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**Taxation and Total Government Take  
from the UK Continental Shelf (UKCS)  
Following Phase 3 of the European Emissions  
Trading Scheme (EU ETS)**

Professor Alexander G. Kemp and  
Linda Stephen

August, 2010

**DEPARTMENT OF ECONOMICS**

## **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 CO<sub>2</sub> 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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**Taxation and Total Government Take from  
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# **Taxation and Total Government Take from the UK Continental Shelf (UKC) Following Phase 3 of the European Emissions Trading Scheme (EU ETS)**

Professor Alexander G. Kemp  
and  
Linda Stephen

## **1. Introduction**

The European Emissions Trading Scheme (EU ETS) applies not only to activities in the UK mainland but to the UK Continental Shelf (UKCS), and the changes to the arrangements from the start of Phase III in 2013 will have significant effects on the industry. From that date generators of electricity will have to purchase at auction CO<sub>2</sub> allowances necessary to cover all the emissions relating to power generation. Further, with respect to CO<sub>2</sub> emissions from other activities such as those relating to mechanical power and those emanating from gas flaring, the proposals are that free allowances are to be reduced linearly from 80% of the relevant allocation (i.e. excluding power generation) in 2013 to 0% in 2027.

From the viewpoint of the economic impact on investors in the UKCS the requirement to purchase CO<sub>2</sub> allowances is akin to a tax or an extra operating cost. This can lead to an acceleration of the timing of the date of cessation of production (COP). It could also result in fields which would otherwise be developed remaining undeveloped. There would be a loss of oil and gas production from the UKCS and a consequent need for further imports, quite possibly from countries where no attempts were being made to reduce CO<sub>2</sub> emissions. This raises the CO<sub>2</sub> leakage issue.



In this paper the effects of the arrangements proposed for Phase III of the EU ETS and beyond to 2040 are modelled under a variety of assumptions. The emphasis is on elucidating the likely effects on (1) direct costs to licensees, (2) (cumulative) production, (3) changes in overall operating costs, and (4) new field investment. The wide variety of plausible outcomes has necessitated the employment of a substantial number of scenarios to produce a worthwhile understanding of the likely effects and the key sensitivities determining the outcomes.

## **2. Methodology and Data**

The projections of production and expenditures in the absence of Phase III of the EU ETS have been made through the use of financial simulation modelling, including the use of the Monte Carlo technique, informed by a large, recently-updated, field database validated by the relevant operators. The field database incorporates key, best estimate information on production, and investment, operating and decommissioning expenditures. These refer to over 320 sanctioned fields, 159 incremental projects relating to these fields, 29 probable fields, and 28 possible fields. These latter are as yet unsanctioned but are currently being examined for development. An additional database contains 251 fields defined as being in the category of technical reserves. Summary data on reserves (oil/gas) and block locations are available for these. They are not currently being examined for development by licensees.

Monte Carlo modelling was employed to estimate the possible numbers of new discoveries in the period to 2035. The modelling incorporated assumptions based on recent trends relating to exploration effort, success rates, sizes, and types (oil, gas, condensate) of discovery. A moving average of the behaviour of

these variables over the past 5 years was calculated separately for 6 areas of the UKCS (Southern North Sea, (SNS), Central North Sea (CNS), Moray Firth (MF), Northern North Sea (NNS), West of Scotland (WOS), and Irish Sea (IS)), and the results employed for use in the Monte Carlo analysis. Because of the very limited data for WOS and IS over the period judgemental assumptions on success rates and average sizes of discoveries were made for the modelling.

It is postulated that the exploration effort depends substantially on a combination of (a) the expected success rate, (b) the likely size of discovery, and (c) oil/gas prices. In the present study 3 future oil/gas price scenarios were employed as follows:

<b>Table 1</b>		
<b>Future Oil and Gas Price Scenarios</b>		
	Oil Price (real) \$/bbl	Gas Price (real) pence/therm
High	80	70
Medium	60	50
Low	45	30

The postulated numbers of annual exploration wells drilled for the whole of the UKCS are as follows for 2009, 2030, and 2035:

<b>Table 2</b>			
<b>Exploration Wells Drilled</b>			
	2010	2030	2035
High	38	30	28
Medium	32	25	23
Low	25	20	19

The annual numbers are modelled to decline in a broadly linear fashion over the period.

It is postulated that success rates depend substantially on a combination of (a) recent experience, and (b) size of the effort. It is further suggested that higher effort is associated with more discoveries but with lower success rates compared to reduced levels of effort. This reflects the view that low levels of effort will be concentrated on the lowest risk prospects, and thus that higher effort involves the acceptance of higher risk. For the UKCS as a whole 3 success rates were postulated as follows with the medium one reflecting the average over the past 5 years.

<b>Table 3</b>	
<b>Success Rates for UKCS</b>	
Medium effort/Medium success rate	= 26%
High effort/Low success rate	= 24%
Low effort/High success rate	= 28%

It should be noted that success rates have varied considerably across sectors of the UKCS. Thus in the CNS and SNS the averages have exceeded 30% while in the other sectors they have been well below the average for the whole province. It is assumed that technological progress will maintain these success rates over the time period.

The mean sizes of discoveries made in the historic period for each of the 6 regions were calculated. They are shown in Table 4. It was then assumed that the mean size of discovery would decrease in line with recent historic experience. Such decline rates are quite modest.

Table 4	
Mean Discovery Size MMboe	
<b>SNS</b>	<b>9</b>
<b>CNS</b>	<b>25</b>
<b>NNS</b>	<b>25</b>
<b>MF</b>	<b>20</b>
<b>WoS</b>	<b>81</b>
<b>IS</b>	<b>5</b>

For purposes of the Monte Carlo modelling of new discoveries the SD was set at 50% of the mean value. In line with historic experience the size distribution of discoveries was taken to be lognormal.

Using the above information the Monte Carlo technique was employed to project discoveries in the 6 regions to 2035. For the whole period the total numbers of discoveries for the whole of the UKCS were are follows:

Table 5	
Total Number of Discoveries to 2035	
High effort/Low success rate	210
Medium Effort/Medium Success Rate	194
Low effort/High success rate	167

For each region the average development costs (per boe) of fields in the probable and possible categories were calculated. These reflect substantial cost inflation over the last few years. Investment costs per boe depend on several factors including not only the absolute costs in different operating conditions

(such as water depth) but on the size of the fields. Thus in the SNS development costs were found to average nearly \$14 per boe because of the small size of fields. In the CNS they averaged nearly \$19/boe and in the NNS they averaged over \$17/boe. Operating costs over the lifetime of the fields were also calculated. The averages were found to be \$8.5/boe in the SNS, over \$11/boe in the CNS and \$12.4/boe in the NNS. Total lifetime field costs (including decommissioning but excluding E and A costs) were found to average over \$23 per boe in the SNS, over \$32 per boe in the CNS, and \$31 per boe in the NNS.

Using these as the mean values the Monte Carlo technique was employed to calculate the development costs of new discoveries. A normal distribution with a SD = 20% of the mean value was employed. For new discoveries annual operating costs were modelled as a percentage of accumulated development costs. This percentage varied according to field size. It was taken to increase as the size of the field was reduced reflecting the presence of economies of scale in the exploitation costs. Thus the field lifetime costs in small fields could become very high on a per boe basis.

With respect to fields in the category of technical reserves it was recognised that many have remained undeveloped for a long time, and so the mean development costs in each of the basins was set at \$5/boe higher than the mean for the new discoveries in that basin. Thus for the CNS the mean development costs are over \$24/boe and in NNS over \$22/boe. For purposes of Monte Carlo modelling a normal distribution of the recoverable reserves for each field with a SD = 50% of the mean was assumed. With respect to development costs the distribution was assumed to be normal with a SD = 20% of the mean value.

The annual numbers of new field developments were assumed to be constrained by the physical and financial capacity of the industry. This subject is currently very pertinent in the UKCS. The ceilings were assumed to be linked to the oil/gas price scenarios with maxima of 20, 17, and 13 respectively under the High, Medium, and Low Price Cases. These constraints do not apply to incremental projects which are additional to new field developments.

A noteworthy feature of the 159 incremental projects in the database validated by operators is the expectation that the great majority will be executed over the next 3 or 4 years. It is virtually certain that in the medium and longer-term many further incremental projects will be designed and executed. They are just not yet at the serious planning stage. Such projects can be expected to be linked not only to currently sanctioned fields, but also to those presently classified as in the categories of probable, possible, technical reserves, and future discoveries.

Accordingly, estimates were made of the potential extra incremental projects from all these sources. Examination of the numbers of such projects and their key characteristics (reserves and costs) being examined by operators over the past 5 years indicated a decline rate in the volumes. On the basis of this, and from a base of the information of the key characteristics of the projects in the database, it was felt that, with a decline rate reflecting historic experience, further portfolios of incremental projects could reasonably be expected. As noted above such future projects would be spread over all categories of host fields. Their sizes and costs reflect recent trends.

With respect to investment decision making and project screening criteria oil companies (even medium-sized and smaller ones) currently assess their opportunities in the UKCS in comparison to those available in other parts of the

world. Capital is allocated on this basis with the UKCS having to compete for funds against the opportunities in other provinces. A problem with the growing maturity of the UKCS is the relatively small average field size and the high unit costs. Recent mean discovery sizes are shown in Table 4 but, given the lognormal distribution, the most likely sizes are below these averages. It follows that the materiality of returns, expressed in terms of net present values (NPVs), is quite low in relation to those in prospect in other provinces (such as offshore Angola, for example). Oil companies frequently rank investment projects according to the NPV/I ratio. Accordingly, this screening method has been adopted in the present study. Specifically, the numerator is the post-tax NPV at 10% discount rate in real terms and the denominator is pre-tax field investment at 10% discount rate in real terms. This differs from the textbook version which states that I should be in post-tax terms because the expenditures are tax deductible through allowances. Oil companies maintain that they allocate capital funds on a pre-tax basis, and this is employed here as the purpose is to reflect realistically the decision-making process. The development project goes ahead when the NPV/I ratio as defined above in real terms  $\geq 0.3$ . The 10% real discount rate reflects the weighted average cost of capital to the investor. The modelling has been undertaken under the current tax system. This includes the field allowances introduced in the Finance Act 2009.

In the light of experience over the past few years some rephrasing of the timing of the commencement dates of new field developments and incremental projects from those projected by operators was undertaken related to the probability that the project would go ahead. Where the operator indicated that a new field development had a probability  $\geq 80\%$  of going ahead the date was left unchanged. Where the probability  $\geq 60\% < 80\%$  the commencement date was slipped by 1 year. Where the probability  $\geq 40\% < 60\%$  the date was slipped by 2 years. Where the probability was  $\geq 20\% < 40\%$  the date was slipped by 3

years, and where the probability was  $< 20\%$  it was slipped by 4 years. If an incremental project had a probability of proceeding  $\geq 50\%$  the date was retained but where it was  $< 50\%$  it was slipped by 1 year.

Within the above framework modelling and data assumptions were made to estimate the effects on activity of the proposed EU ETS arrangements from the start of Phase III onwards. Information on emissions is available from the series of EEMS publications, including those relating to both combustion and flaring at a facility level. Data on allocations of allowances to installations are available from the National Allocation Plans (including for Phases II and III). Unfortunately the data on both emissions and allocations relate to installations rather than fields. Accordingly, by inspection and using knowledge of any relationships discovered, fields were linked to installations where these were prevalent. Emissions and allowances relating to communal installations such as terminals were shared with the linked fields on a unit of production basis. This proved to be relatively straightforward with respect to sanctioned fields. With respect to incremental projects relating to sanctioned fields these were linked where justified by inspection, and the allowances arising from the presence of the incremental project were attributed to the host field. The effects of the EU ETS scheme were calculated on the combined host plus incremental project. This procedure also applies to future incremental projects.

From the data over the past few years it is clear that emissions do not follow production in a field. It was assumed in the present study that emissions would remain constant throughout the life of a field.

With respect to discovered but as yet undeveloped fields, namely those defined as “probable”, “possible” and “technical reserves” a method was required to estimate their likely emissions. From the information available on emissions



relating to existing sanctioned installations/fields and the allocations of allowances made to them, plus the information on the change in allowances allocated following the linking of a new project/field to an existing installation a pattern was discerned showing the relationship between average emissions and average peak production per day. On the basis of this relationship estimates were made of the emissions for the fields in the categories of “probable”, “possible”, and “technical reserves”. It was decided not to attempt to make estimates for fields in the category of future discoveries because the areas of uncertainty were felt to be too great. (The initial modelling of future activity levels had to include new discoveries, however, to distinguish the numbers and phasing of fields in the category of technical reserves). The definition of the coverage of the study as far as CO<sub>2</sub> emissions is concerned is thus all sanctioned fields, all current and future incremental projects, and all currently discovered but undeveloped fields. Of course, only those which pass the investment hurdles discussed above in the absence of the Phase III arrangements are included in the base case against which the effects of the scheme are to be measured.

From inspection of the data on the composition of emissions there was found to be a wide range in the proportion emanating from electricity generation. It was also unclear how this would change through time. Accordingly, for purposes of illuminating the possible future impact of the Phase III proposals, it was decided to model the effect of 3 scenarios. The first is where full allowances are given to cover 80% of the total allocation in 2013, falling linearly to 0% in 2027. This would only be possible with zero electricity generation, and this scenario is primarily regarded as a case to compare with others where tougher obligations are imposed. For convenience it is termed here the “maximum allowance case”. The second case is where 50% of the emissions relate to electricity generation and thus all the allowances required to cover the related emissions have to be

bought at auction. Free allowances for the remaining 50% emissions are available to the extent of 80% in 2013 falling linearly to 0% in 2027. The third case is where all allowances have to be bought at auction from 2013 onwards. In all cases it is assumed that allowances will equal emissions and thus that penalties are avoided.

The imposition of obligations to purchase CO<sub>2</sub> allowances at auction has an effect akin to a tax. One basic issue is the incidence of the obligation to purchase CO<sub>2</sub> allowances. This will differ according to the ability of the organization on whom the obligation is placed to pass on the burden to others. In the case of electricity generation in the UK it is likely that in the electricity market itself UK generators will to a large extent pass on the burden to electricity consumers. Electricity is not widely traded internationally and in the case of the EU trade is likely to be among partner countries. Electricity prices are likely to increase following the start of Phase III to an extent determined by the price elasticities of demand and supply. In the North Sea, however, the situation is quite different. The oil market is a world one, and so increasingly is the gas market. When producers of North Sea oil and gas are faced with increased costs for electricity generation due to the obligation to purchase CO<sub>2</sub> allowances they cannot pass on the costs in higher oil and gas prices because in the world market there are plenty competing producers outside the EU ETS who are not faced with such increased costs. Thus the impact and incidence of the Phase III obligations will be on the North Sea producers. Similarly, when allowances have to be purchased for purposes other than electricity generation the producers on whom the burden is placed will not be able to pass on the cost to oil/gas consumers. The incidence will continue to be on the producers.

Within this conceptual framework the effects of the Phase 3 proposals were examined within the modelling framework described above. With respect to

production there are 2 distinct effects. Purchases of allowances increase operating costs, and the result will be an acceleration of the timing of the economic limit of the field from the producer's viewpoint. The effect is akin to that of a royalty or production tax. The second effect is on the investment decision in new fields and/or incremental projects. The increased operating costs may render uneconomic the returns to a new investment. The modelling calculates the loss of the investment outlays and the reduced operating costs emanating from accelerated cessation of production (COP). The total field operating costs are, of course, greatly increased by the need to purchase CO<sub>2</sub> allowances. The model calculates these and the consequent net change in field lifetime operating costs after taking account of the reduction from the acceleration of the COP dates. The various effects on activity were reported in a recent paper.<sup>1</sup> In this paper the effects on total tax revenues and total Government take from all the discovered fields and projects discussed above are calculated. The effects of the deductibility of the costs of purchasing CO<sub>2</sub> allowances are highlighted. Tax takes and total Government takes on the various categories of fields and projects are also calculated.

### **3. Results**

The results are shown in relation to the sum of sanctioned fields, incremental projects (current and future), probable fields, possible fields, and technical reserves, which pass the economic hurdles.

