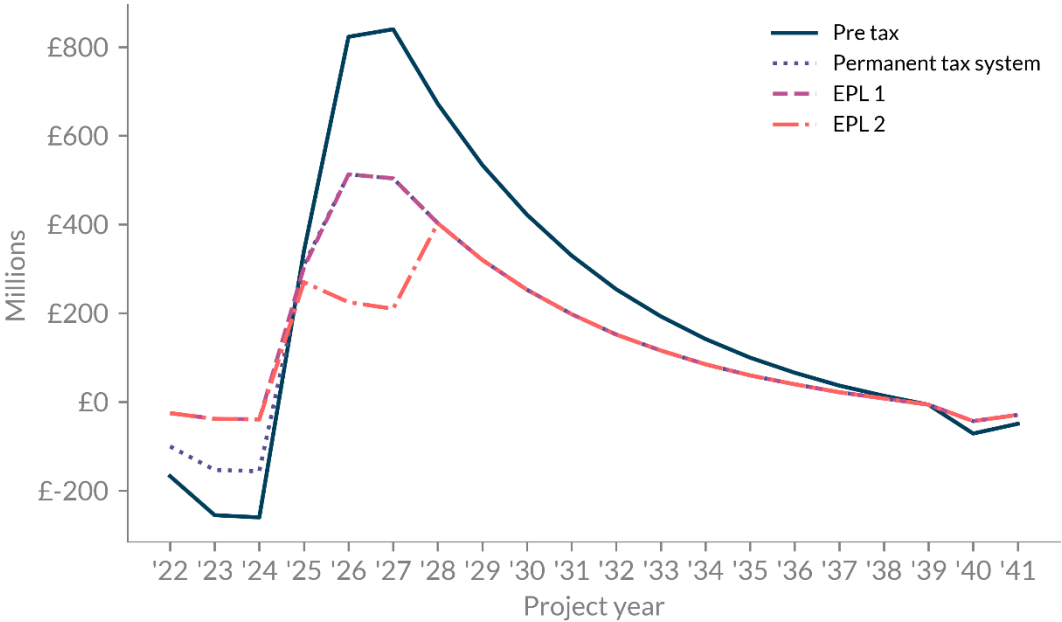
**Figure 4. Net cash flow for the small field assuming tax case where there is income available to claim relief immediately**



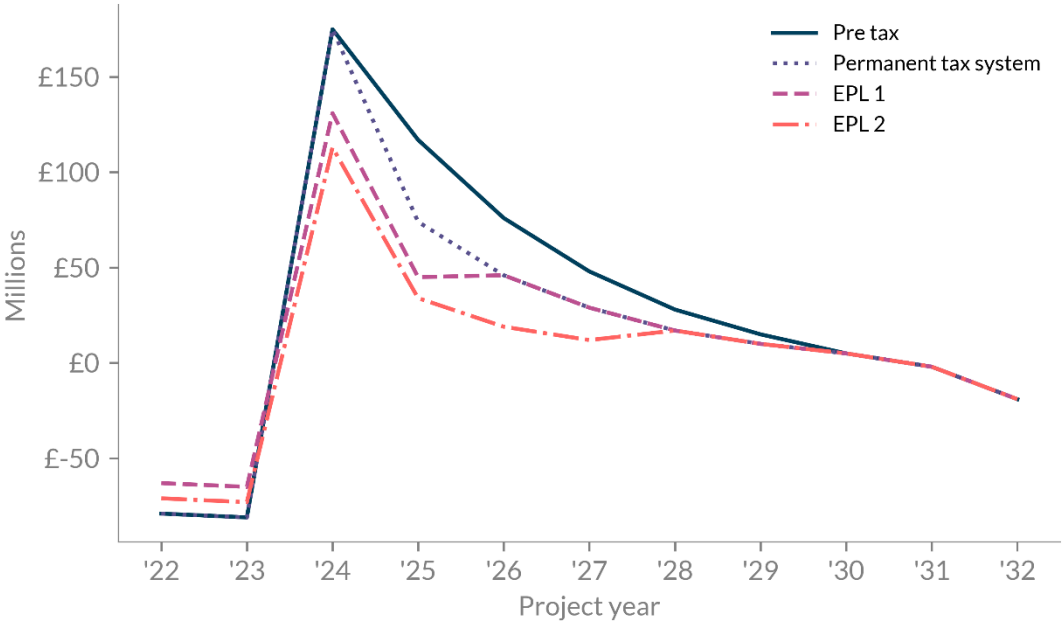
**Figure 5. Net cash flow for the medium field assuming tax case where there is income available to claim relief immediately**