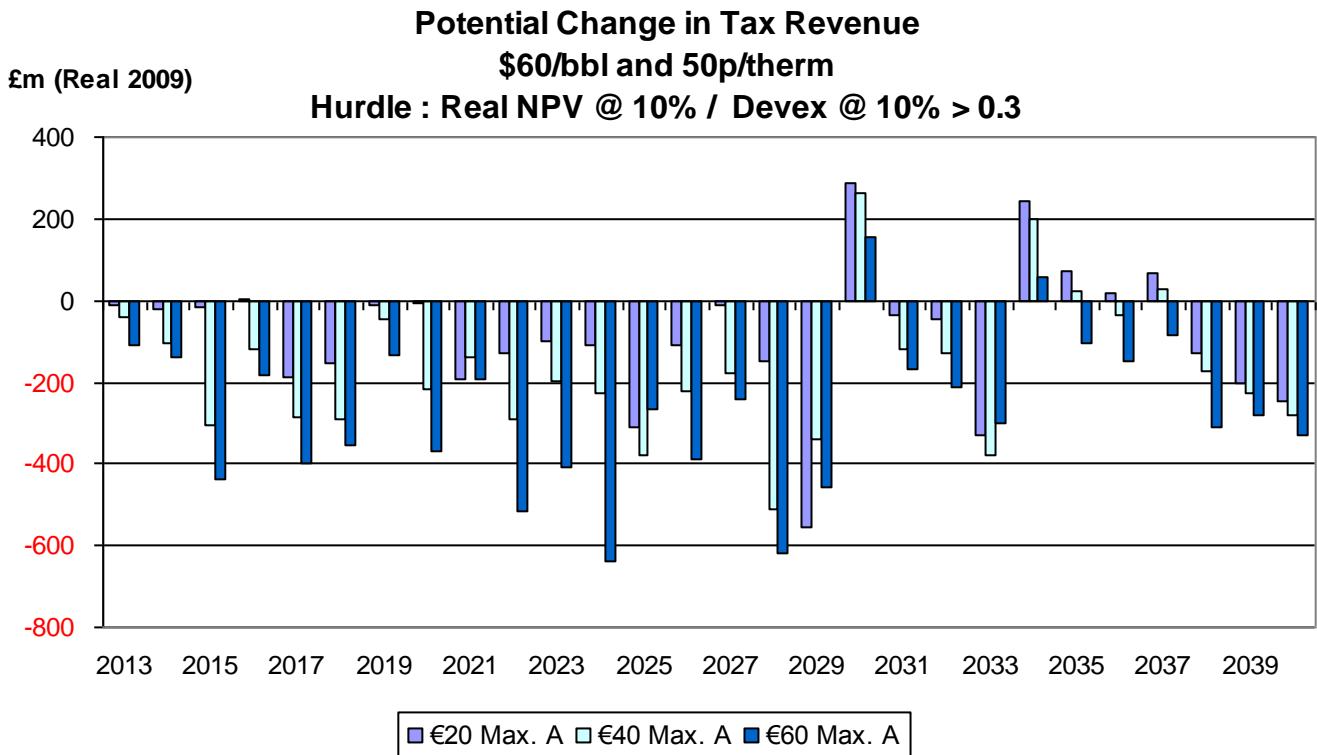
#### **(a) Maximum Free Allowances**

##### **i) Potential Change in Tax Revenue**

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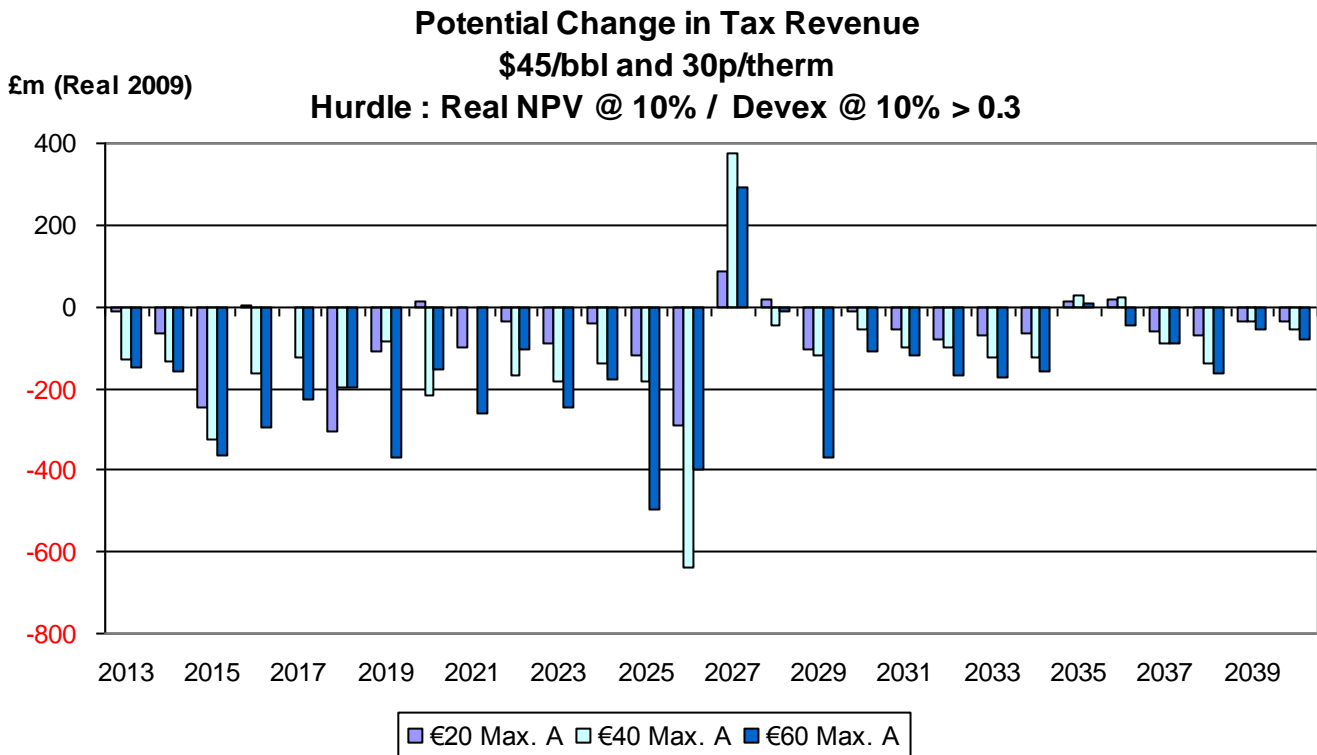
<sup>1</sup> See A G Kemp and L Stephen, North Sea Study Occasional Paper No. 115, The Effects of the European Emissions Trading Scheme (EU ETS) on Activity in the UK Continental Shelf (UKCS) and CO<sub>2</sub> Leakage, University of Aberdeen Department of Economics, April 2010.

Chart 1



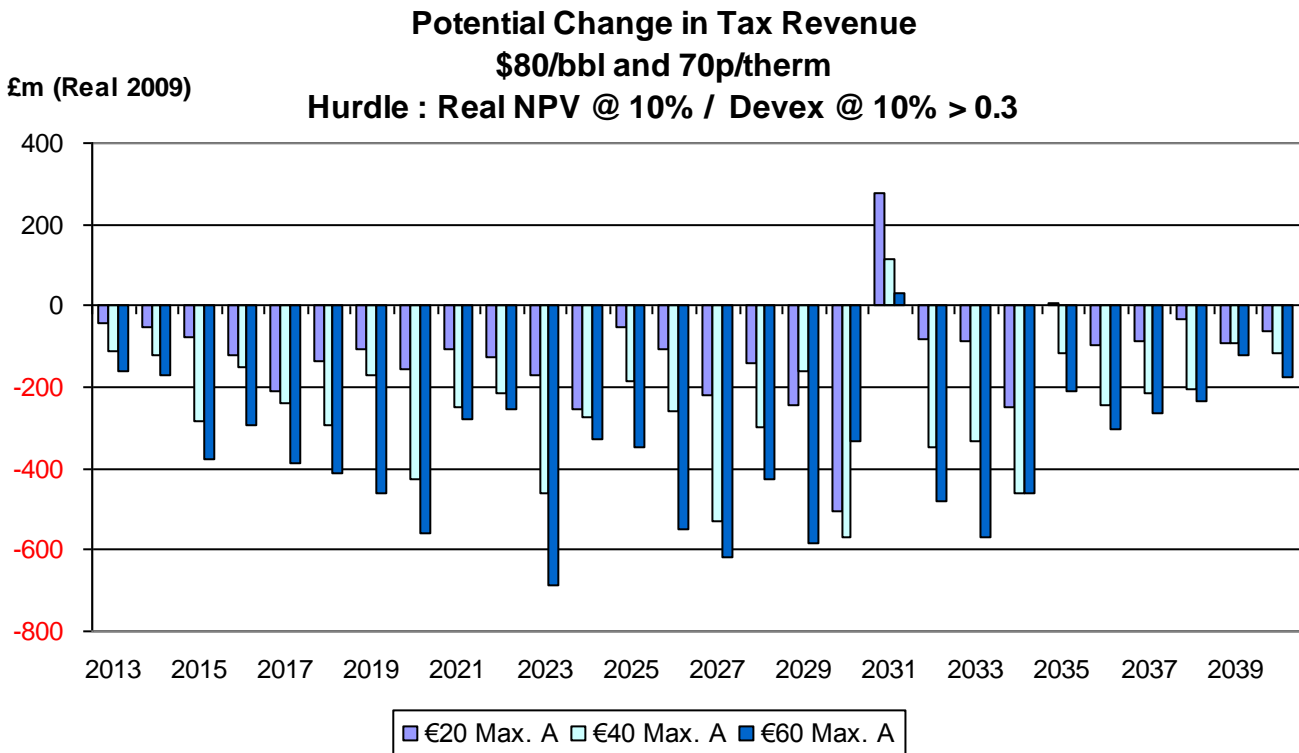
In Chart 1 it is seen that at the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, real tax revenue could be reduced by £188m in 2017, £191m in 2021, £311m in 2025 and £555m in 2029. The positive tax changes reflect the fact that decommissioning allowances have been given in earlier years and this signifies a loss of production. The cumulative loss in tax revenue could be £412m by 2020, £1792m by 2030 and £2385m by 2040. With a CO<sub>2</sub> price of €40/t, real tax revenue could be reduced by £291m in 2018, £290m in 2022, £379m in 2025 and £512m in 2028. The cumulative loss in tax revenue could be £1408m by 2020, £3632m by 2030 and £4724m by 2040. With a CO<sub>2</sub> price of €60/t, real tax revenue could be reduced by £401m in 2017, £516m in 2022, £639m in 2024 and £620m in 2028. The cumulative loss in tax revenue could be £2118m by 2020, £5697m by 2030 and £7584m by 2040.

Chart 2



In Chart 2 it is seen that at the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, real tax revenue could be reduced by £308m in 2018, £102m in 2021 and £289m in 2026. The cumulative loss in tax revenue could be £719m by 2020, £1412m by 2030 and £1862m by 2040. With a CO<sub>2</sub> price of €40/t, real tax revenue could be reduced by £322m in 2015, £198m in 2018, £218m in 2020 and £639m in 2026. The cumulative loss in tax revenue could be £1373m by 2020, £2533m by 2030 and £3249m by 2040. With a CO<sub>2</sub> price of €60/t, real tax revenue could be reduced by £365m in 2015, £369m in 2019, £497m in 2025 and £400m in 2026. The cumulative loss in tax revenue could be £1918m by 2020, £3808m by 2030 and £4849m by 2040.

Chart 3

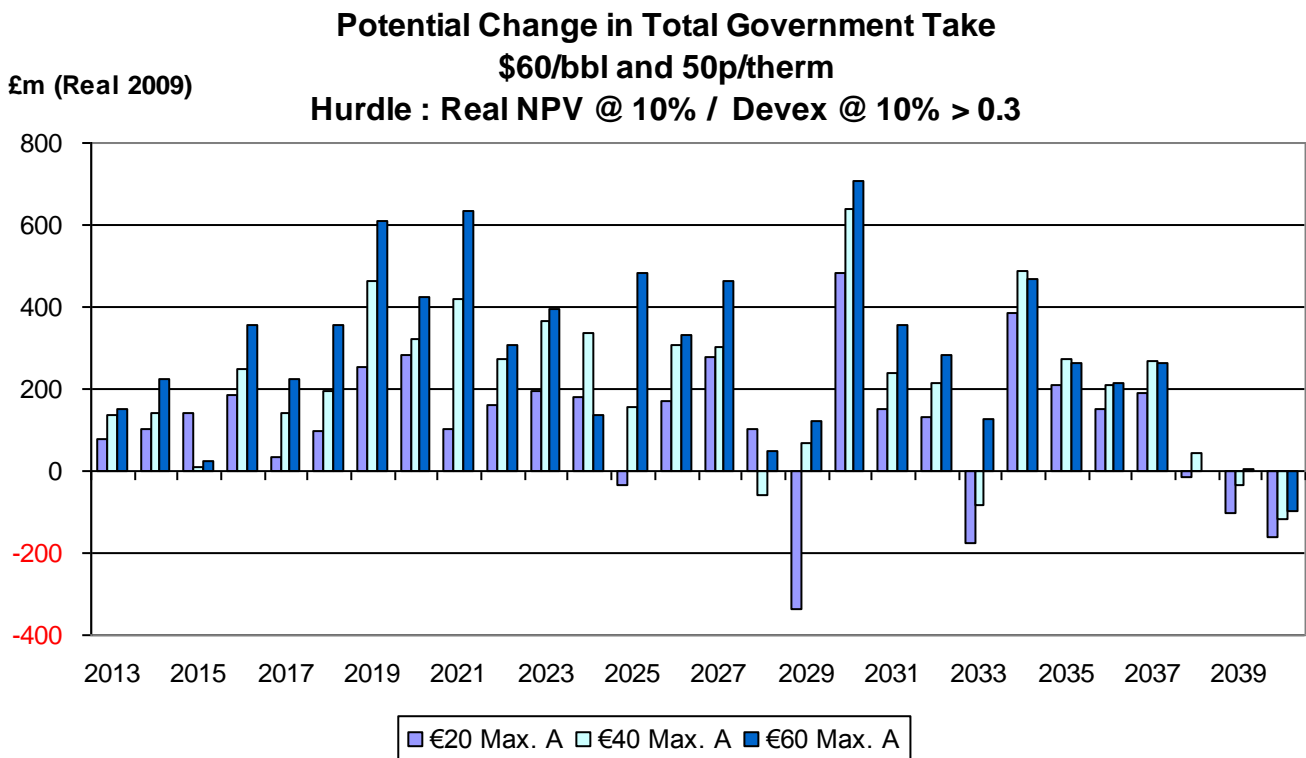


In Chart 3 it is seen that at the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, real tax revenue could be reduced by £212m in 2017, £154m in 2020, £255m in 2024 and £503m in 2030. The cumulative loss in tax revenue could be £904m by 2020, £2838m by 2030 and £3344m by 2040. With a CO<sub>2</sub> price of €40/t, real tax revenue could be reduced by £284m in 2015, £427m in 2020, £530m in 2027 and £568m in 2030. The cumulative loss in tax revenue could be £1794m by 2020, £4998m by 2030 and £7008m by 2040. With a CO<sub>2</sub> price of €60/t, real tax revenue could be reduced by £378m in 2015, £561m in 2020, £685m in 2023, £617m in 2027 and £582m in 2029. The cumulative loss in tax revenue could be £2823m by 2020, £7231m by 2030 and £10012m by 2040.

ii) Potential Change in Total Government Take

As discussed above potential government take is tax revenue plus the income that arises from the auction of allowances for CO<sub>2</sub> emissions.

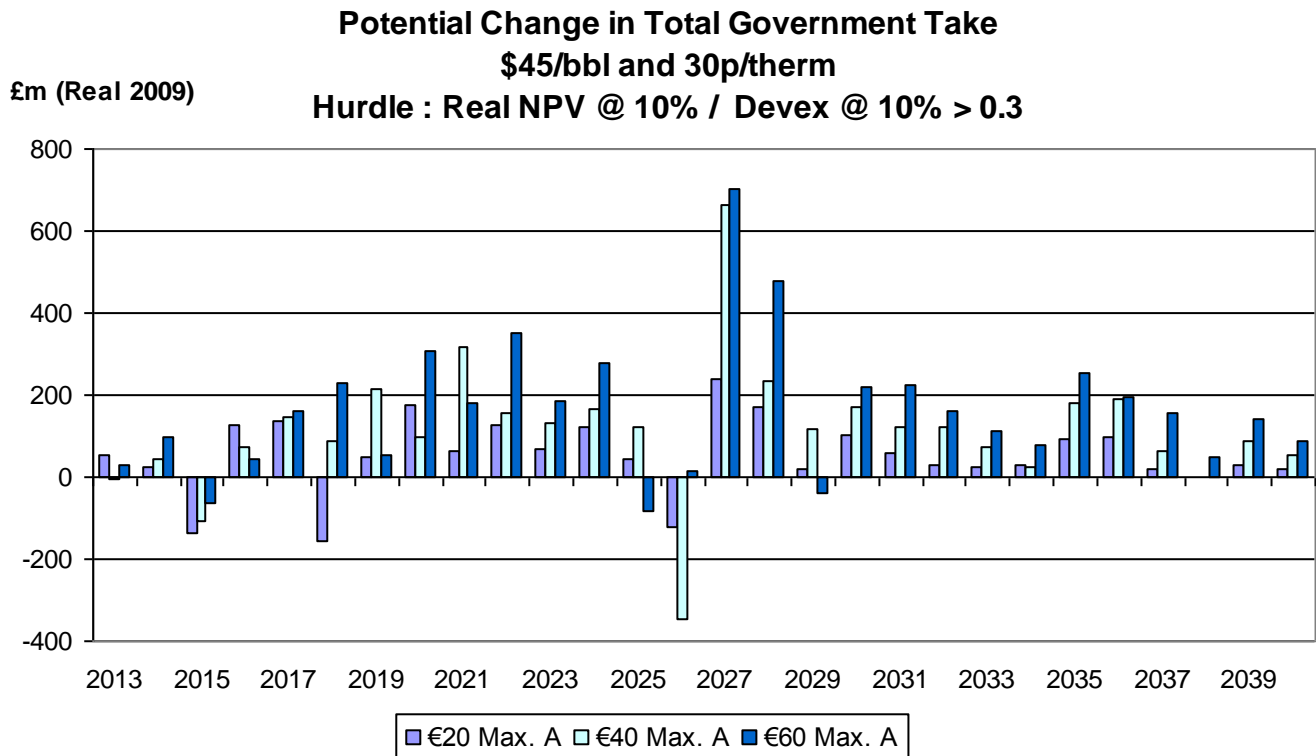
Chart 4



In Chart 4 it is seen that at the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the real total government take could be increased by £185m in 2016, £283m in 2020, £277m in 2027, £482m in 2030 and £387m in 2034. The cumulative change in total government take could be £1175m by 2020, £2478m by 2030 and £3242m by 2040. With a CO<sub>2</sub> price of €40/t, the real total government take could be increased by £247m in 2016, £465m in 2019, £365m in 2023, £640m in 2030 and £488m in 2034. The cumulative change in total government take could be £1660m by 2020, £4468m by 2030 and £5966m by 2040. With a CO<sub>2</sub> price of €60/t, the real total

government take could be increased by £354m in 2016, £607m in 2019, £482m in 2025, £705m in 2030 and £467m in 2034. The cumulative change in total government take could be £2370m by 2020, £6002m by 2030 and £7878m by 2040.

Chart 5

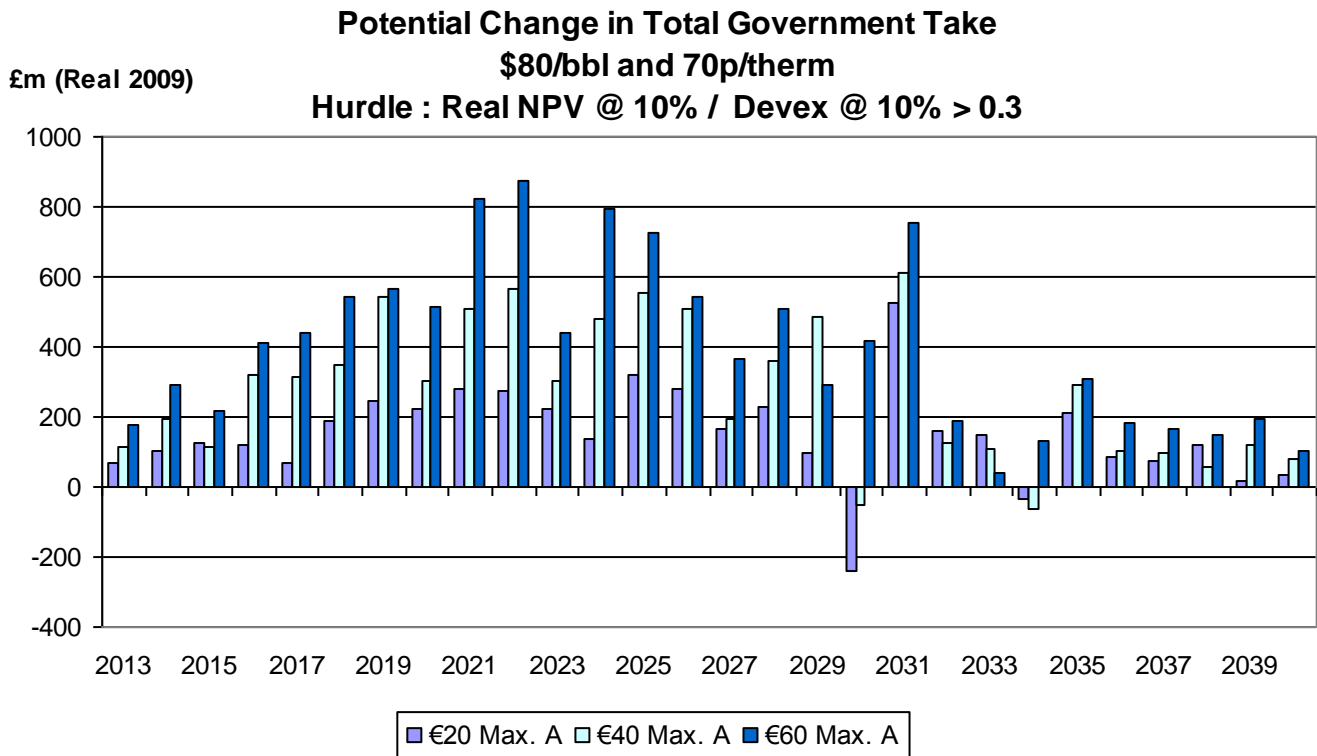


In Chart 5 it is seen that at the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the real total government take could be increased by £136m in 2017, £177m in 2020, £241m in 2027 and £103m in 2030. The cumulative change in total government take could be £272m by 2020, £1111m by 2030 and £1510m by 2040. With a CO<sub>2</sub> price of €40/t, the real total government take could be increased by £145m in 2017, £316m in 2021, £661m in 2027 and £188m in 2036. The cumulative change in total government take could be £551m by 2020, £2284m by 2030 and £3202m by 2040. With a CO<sub>2</sub> price of €60/t, the real total government take could be



increased by £231m in 2018, £349m in 2022, £704m in 2027 and £253m in 2035. The cumulative change in total government take could be £864m by 2020, £3156m by 2030 and £4609m by 2040.

Chart 6



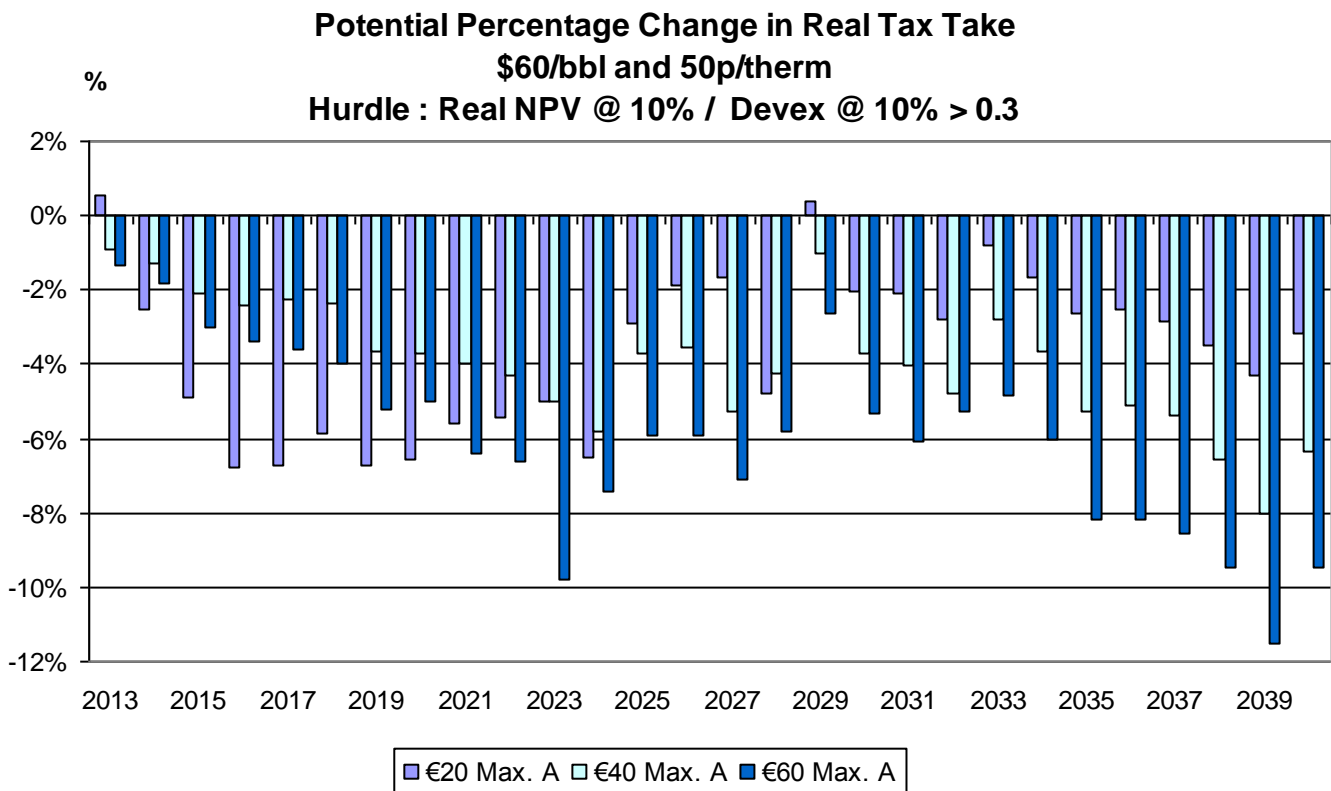
In Chart 6 it is seen that at the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the real total government take could be increased by £187m in 2018, £279m in 2021, £322m in 2025 and £212m in 2035. The cumulative change in total government take could be £1144m by 2020, £2913m by 2030 and £4255m by 2040. With a CO<sub>2</sub> price of €40/t, the real total government take could be increased by £318m in 2016, £542m in 2019, £563m in 2022, £556m in 2025 and £613m in 2031. The cumulative change in total government take could be £2248m by 2020, £6163m by 2030 and £7699m by 2040. With a CO<sub>2</sub> price of €60/t, the real total government take could be increased by £568m in 2019, £877m in 2022, £794m in 2024, £754m

in 2031 and £311m in 2035. The cumulative change in total government take could be £3162m by 2020, £8947m by 2030 and £11168m by 2040.

iii) Percentage Change in Tax Revenue

The real percentage tax take is calculated here as (aggregate real tax)/(aggregate real pre-tax NPV).

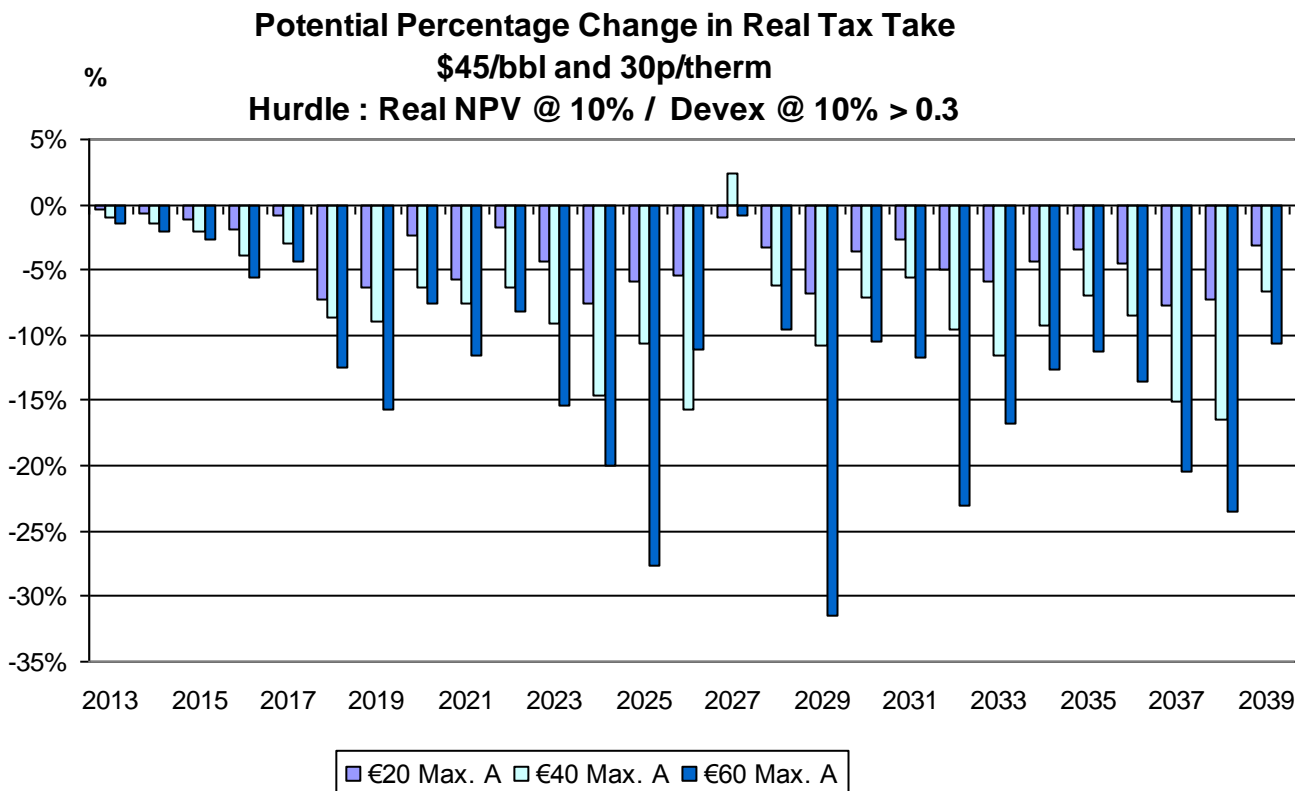
Chart 7



In Chart 7 it is seen that at the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real tax take is reduced by 6.79% in 2016, 6.56%, in 2020, 2.89%, 2.81% in 2032 and 4.3% in 2039. Over the period to 2040, the average change in the real tax take is a decrease of 3.62%. With a CO<sub>2</sub> price of €40/t, the percentage real tax take could be reduced by 2.4% in 2016, 3.97% in 2021, 5.81% in 2024, 4.27% in 2028 and 8.04% in 2039. Over the period to 2040, the average change in the

real tax take is a decrease of 3.97%. With a CO<sub>2</sub> price of €60/t, the percentage real tax take could be reduced by 5.23% in 2019, 9.78% in 2023, 7.08% in 2027, 8.2% in 2035 and 11.49% in 2039. Over the period to 2040, the average change in the real tax take is a decrease of 5.99%.

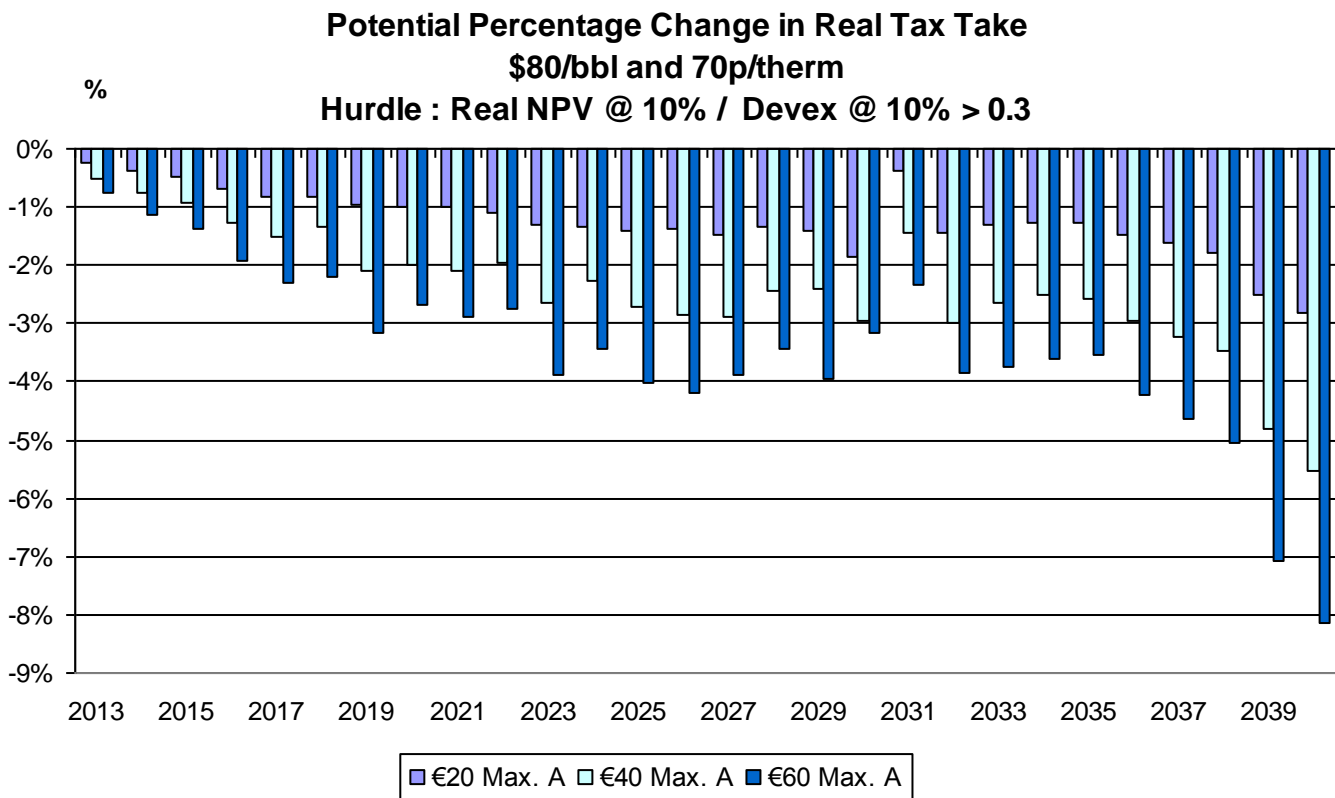
Chart 8



In Chart 8 it is seen that at the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real tax take could be reduced by 7.33% in 2018, 7.61%, in 2024, 6.85%, in 2029, 5.86% in 2033 and 7.69% in 2037. Over the period to 2040, the average change in the real tax take is a decrease of 4.07%. With a CO<sub>2</sub> price of €40/t, the percentage real tax take could be reduced by 8.92% in 2019, 14.56% in 2024, 10.73% in 2029, 11.5% in 2033 and 16.43% 2038. Over the period to 2040, the average change in the real tax take is a decrease of 7.82%. With a CO<sub>2</sub> price of €60/t, the percentage real

tax take could be reduced by 15.66% in 2019, 27.71% in 2025, 31.5% in 2029, 23.01% in 2032 and 23.47% in 2038. Over the period to 2040, the average change in the real tax take is a decrease of 12.66%.

Chart 9



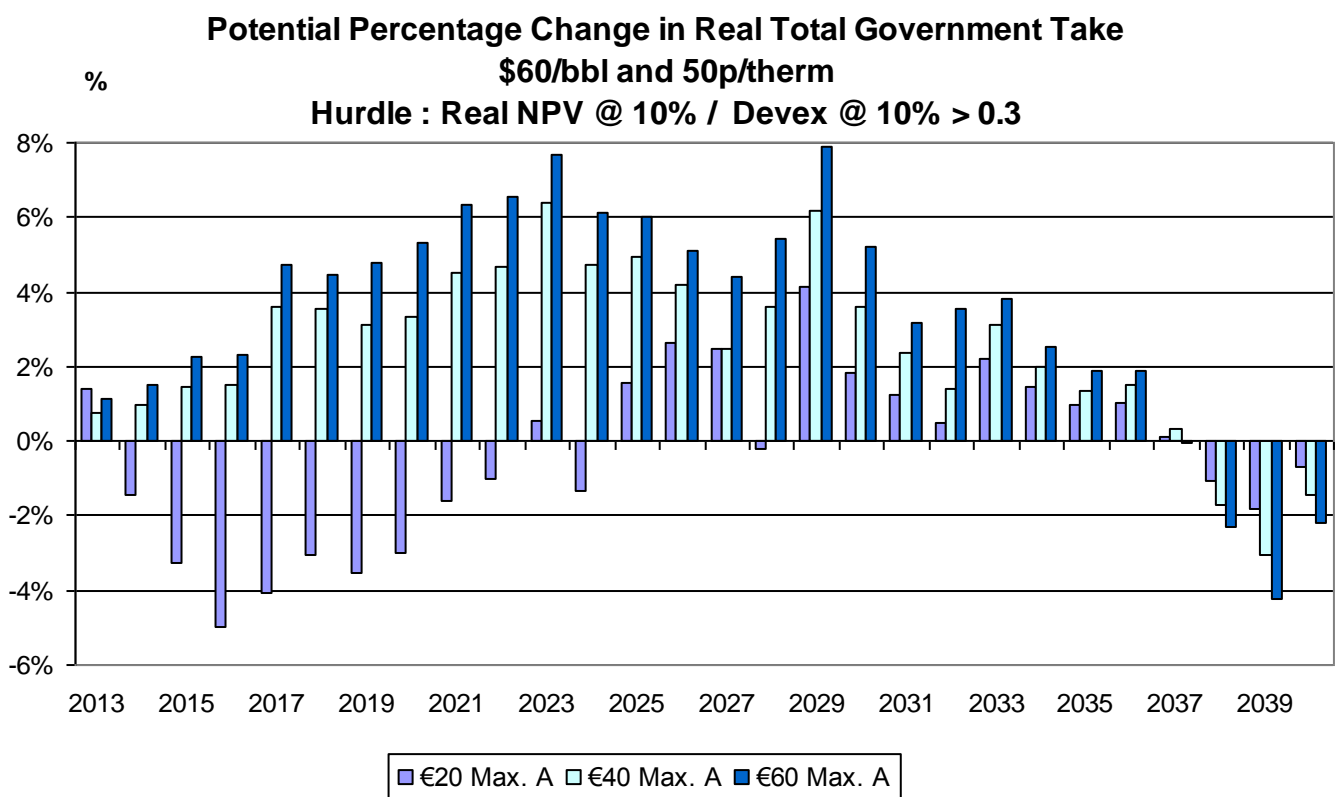
In Chart 9 it is seen that at the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real tax take could be reduced by 0.96% in 2019, 1.4%, in 2025, 1.87%, in 2030, 1.6% in 2037 and 2.8% in 2040. Over the period to 2040, the average change in the real tax take is a decrease of 1.24%. With a CO<sub>2</sub> price of €40/t, the percentage real tax take could be reduced by 1.53% in 2017, 2.1% in 2019, 2.64% in 2023, 2.9% in 2027 and 5.32% in 2040. Over the period to 2040, the average change in the real tax take is a decrease of 2.42%. With a CO<sub>2</sub> price of €60/t, the percentage real tax take could be reduced by 2.31% in 2017, 3.16% in 2019, 4.02% in

2026, 3.95% in 2029 and 8.15% in 2040. Over the period to 2040, the average change in the real tax take is a decrease of 3.48%.

iv) Percentage Change in Total Government Take

The percentage government take is defined here as the (aggregate real tax + aggregate real emission costs) / (aggregate real pre-tax NPV).