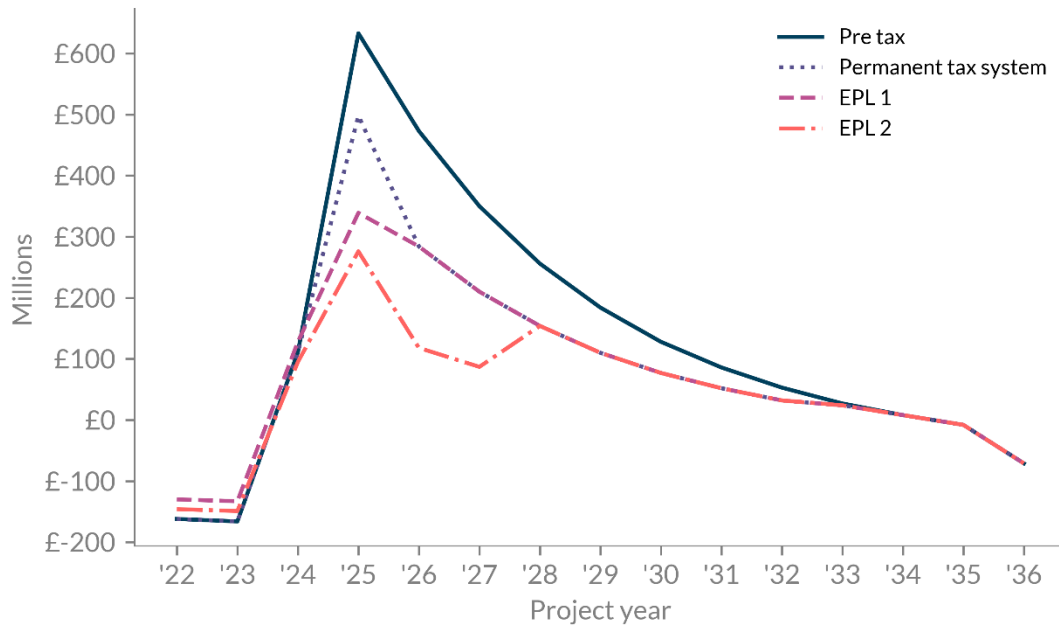
**Figure 6. Net cash flow for the large field assuming tax case where there is income available to claim relief immediately**



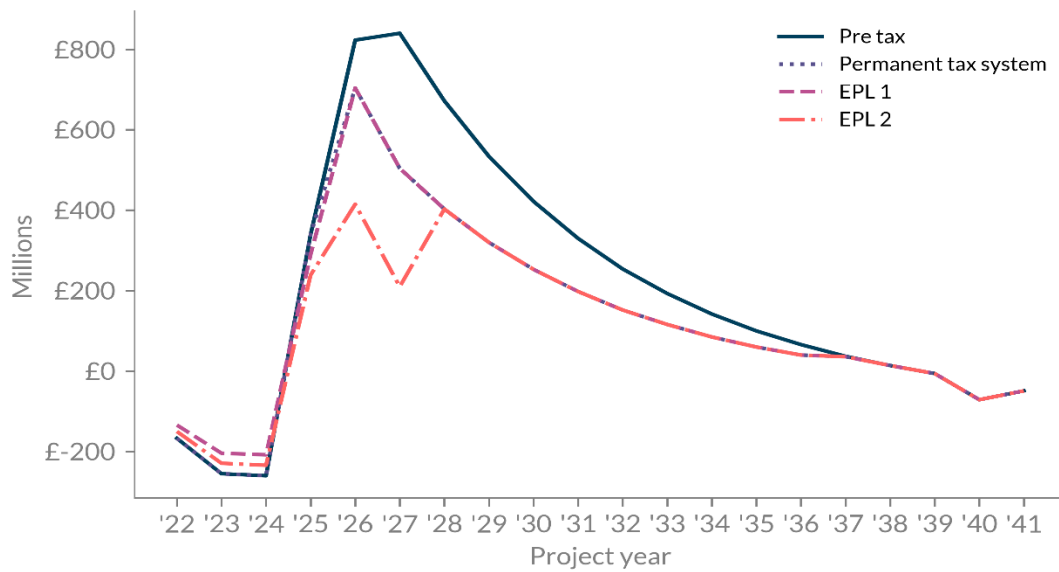
**Figure 7. Net cash flow for the small field assuming tax case where there is no other income available to claim relief immediately**



**Figure 8. Net cash flow for the medium field assuming tax case where there is no other income available to claim relief immediately**



**Figure 9. Net cash flow for the large field assuming tax case where there is no other income available to claim relief immediately**





We turn now to the impact of the EPL on taxing extraordinary profits. Table 7 presents the amount of tax paid by each field. Tax paid increases regardless of the tax case considered. This means the EPL is successful in taxing extraordinary profits. See Figures 4 and 5 with the cash flows for the small and medium fields. It is noteworthy that the net cashflows flatten when the EPL 1 is introduced and show a dip when EPL 2 is considered. The net profits of the early years are taxed resulting in a smoother trend over the lifetime of the project.