Chart 10



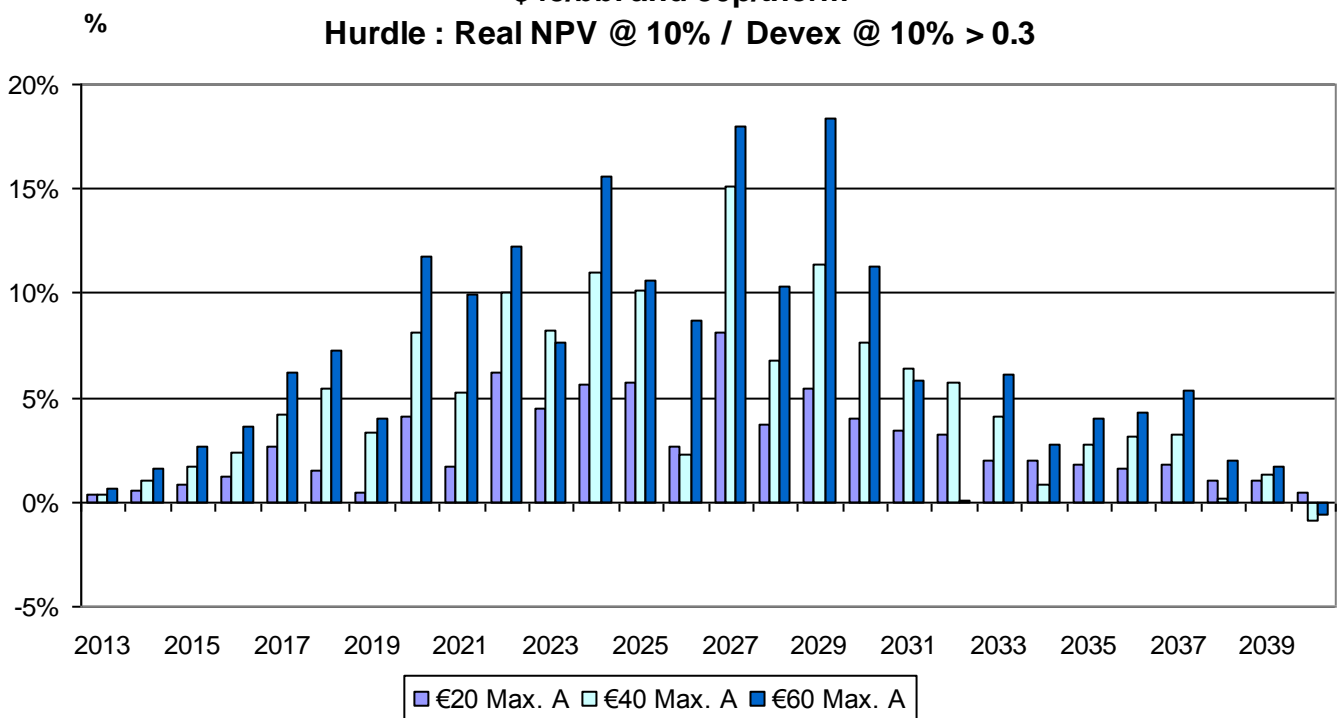
In Chart 10 it is seen that at the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real total government take could be 4.98% lower in 2016, 3.52% lower in 2019, 2.63% higher in 2026, 4.16% higher in 2029 and 2.2% higher in 2033. Over the period to 2040, the average change in real total government take is a decrease of 0.32%. With a CO<sub>2</sub> price of €40/t, the percentage real government take could

be 3.58% higher in 2017, 6.41% higher in 2023, 6.16% higher in 2029 and 3.11% higher in 2033. Over the period to 2040, the average change in real total government take is an increase of 2.48%. With a CO<sub>2</sub> price of €60/t, the percentage real government take could be 4.75% higher in 2017, 7.7% higher in 2023, 7.9% higher in 2029 and 3.839% higher in 2033. Over the period to 2040, the average change in real total government take is an increase of 3.41%.

Chart 11

**Potential Percentage Change in Real Total Government Take  
\$45/bbl and 30p/therm**

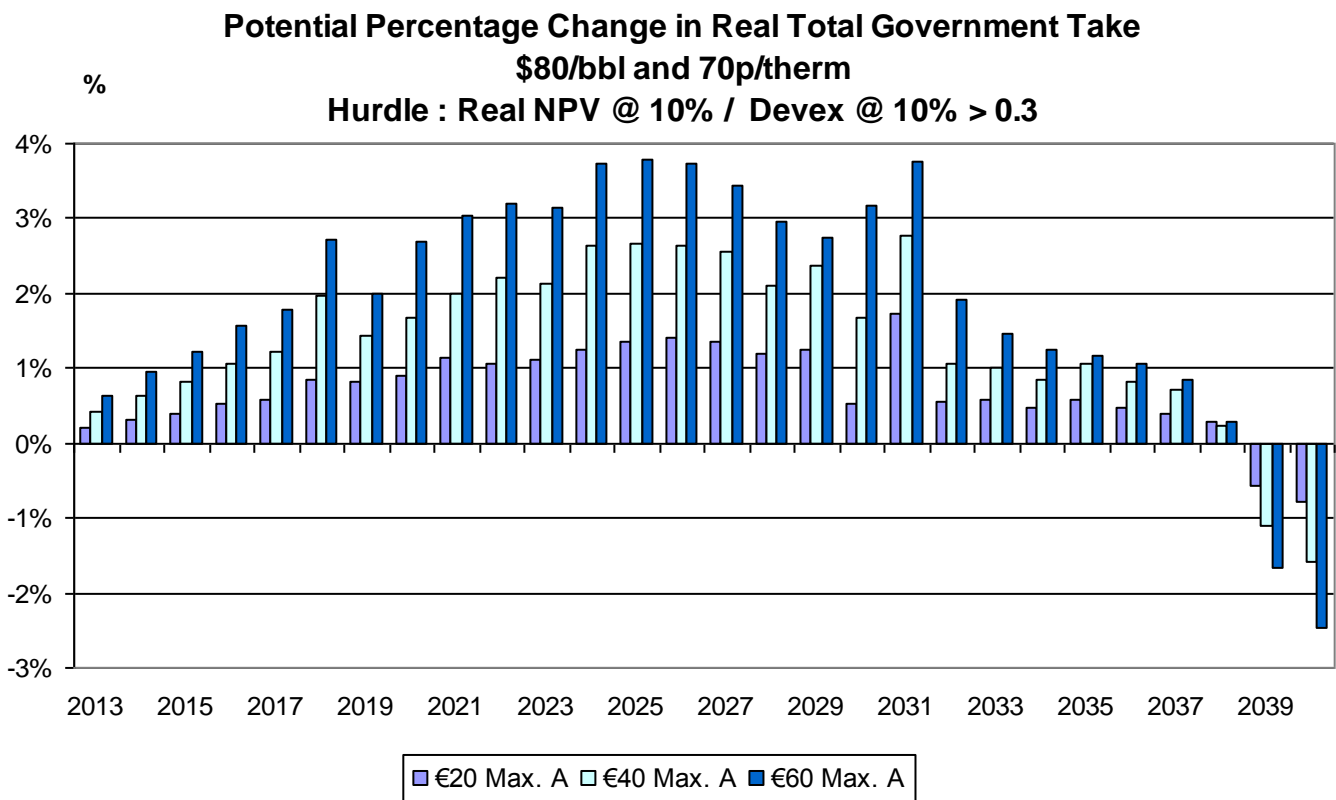
**Hurdle : Real NPV @ 10% / Devex @ 10% > 0.3**



In Chart 11 it is seen that at the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real total government take could be 4.13% higher in 2020, 6.24% higher in 2022, 8.17% higher in 2027, 5.42% in 2029 and 3.47% higher in 2031. Over the period to 2040, the average change in real total government take is an increase of 2.78%. With a CO<sub>2</sub> price of €40/t, the percentage real government take could be 5.46% higher in 2018,

10.04% higher in 2022, 11.03% higher in 2024 and 1142% higher in 2029. Over the period to 2040, the average change in real total government take is an increase of 5.05%. With a CO<sub>2</sub> price of €60/t, the percentage real government take could be 7.26% higher in 2018, 11.72% higher in 2020, 12.22% higher in 2022 and 18.34% higher in 2029. Over the period to 2040, the average change in real total government take is an increase of 6.85%.

Chart 12



In Chart 12 it is seen that at the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real total government take could be 0.84% higher in 2018, 1.41% higher in 2026, 1.73% higher in 2031 and 0.4% higher in 2037. Over the period to 2040, the average change in real total government take is an increase of 0.71%. With a CO<sub>2</sub> price of €40/t, the percentage real government take could be 1.97% higher in 2018, 2.21% higher

in 2022, 2.65% higher in 2025 and 2.77% higher in 2031. Over the period to 2040, the average change in real total government take is an increase of 1.36%. With a CO<sub>2</sub> price of €60/t, the percentage real government take could be 2.71% higher in 2018, 3.79% higher in 2025, and 3.76% higher in 2031. Over the period to 2040, the average change in real total government take is an increase of 1.93%.



v) Remaining Percentage Tax Takes (Sanctioned Fields and Incremental Projects)

The real remaining (from 2013) tax takes at 10% discount rate are shown against real remaining pre-tax NPVs at 10% for the sanctioned and incremental fields. By 2013 there are many sanctioned fields and incremental projects which are at the tail end of their lives or in the process of decommissioning and these results in the remaining NPV being negative.

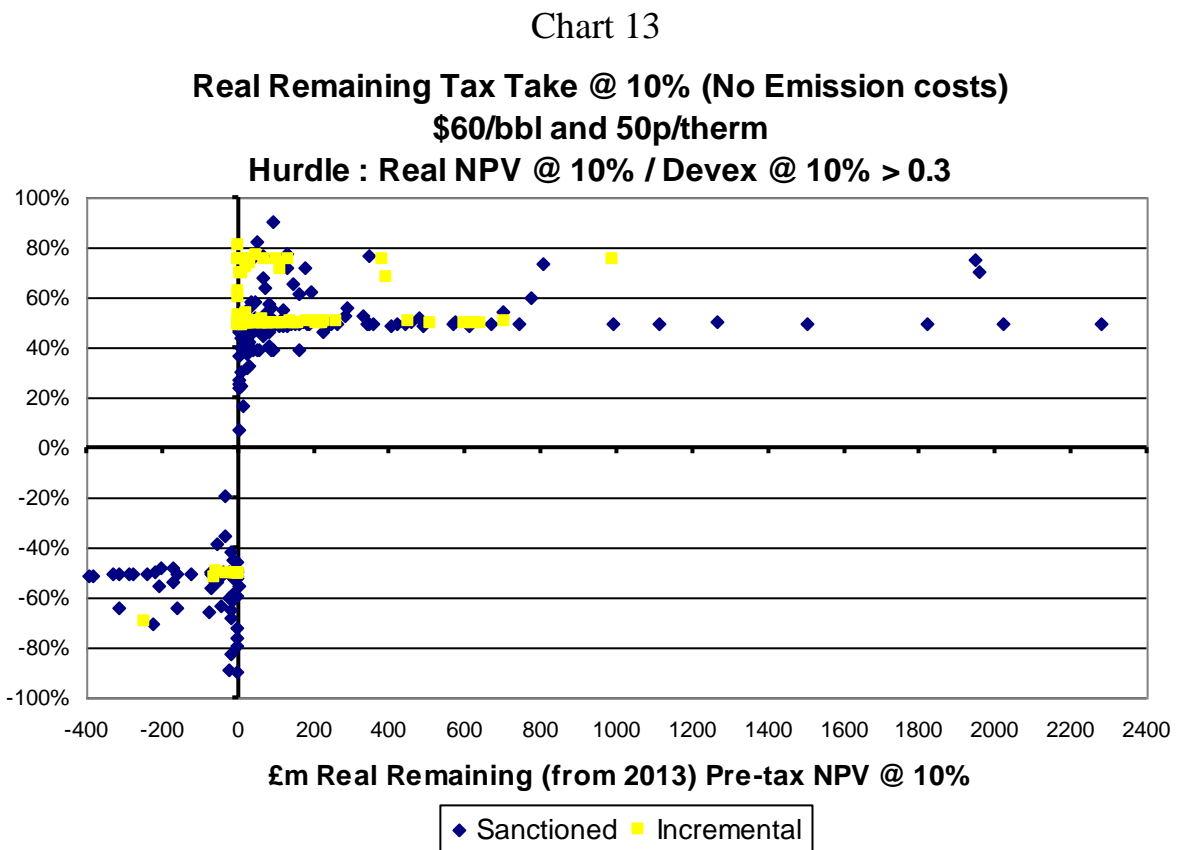


Chart 13 shows the real remaining percentage tax take discount rate 10% at the medium price for the scenario where there are no emission costs. The very high or very low remaining tax takes are generally associated with pre 1993 fields which are liable for PRT that are either at the tail end of production with large decommissioning costs or in the process of decommissioning. Some of the post 1993 sanctioned fields have a lifetime real tax take at 10% greater than 50% but

their remaining real tax takes are 50%. There are 78 sanctioned fields and 15 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 19 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 58 of the sanctioned fields and 12 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 50 sanctioned fields and 39 incremental projects which have a real remaining tax take at 10% of 60% or more and 144 of the sanctioned fields and 99 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 14

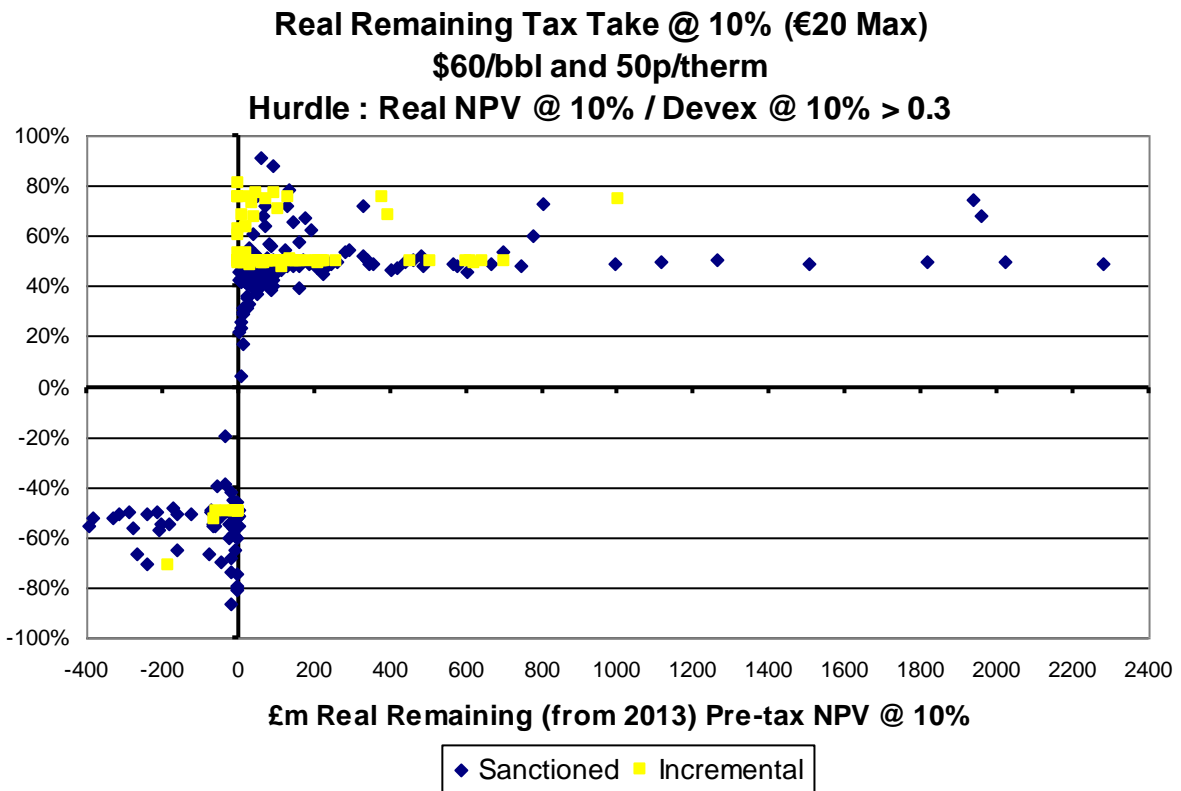


Chart 14 shows the real remaining percentage tax take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t. There are 79 sanctioned fields and 15 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 21 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 67 of the sanctioned fields and 11 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 39 sanctioned fields and 37 incremental projects which have a real remaining tax take at 10% of 60% or more and 143 of the sanctioned fields and 99 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 15

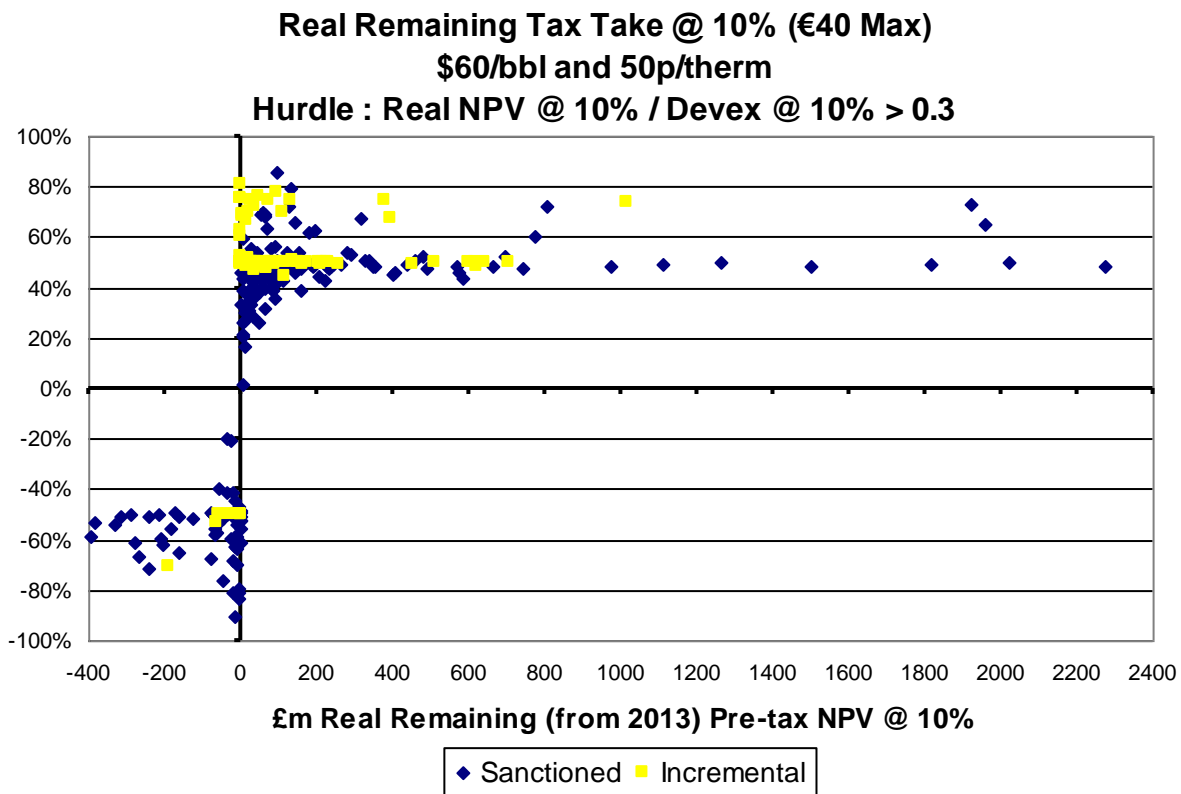


Chart 15 shows the real remaining percentage tax take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t. There are 79 sanctioned fields and 15 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 24 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 66 of the sanctioned fields and 11 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 36 sanctioned fields and 38 incremental projects which have a real remaining tax take at 10% of 60% or more and 132 of the sanctioned fields and 99 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 16

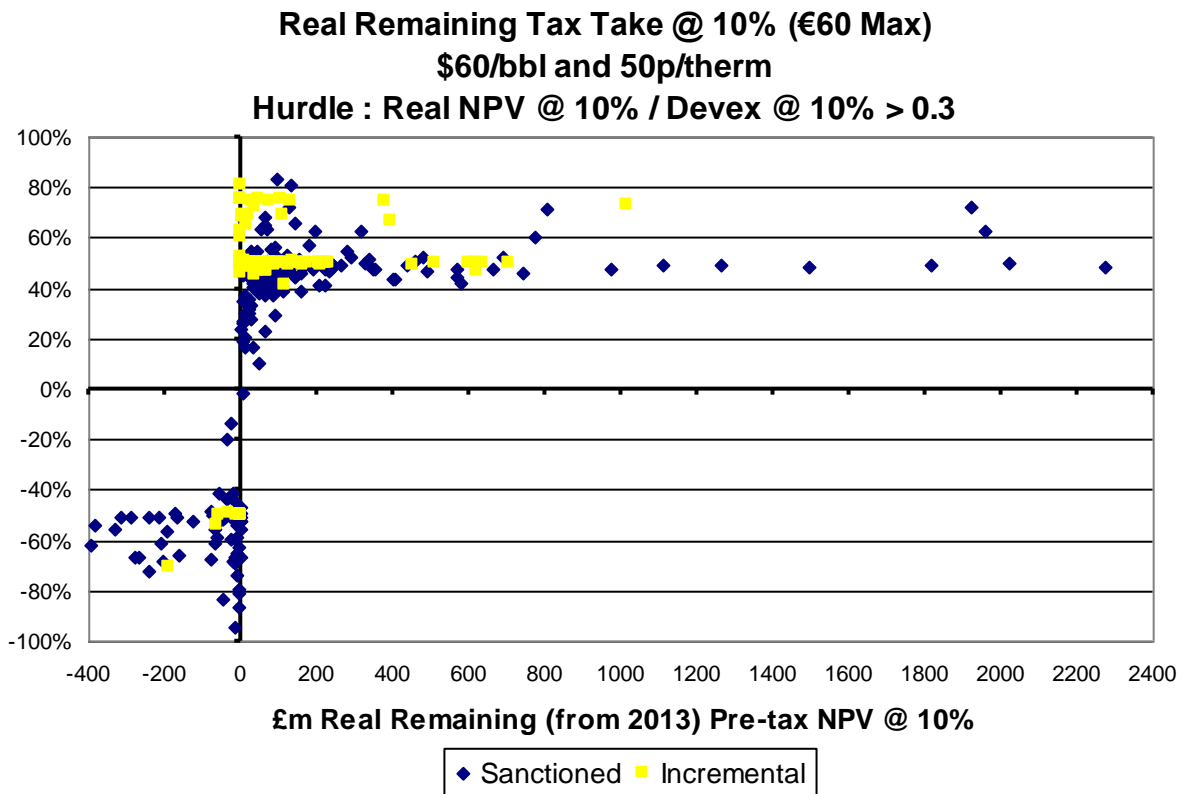


Chart 16 shows the real remaining tax take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t. There are 80 sanctioned fields and 15 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 27 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 66 of the sanctioned fields and 11 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 34 sanctioned fields and 38 incremental projects which have a real remaining tax take at 10% of 60% or more and 129 of the sanctioned fields and 98 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 17

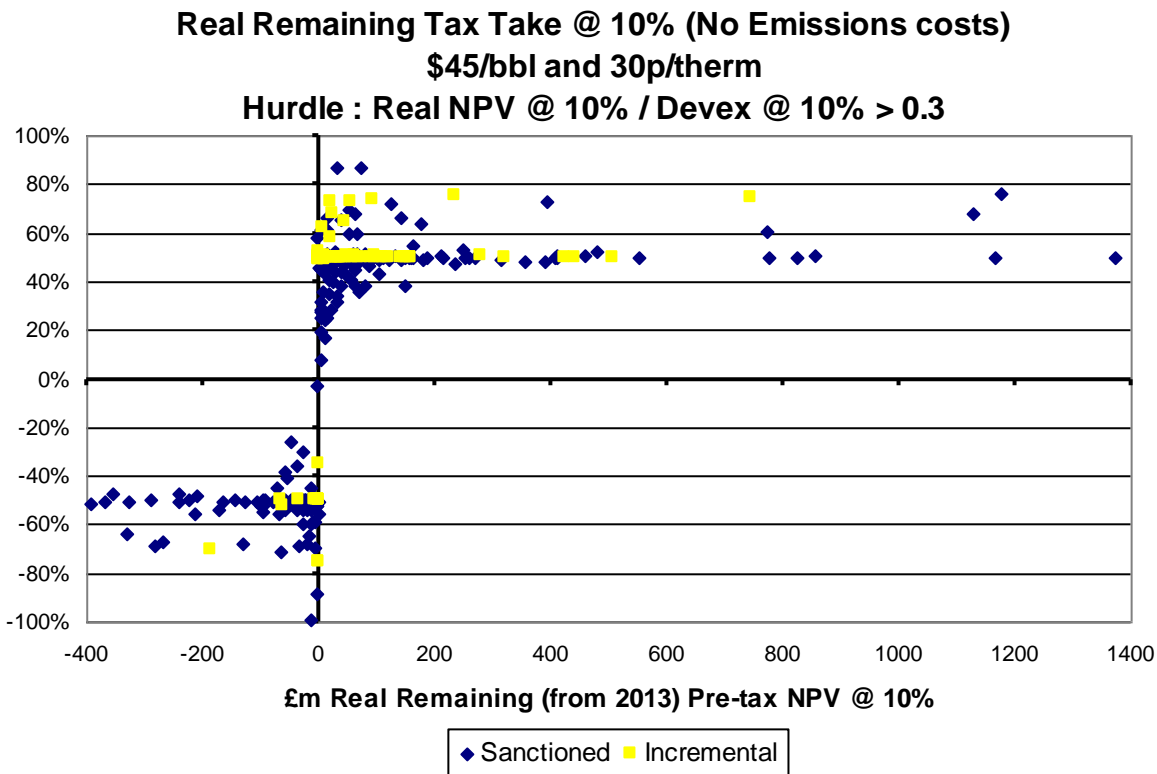


Chart 17 shows the real remaining percentage tax take at 10% for the scenario at the low price where there are no emission costs. There are 91 sanctioned fields and 19 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 16 of the sanctioned fields and 3 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 66 of the sanctioned fields and 16 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 41 sanctioned fields and 27 incremental projects which have a real remaining tax take at 10% of 60% or more and 125 of the sanctioned fields and 73 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 18

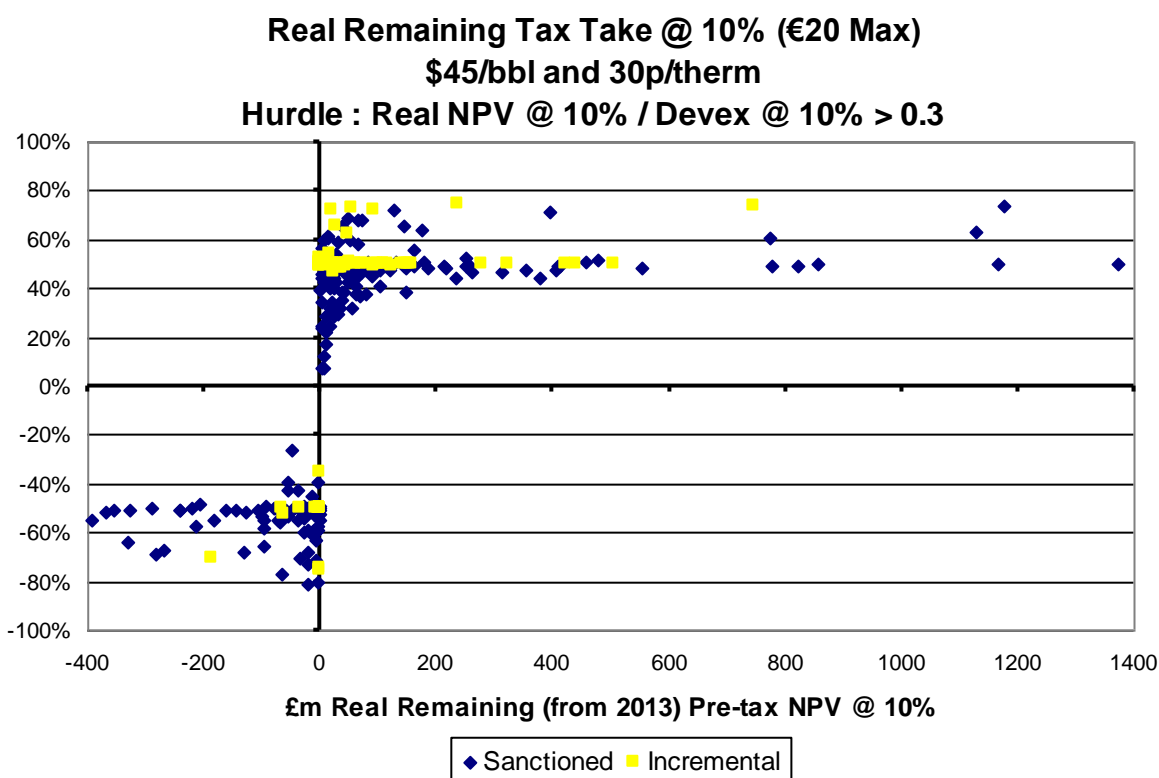


Chart 18 shows the real remaining percentage tax take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t. There are 93 sanctioned fields and 19 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 21 of the sanctioned fields and 3 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 78 of the sanctioned fields and 15 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 31 sanctioned fields and 26 incremental projects which have a real remaining tax take at 10% of 60% or more and 117 of the sanctioned fields and 72 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 19

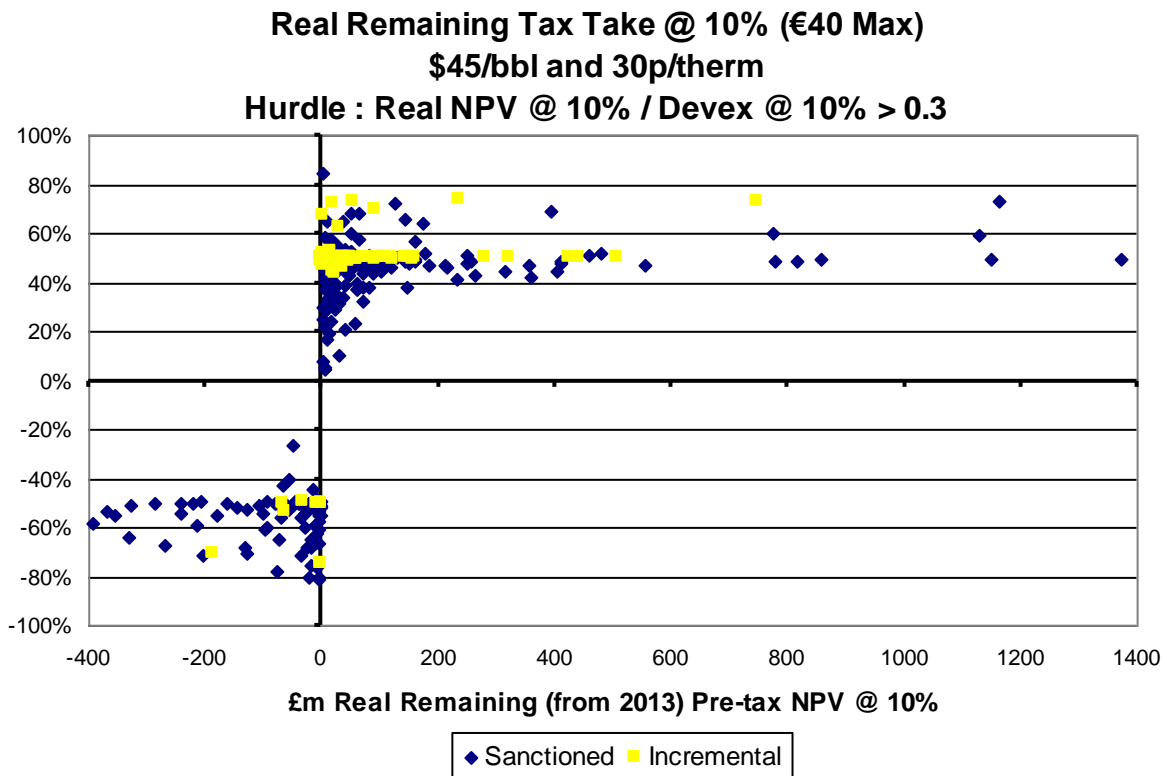


Chart 19 shows the real remaining percentage tax take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t. There are 93 sanctioned fields and 18 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 28 of the sanctioned fields and 3 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 82 of the sanctioned fields and 15 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 29 sanctioned fields and 22 incremental projects which have a real remaining tax take at 10% of 60% or more and 109 of the sanctioned fields and 71 of the incremental projects which have a real remaining tax take at 10% of 50% or more.



Chart 20

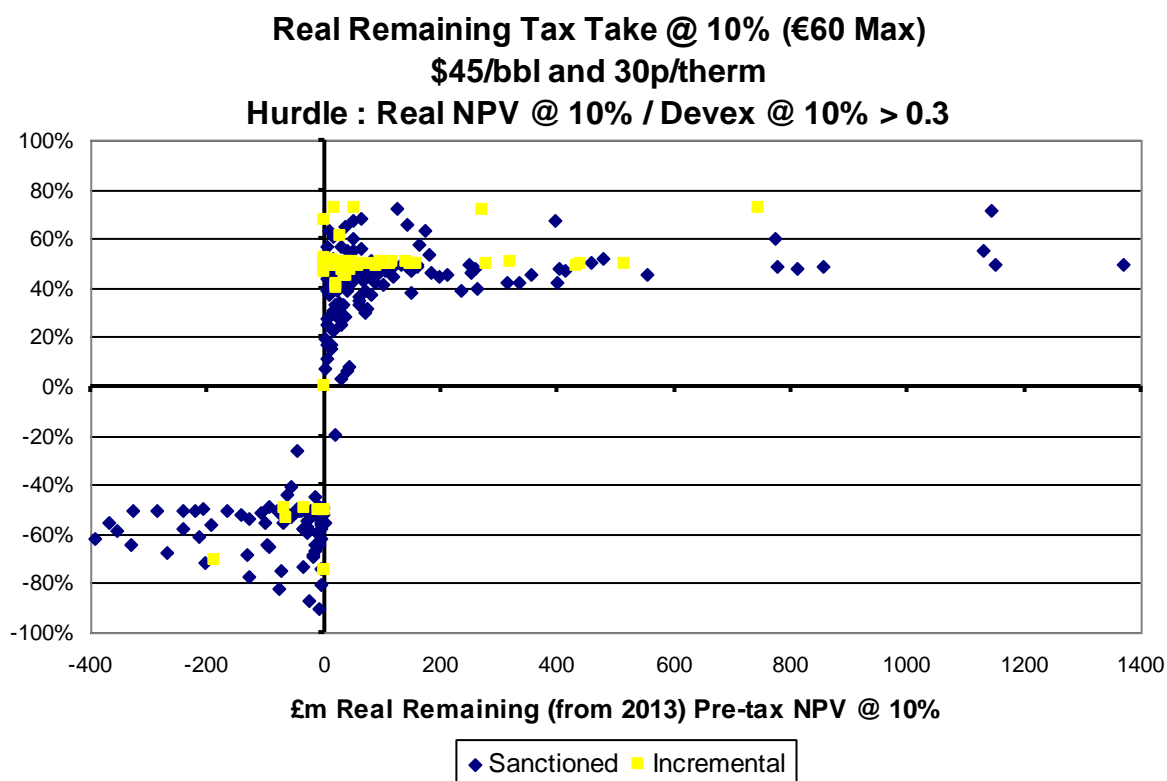


Chart 20 shows the real remaining percentage tax take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t. There are 94 sanctioned fields and 18 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 30 of the sanctioned fields and 3 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 82 of the sanctioned fields and 15 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 26 sanctioned fields and 21 incremental projects which have a real remaining tax take at 10% of 60% or more and 105 of the sanctioned fields and 68 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 21

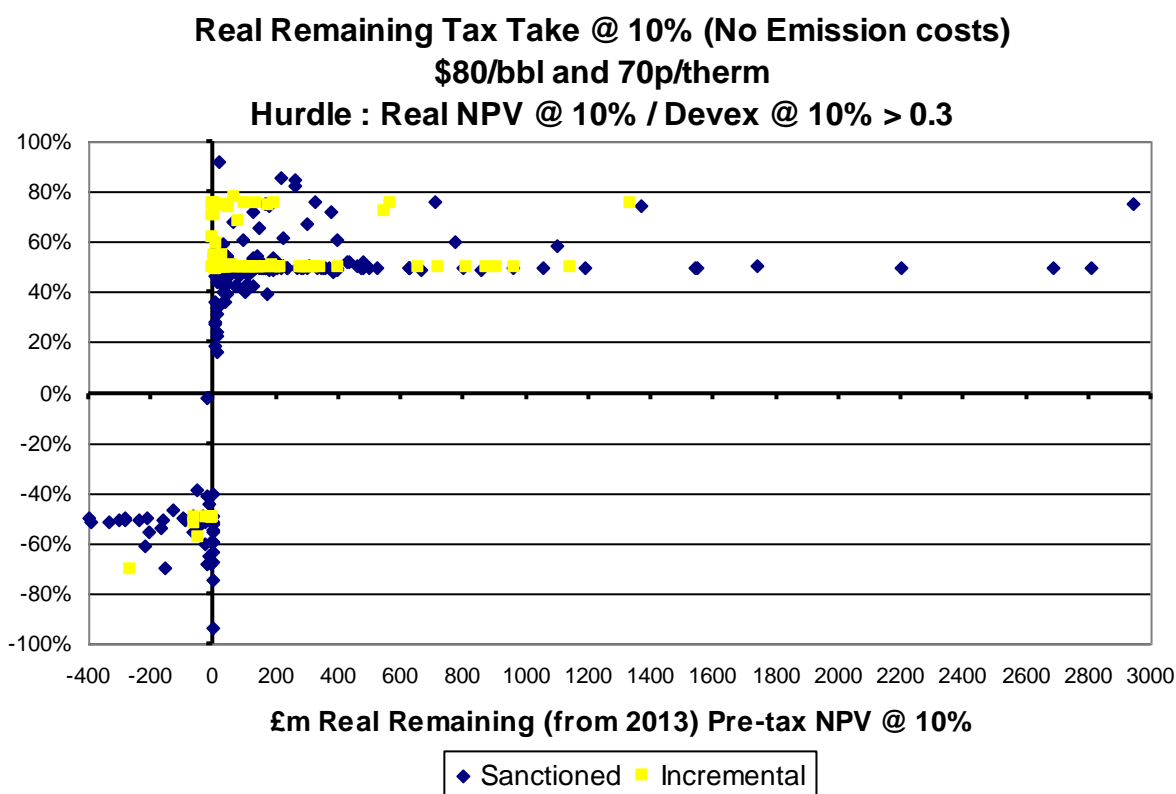


Chart 21 shows the real remaining percentage tax take at 10% for the scenario at the high price where there are no emission costs. There are 68 sanctioned fields and 16 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 17 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 53 of the sanctioned fields and 13 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 59 sanctioned fields and 45 incremental projects which have a real remaining tax take at 10% of 60% or more and 163 of the sanctioned fields and 110 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 22