**Table 7. Tax paid by each project under different tax arrangements (Real Present Value@10%)**

Field	Tax case –other income			Tax case – no other income		
	Permanent	EPL 1	EPL 2	Permanent	EPL 1	EPL 2
Field 1 – Small	£120	£175	£224	£68	£124	£172
Field 2 – Medium	£515	£649	£876	£418	£552	£780
Field 3 – Large	£887	£947	£1,318	£691	£751	£1,123

Notes: All values in £million.

However, this result is underpinned by the assumptions made on the beginning of production and the decline rate. Earlier production resulting in earlier profits will allow for more tax to be paid, while delayed production, meaning later profits will reduce the amount of profits taxed by the EPL.

In summary:

1. Tax paid under the EPL 2 will generally increase.
2. The EPL 2 would appear to be successful in taxing extraordinary profits. It smooths spikes in positive net-cash flows.
3. The results are consistent no matter the ring fence income case assumed.

### **Section 3.3 Impact of the EPL with capital rationing**

The oil price collapse following the Covid-19 pandemic created a difficult operational environment for oil and gas investors. Low profits or losses alongside restricted access to financing led companies to exercise stringent capital rationing. Even in the present high price environment capital rationing and discipline is a relevant consideration for investors.

We use the ratio of post-tax NPV@10% and real pre-tax investment@10% (NPV/I) as a measure of capital productivity. This measure is useful to rank oil and gas projects and to allocate capital. The results in Table 8 show the NPV/I ratios for the three oil fields under different tax scenarios and ring-fence income cases. Field investment starts in 2022 in all the cases. For the tax case with other income available, we see that the NPV/I ratio is higher under the EPL 1 system compared to the no other income case. This reflects the higher post-tax NPV due to the investment allowances within the EPL 1. In the case where no other income is available the ratios for the small- and medium-sized field are lower under the EPL 1. However, the large field increases its NPV/I ratio under the EPL 1 because there are less years where the EPL 1 applies to profits and the investment allowances give major early tax relief.

The NPV/I ratios for EPL 2 have significantly decreased compared to EPL 1 and the permanent system for all tax cases and field sizes. This further supports the conclusions from section 3.2 on the strong negative impact of EPL 2 on project value. Notably, the small field now has an NPV/I ratio close to zero suggesting that under capital rationing the project will not proceed.

**Table 8. NPV/Investment ratios by field size and tax case  
(Post-Tax NPV@10% / Real pre-tax investment@10%)**

Field	Tax case – Other income			Tax case – No other income		
	Permanent	EPL 1	EPL 2	Permanent	EPL 1	EPL 2
Field 1 – Small	0.69	0.78	0.46	0.62	0.45	0.03
Field 2 – Medium	1.45	1.63	1.17	1.24	1.17	0.60
Field 3 – Large	1.52	1.88	1.37	1.38	1.50	0.89

## Section 4 Concluding remarks and observations

The effects of the updated Energy Profits Levy (EPL 2) on new investment in the UKCS are complex. The present study finds that they depend principally on (1) the timing of the investment expenditure and the related income, and (2) whether the investor is in receipt of other ring fence income at the time of the investment. (Of course, like all investments in the petroleum industry, oil price and cost behaviour also have major effects on incentives to invest). If the investor has incurred his project investment costs prior to 26<sup>th</sup> May 2022 and has substantial income in the period 2022-2025 the EPL 2 has a major negative impact on his post-tax returns. The negative effect is particularly pronounced when the income subjected to the EPL 2 occurs in the early years of the producing life of the field.

Even if the investor has adequate other North Sea income at the time when the new field investment, the revised rate of 35% of EPL 2 results in lower post-tax returns to the investor compared to the permanent system. This contrasts with EPL 1 where the 25% rate and the investment allowance increased the value of

the projects. Where the related income commences shortly after 2028 the benefits are very noticeable. In these very favourable circumstances, it was found that post-tax NPVs were still less than pre-tax returns using a 10% discount rate.

Because of these large differences in prospective returns there are incentives to phase the investment expenditure and production to take advantage of the timing of the investment reliefs and the payments of the EPL. There will, of course, be significant constraints on the ability of investors to schedule their expenditures and production to best advantage. The timing of new investments and production depends on many factors including approval by the regulator and the availability of contractors to undertake the necessary work. In general, it will be easier to delay rather than accelerate investment activity.

The incentive effect is likely to impact decommissioning activity in particular. A noteworthy feature of the detailed rules of the EPL is that decommissioning expenditure is not a deductible item. Given the presence of the Decommissioning Relief Deed (DRD) this may be regarded as controversial. The EPL will clearly reduce cash flows and, given the investment allowances from undertaking new investments, there are incentives to delay decommissioning work. This will be the subject of further research.