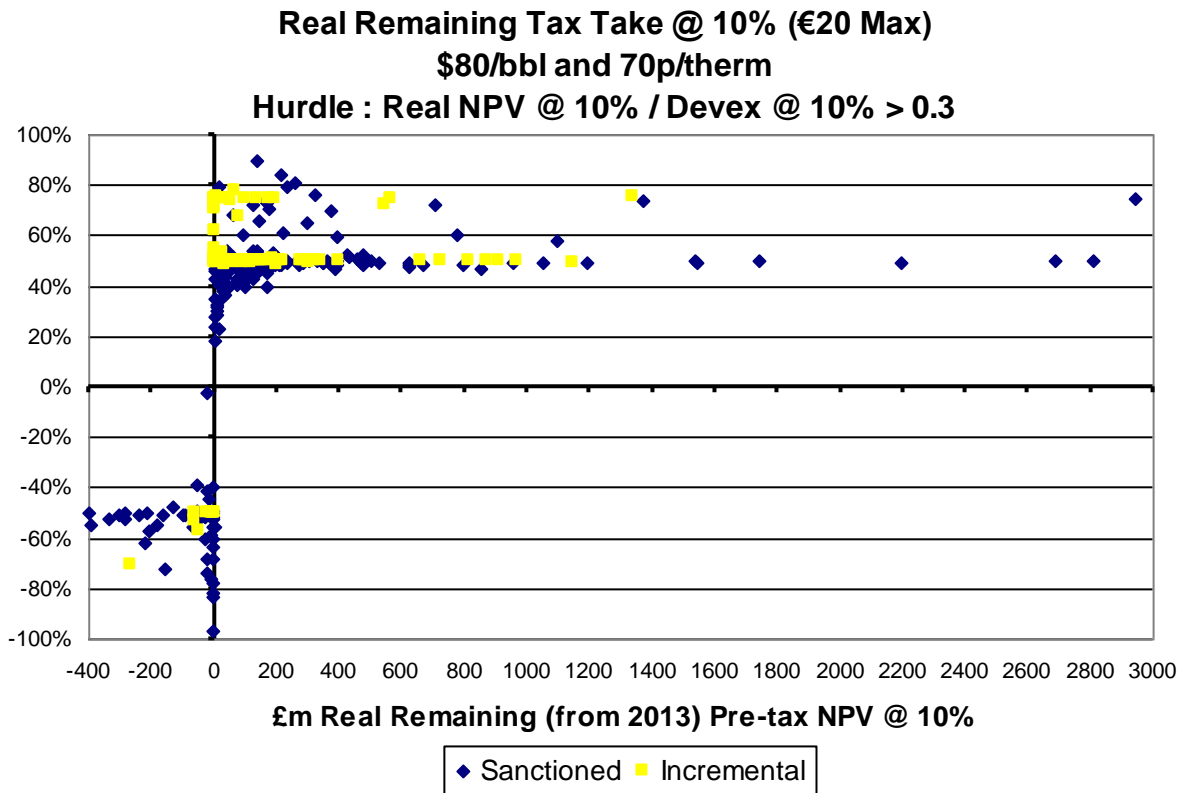


Chart 22 shows the real remaining percentage tax take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t. There are 68 sanctioned fields and 16 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 19 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 57 of the sanctioned fields and 12 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 43 sanctioned fields and 42 incremental projects which have a real remaining tax take at 10% of 60% or more and 162 of the sanctioned fields and 110 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 23

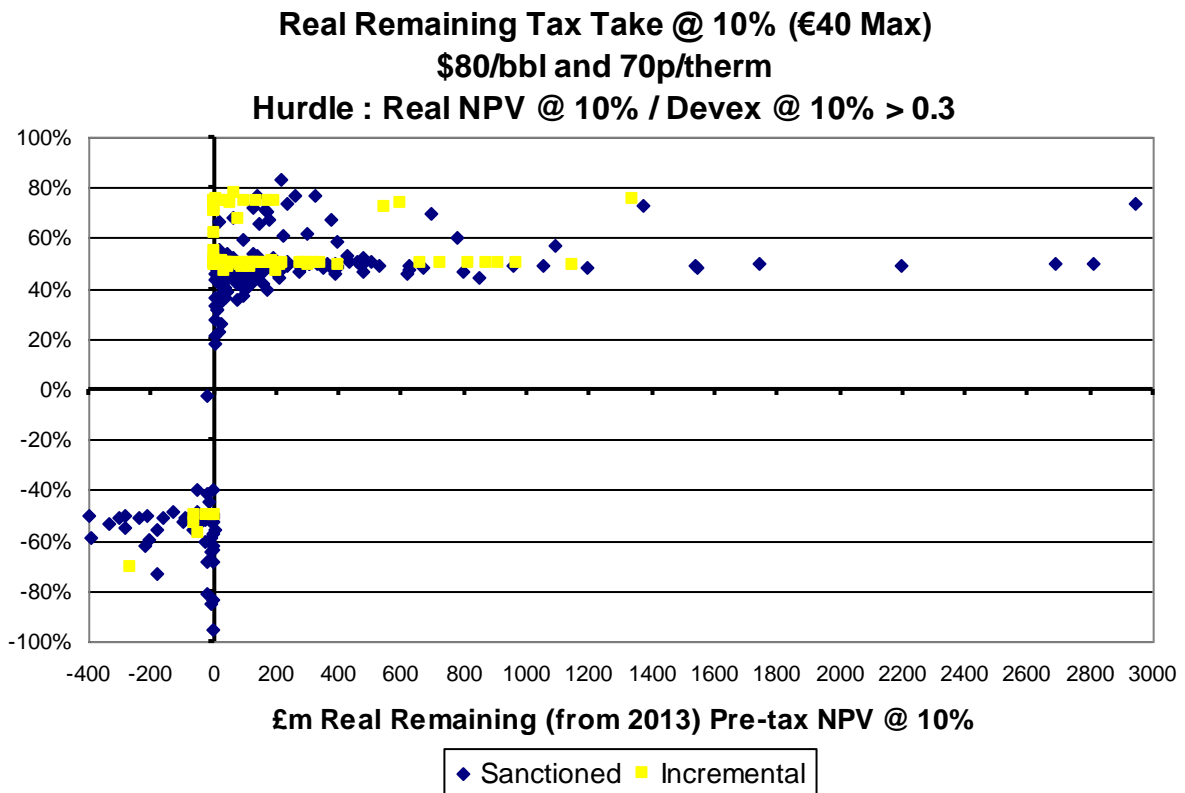


Chart 23 shows the real remaining percentage tax take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t. There are 68 sanctioned fields and 16 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 19 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 58 of the sanctioned fields and 12 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 41 sanctioned fields and 43 incremental projects which have a real remaining tax take at 10% of 60% or more and 157 of the sanctioned fields and 110 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 24

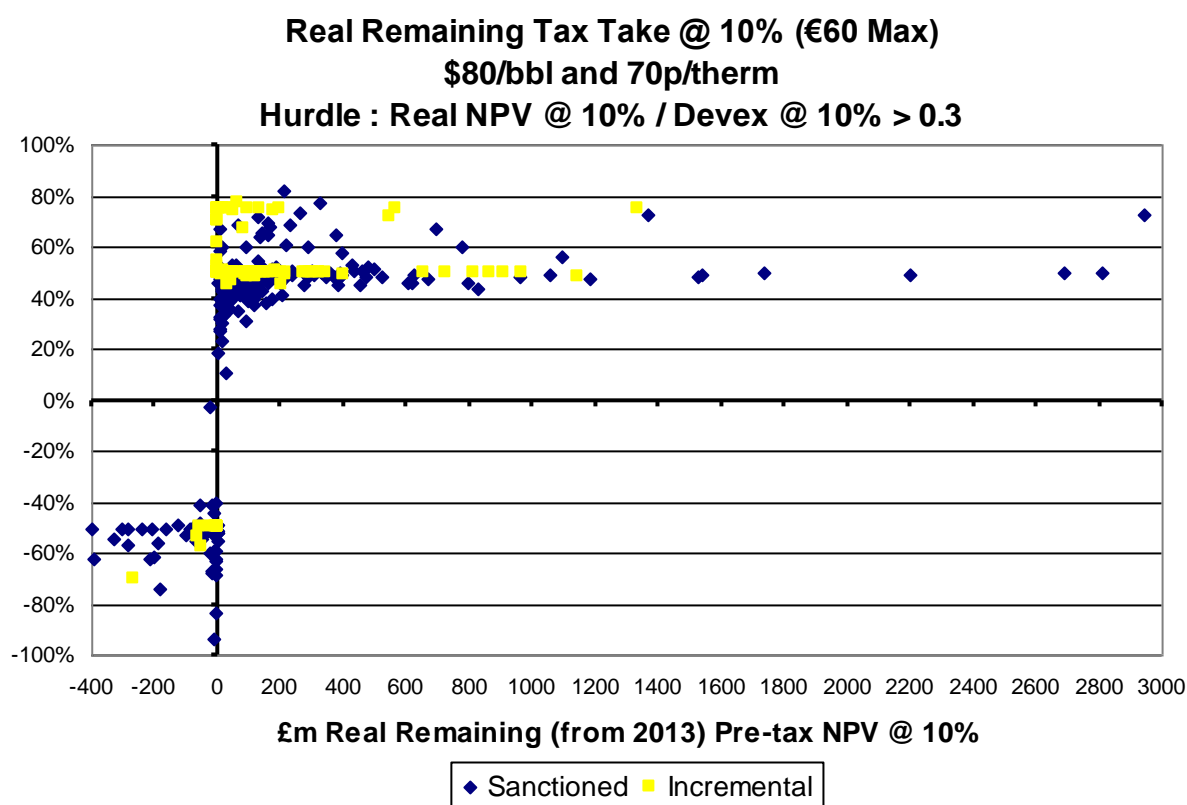


Chart 24 shows the real remaining percentage tax take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t. There are 68 sanctioned fields and 16 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 21 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 58 of the sanctioned fields and 12 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 42 sanctioned fields and 44 incremental projects which have a real remaining tax take at 10% of 60% or more and 152 of the sanctioned fields and 110 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

vi) New Field Lifetime Percentage Tax Take at 10%

The real tax takes at 10% are shown against real pre-tax NPVs at 10% for the probable, possible and technical reserve fields. Many of the technical reserves fields are small and so they receive a value allowance which reduces the tax on income but preserves tax relief for field investment at 50%.

Chart 25

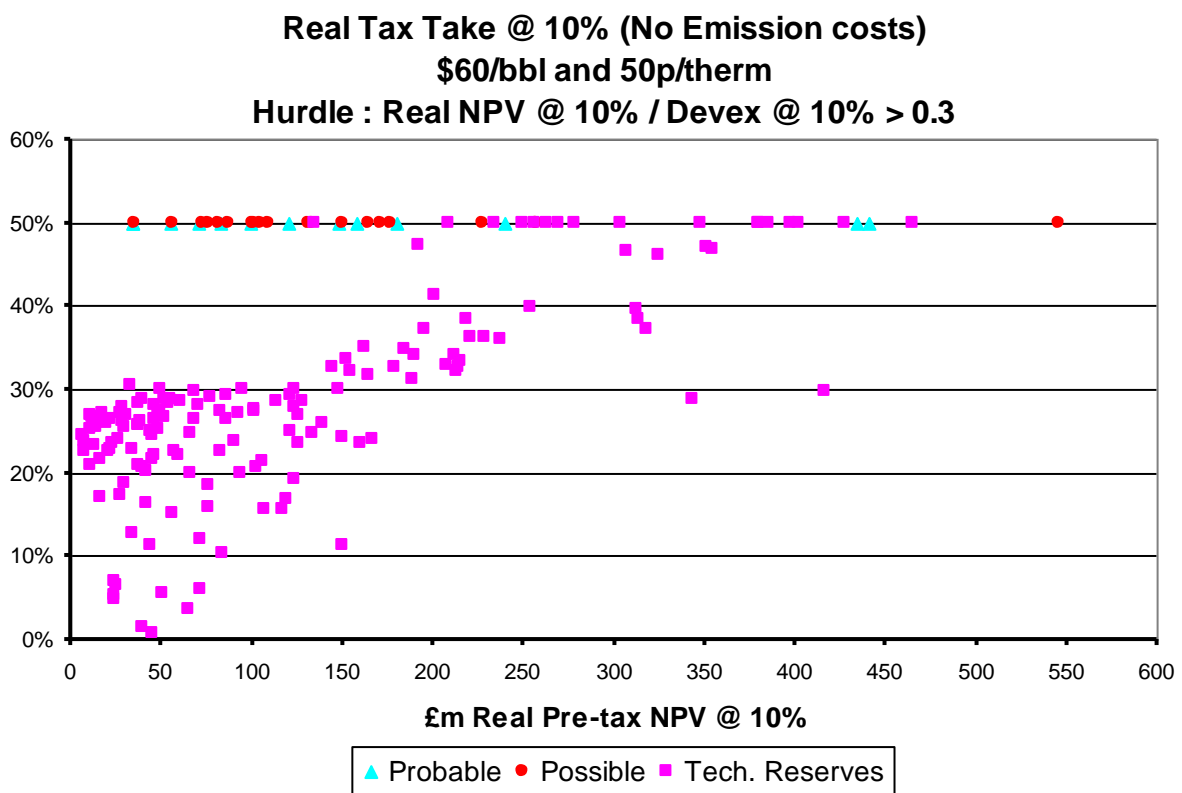


Chart 25 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario where there are no emission costs at the medium price. There are 15 probable fields, 20 possible fields and 26 technical reserve fields which have a real tax take at 10% of 50% or more. There are 15 probable fields, 20 possible fields and 160 technical reserve fields which pass the (real NPV at 10% /real

devex at 10%) hurdle rate. The results indicate that, broadly speaking, the value allowance operates progressively in relation to field profitability.

Chart 26

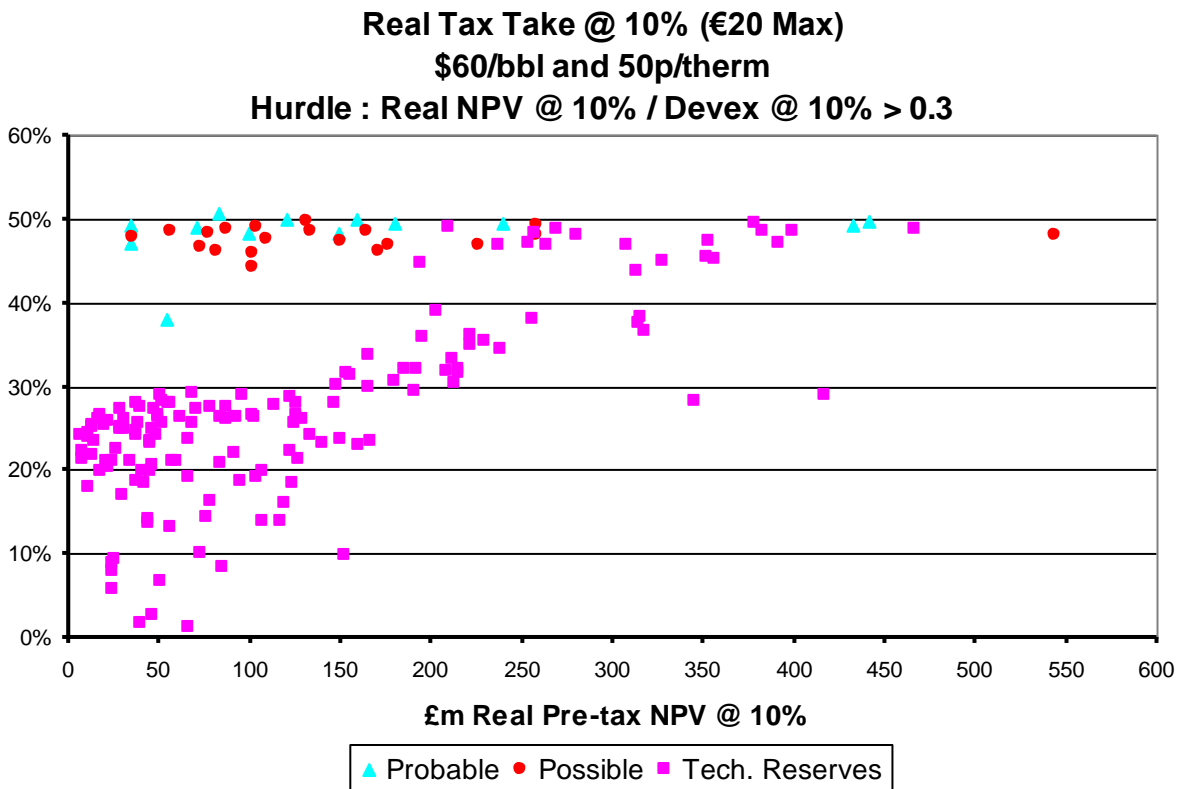


Chart 26 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t at the medium price. There are 14 probable fields, 20 possible fields and 22 technical reserve fields which have a real tax take at 10% of 50% or more. There are 15 probable fields, 20 possible fields and 152 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 27

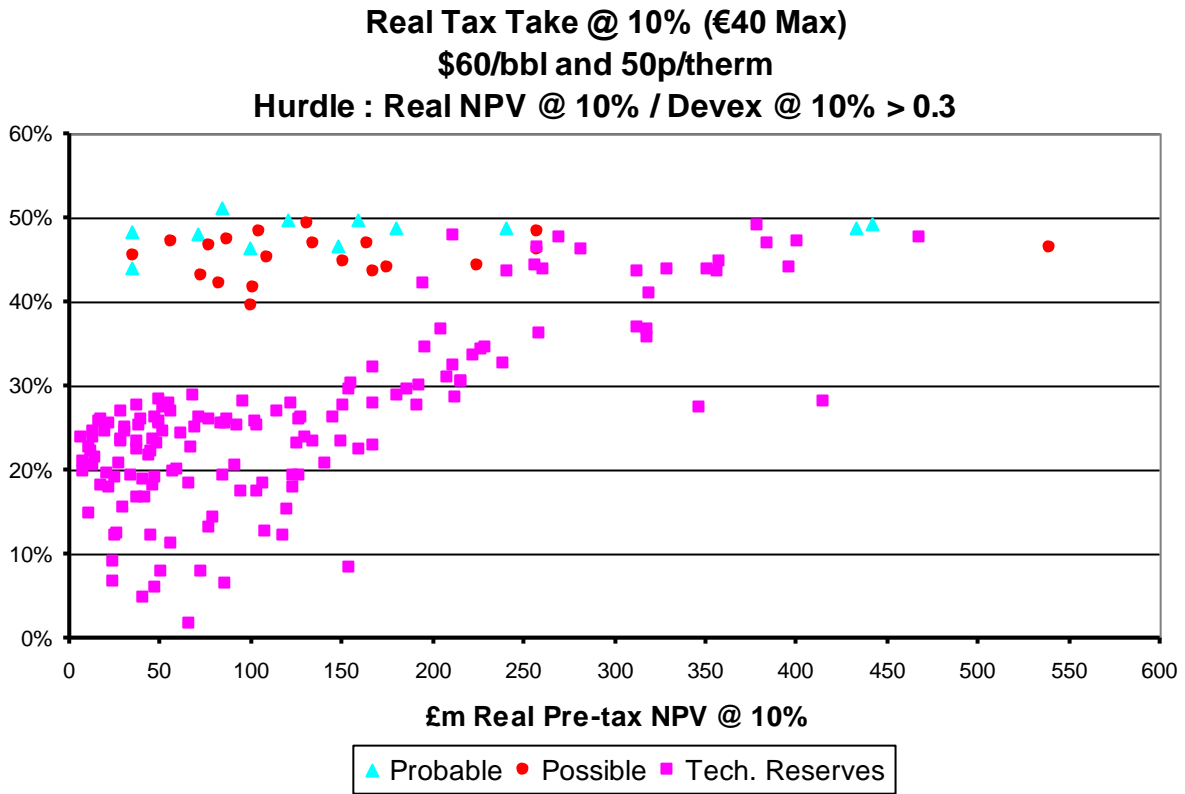


Chart 27 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t at the medium price. There are 14 probable fields, 19 possible fields and 22 technical reserve fields which have a real tax take at 10% of 50% or more. There are 14 probable fields, 20 possible fields and 151 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.



Chart 28

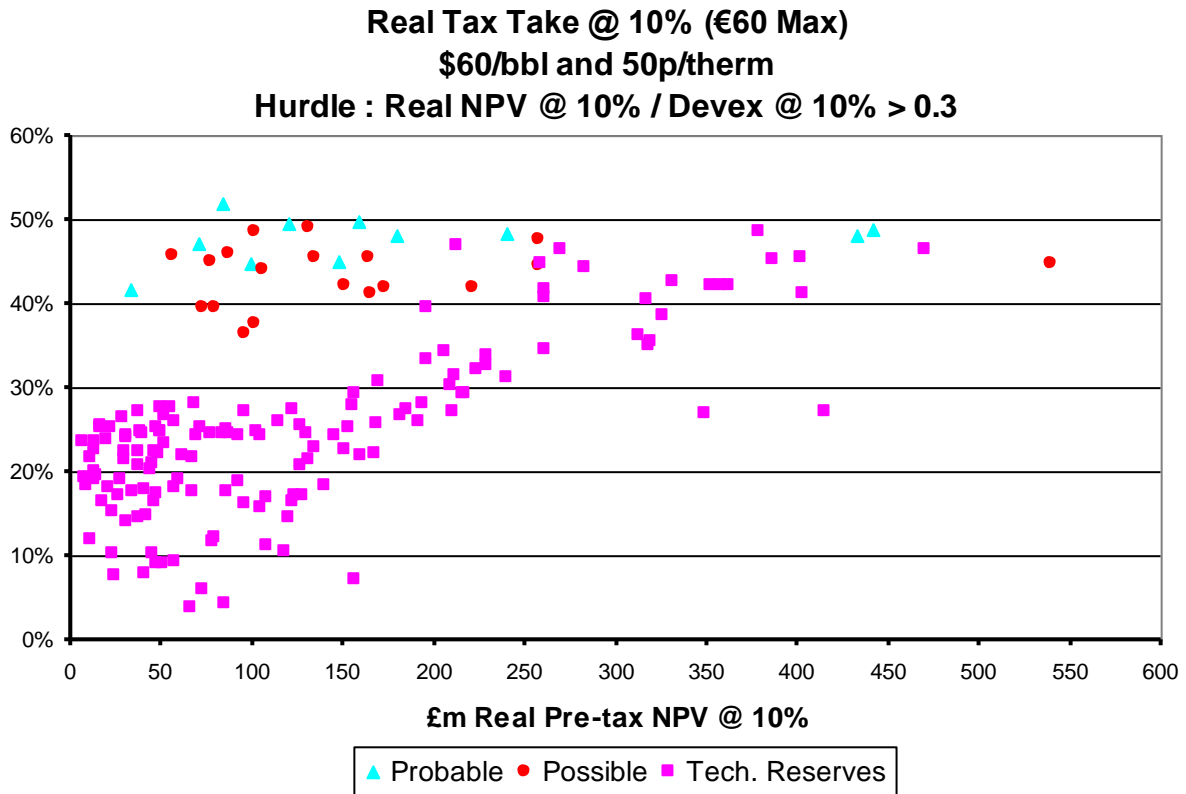


Chart 28 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t at the medium price. There are 13 probable fields, 15 possible fields and 19 technical reserve fields which have a real tax take at 10% of 50% or more. There are 13 probable fields, 19 possible fields and 148 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 29

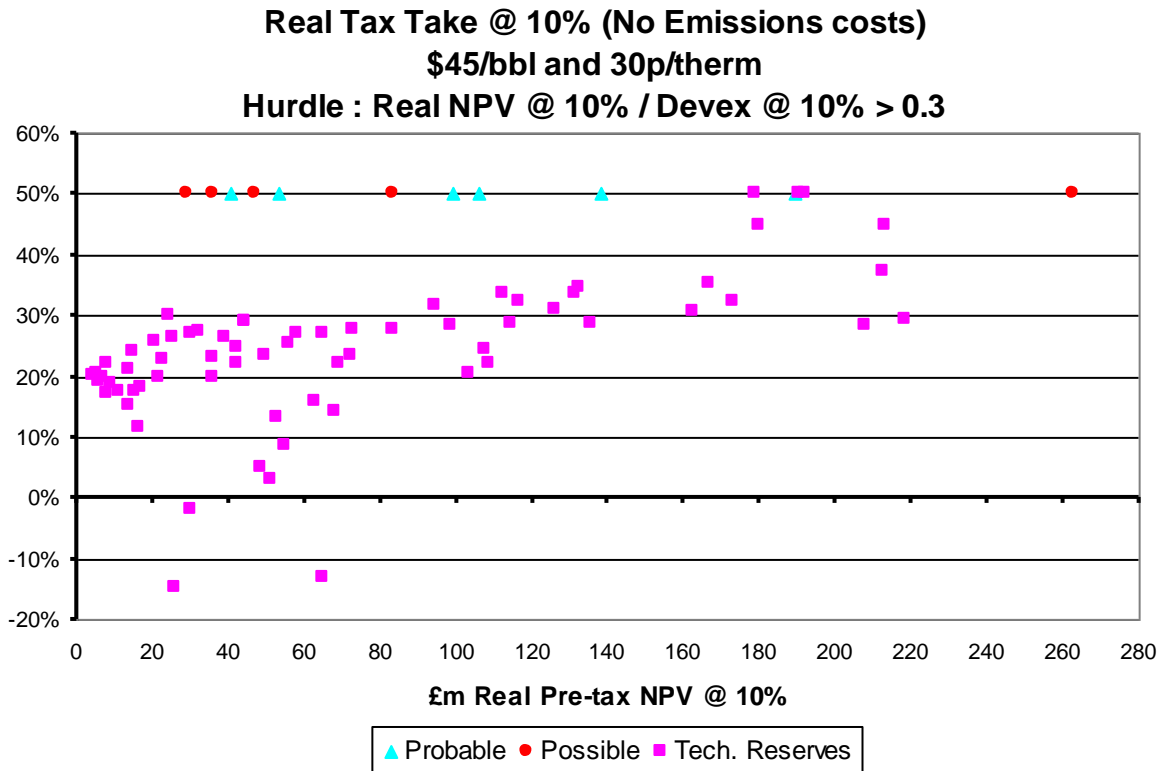


Chart 29 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario where there are no emission costs at the low price. There are 6 probable fields, 5 possible fields and 7 technical reserve fields which have a real tax take at 10% of 50% or more. There are 6 probable fields, 5 possible fields and 70 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 30

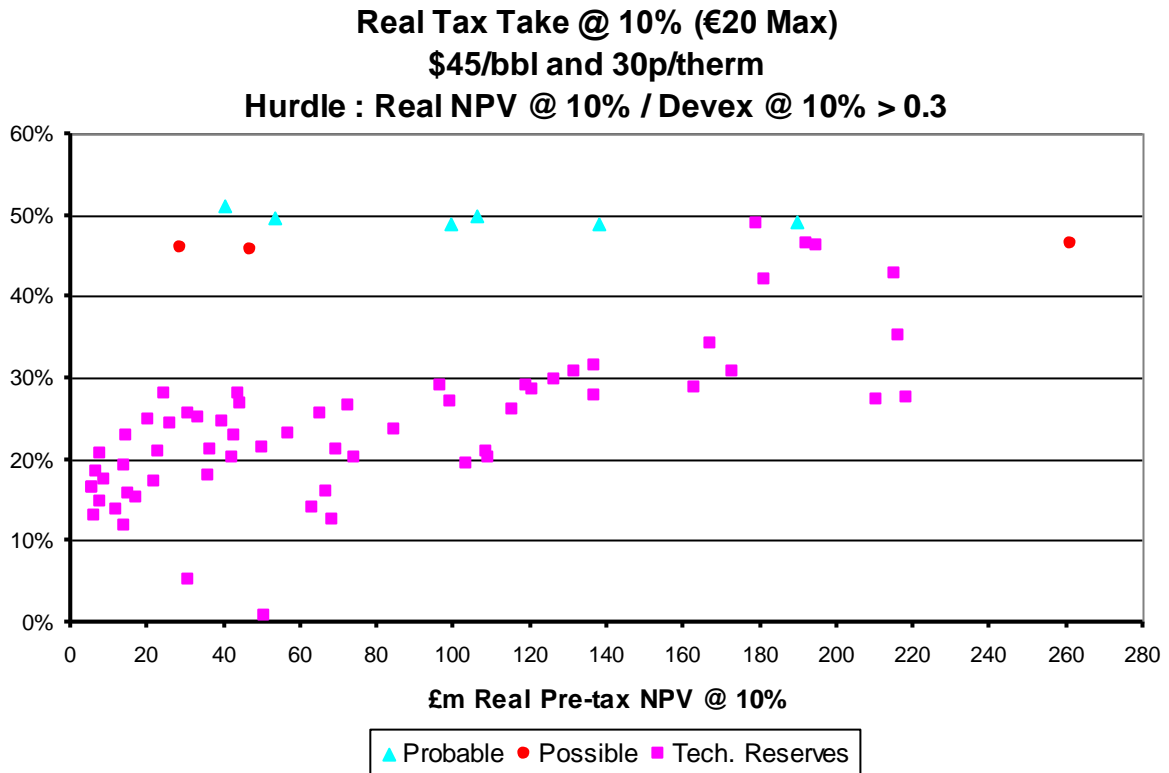


Chart 30 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t at the low price. There are 6 probable fields, 3 possible fields and 64 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 31

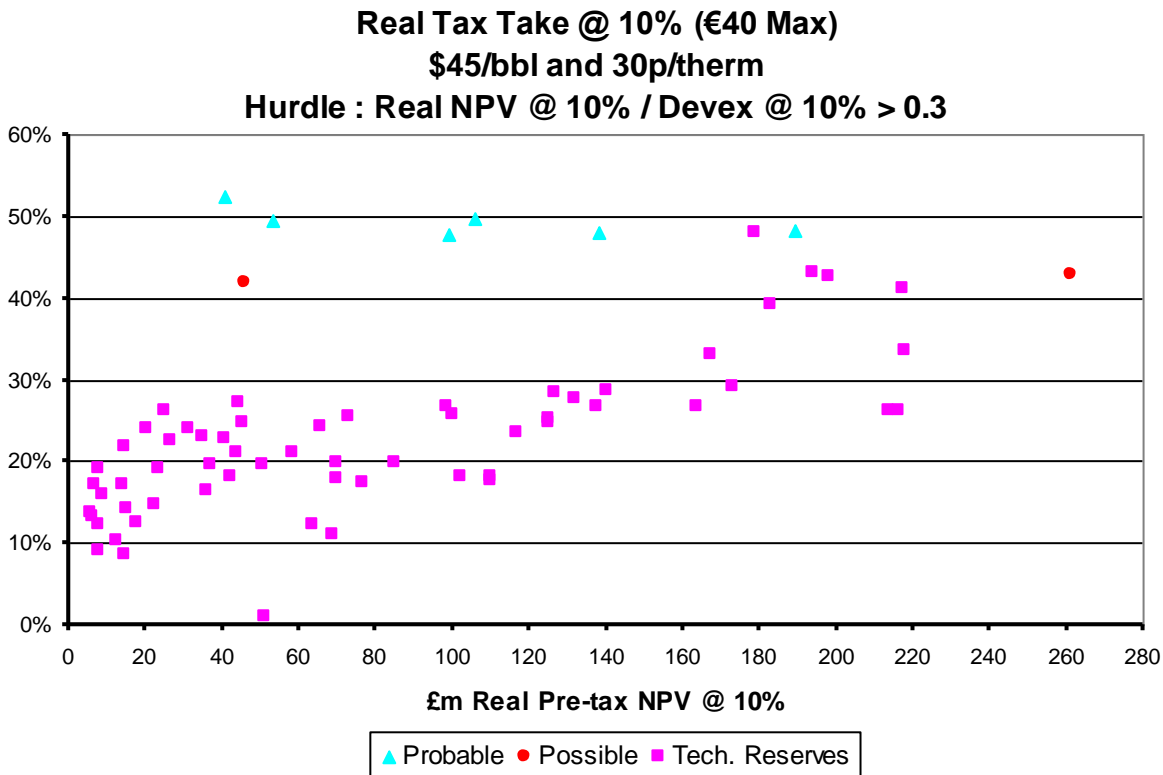


Chart 31 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t at the low price. There are 6 probable fields, 2 possible fields and 6 technical reserve fields which have a real tax take at 10% of 50% or more. There are 6 probable fields, 2 possible fields and 63 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 32

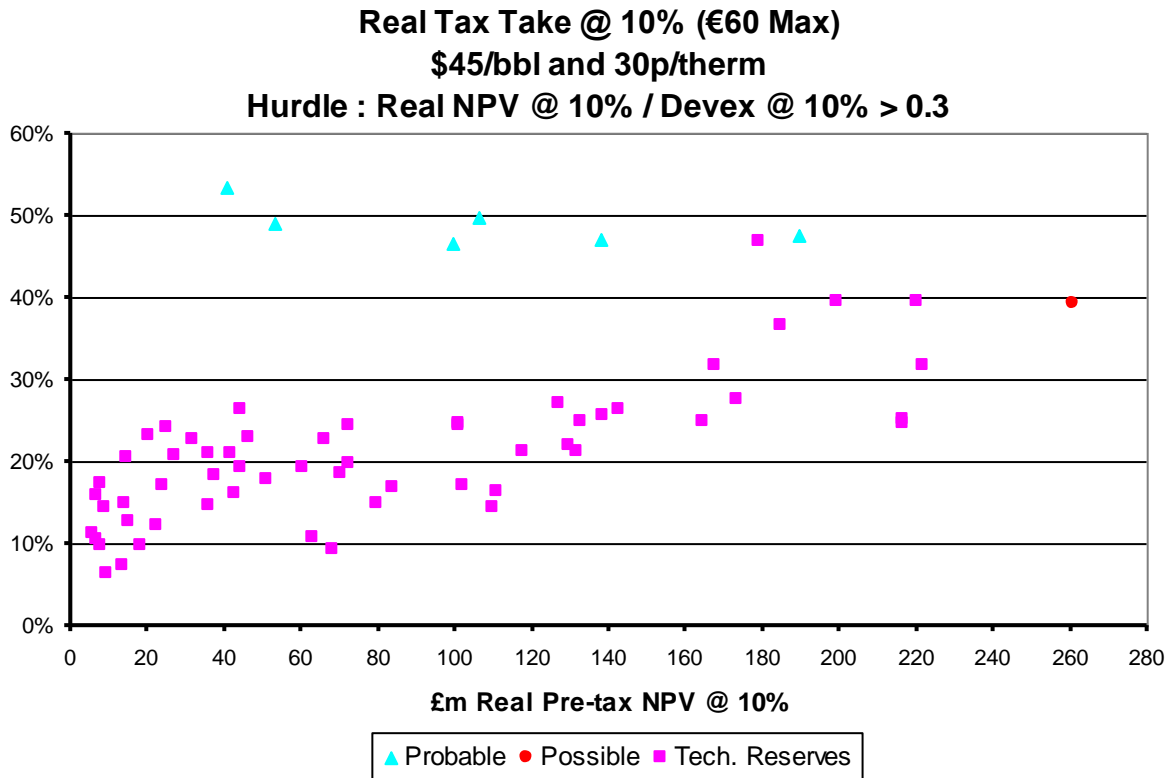


Chart 32 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t at the low price. There are 6 probable fields, no possible fields and 3 technical reserve fields which have a real tax take at 10% of 50% or more. There are 6 probable fields, 1 possible field and 60 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 33

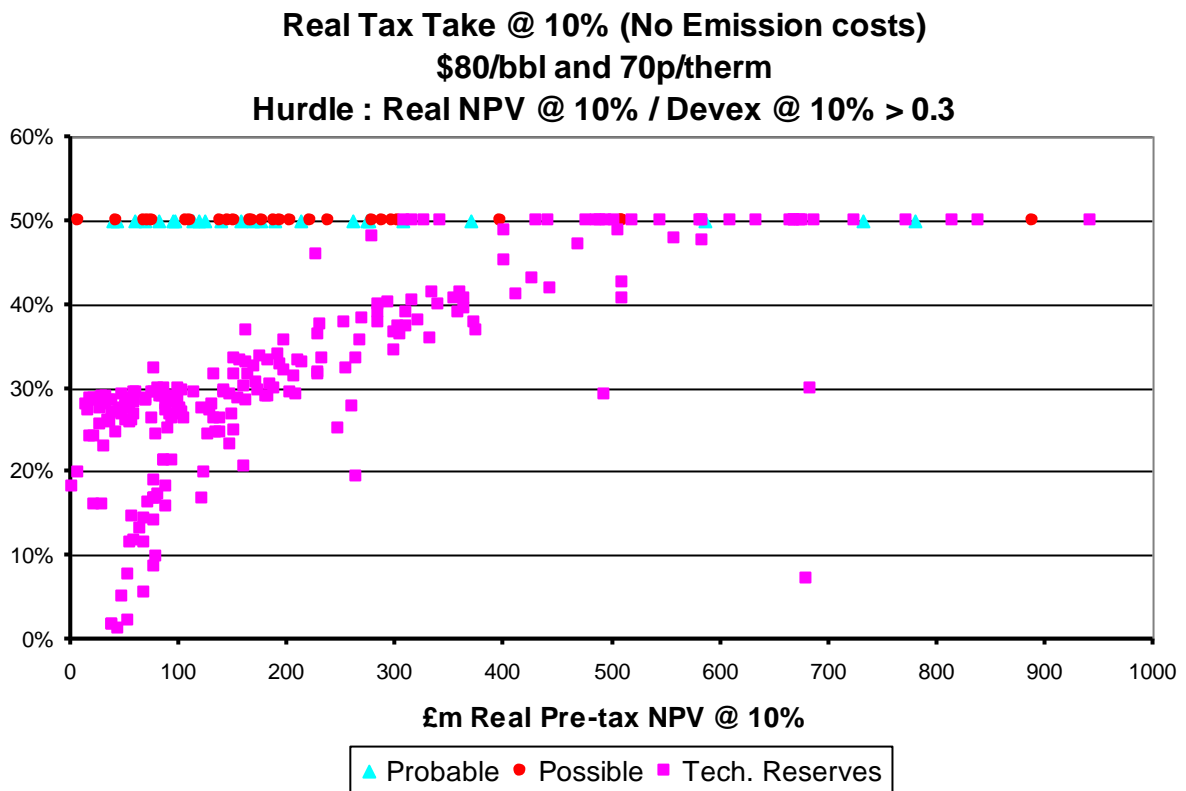


Chart 33 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario where there are no emission costs at the high price. There are 28 probable fields, 26 possible fields and 52 technical reserve fields which have a real tax take at 10% of 50% or more. There are 28 probable fields, 26 possible fields and 231 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 34

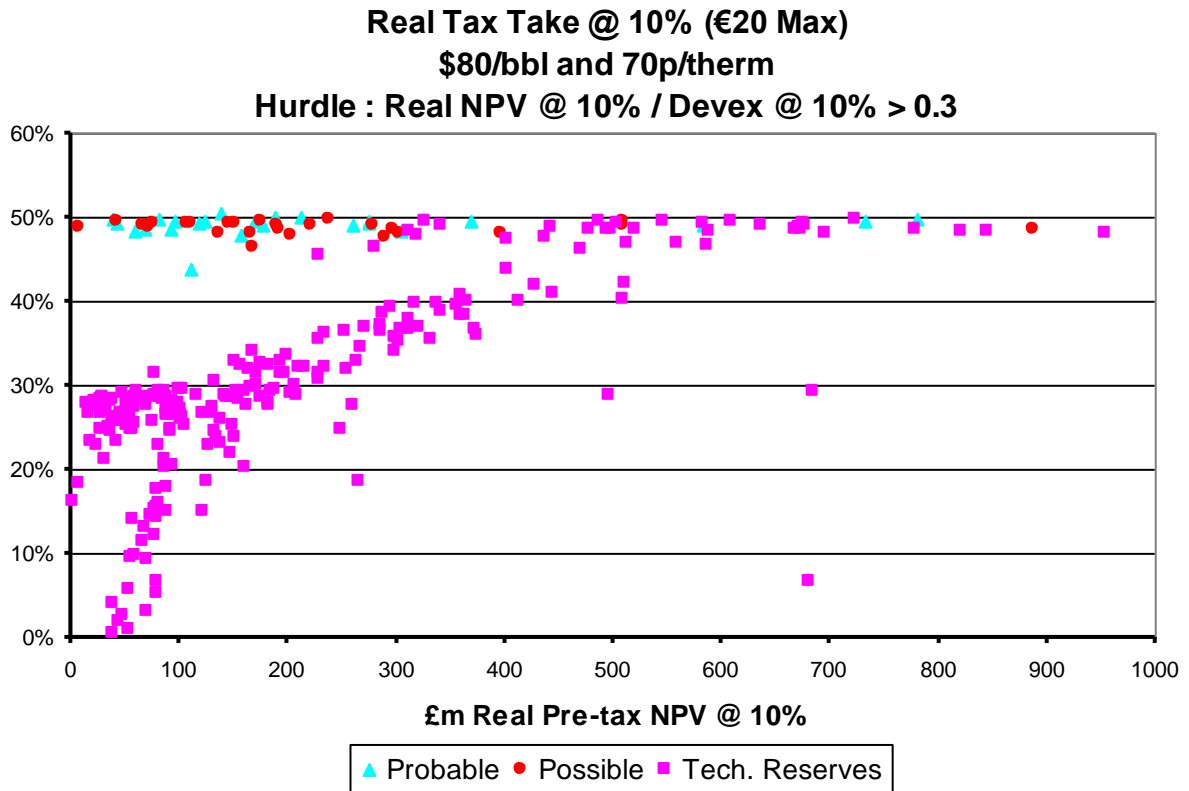


Chart 34 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t at the high price. There are 28 probable fields, 26 possible fields and 47 technical reserve fields which have a real tax take at 10% of 50% or more. There are 28 probable fields, 26 possible fields and 229 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 35

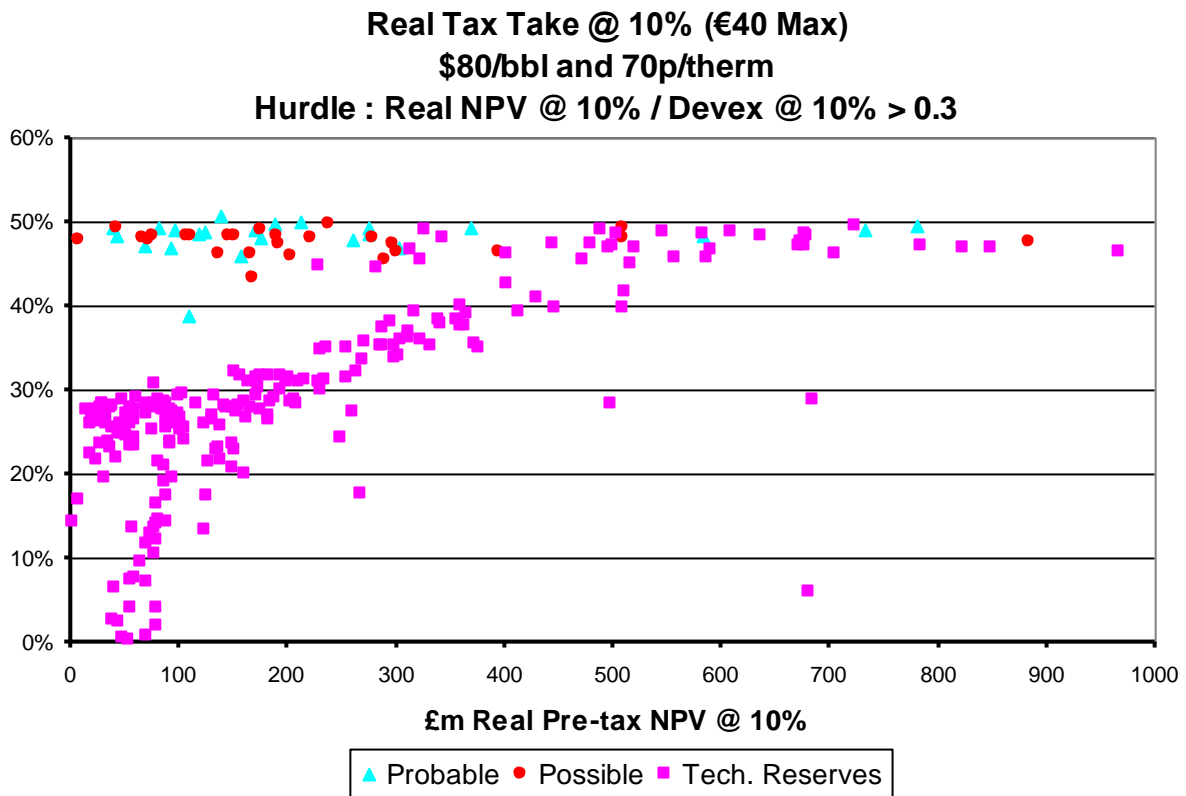


Chart 35 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t at the high price. There are 27 probable fields, 26 possible fields and 42 technical reserve fields which have a real tax take at 10% of 50% or more. There are 27 probable fields, 26 possible fields and 228 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.



Chart 36

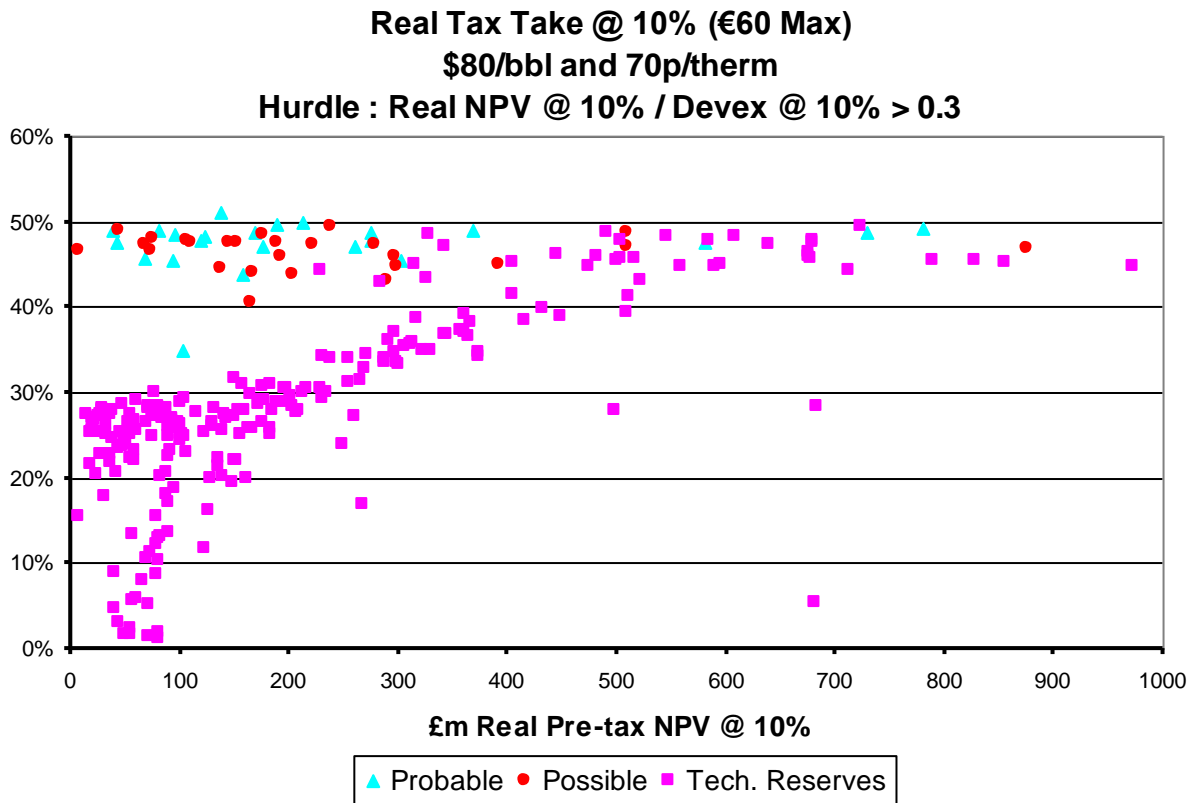


Chart 36 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t at the high price. There are 26 probable fields, 26 possible fields and 41 technical reserve fields which have a real tax take at 10% of 50% or more. There are 27 probable fields, 26 possible fields and 227 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

vii) Remaining Percentage Total Government Takes (Sanctioned Fields and Incremental Projects)

The real remaining (from 2013) government take (tax plus emission costs) at 10% is shown against the real remaining pre-tax NPV at 10% for the sanctioned fields and incremental fields. By 2013 there are many sanctioned fields and incremental projects which are at the tail end of their lives or in the process of decommissioning and these results in the remaining NPV being negative.

Chart 37

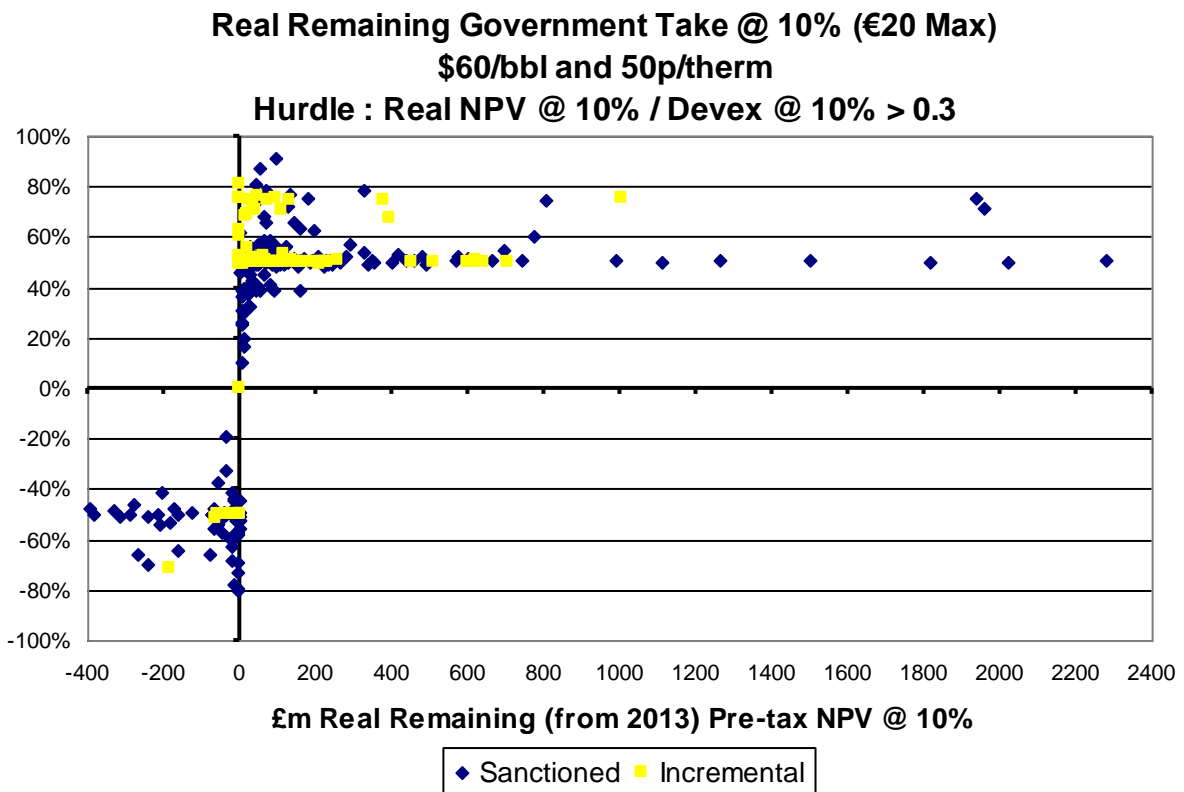


Chart 37 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t. There are 78 sanctioned fields and 15 incremental projects with a real remaining government take at 10% of

less than zero. Of these, 17 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 50 of the sanctioned fields and 12 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 109 sanctioned fields and 54 incremental projects which have a real remaining government take at 10% of 60% or more and 144 of the sanctioned fields and 99 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 38

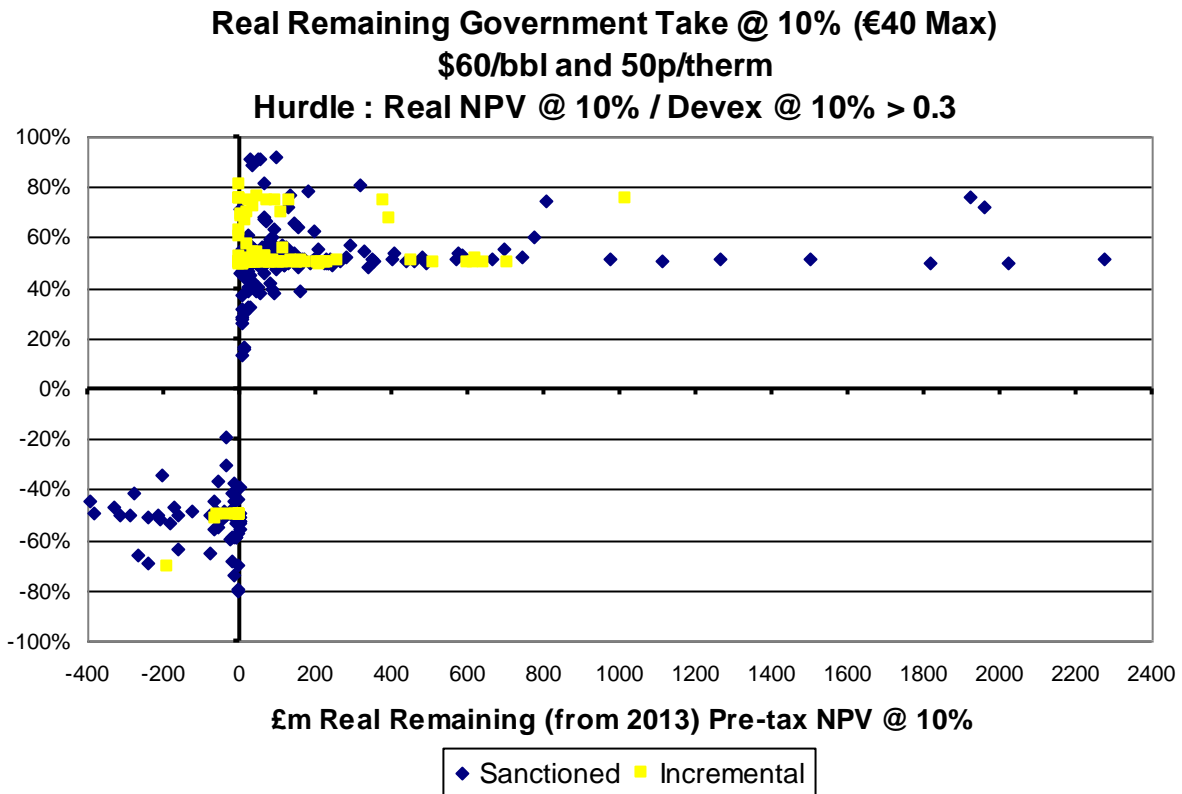


Chart 38 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t. There are 79 sanctioned fields and 15 incremental projects with a real remaining government take at 10% of less than zero. Of these, 16 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 48 of the sanctioned fields and 12 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 115 sanctioned fields and 55 incremental projects which have a real remaining government take at 10% of 60% or more and 144 of the sanctioned fields and 99 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 39

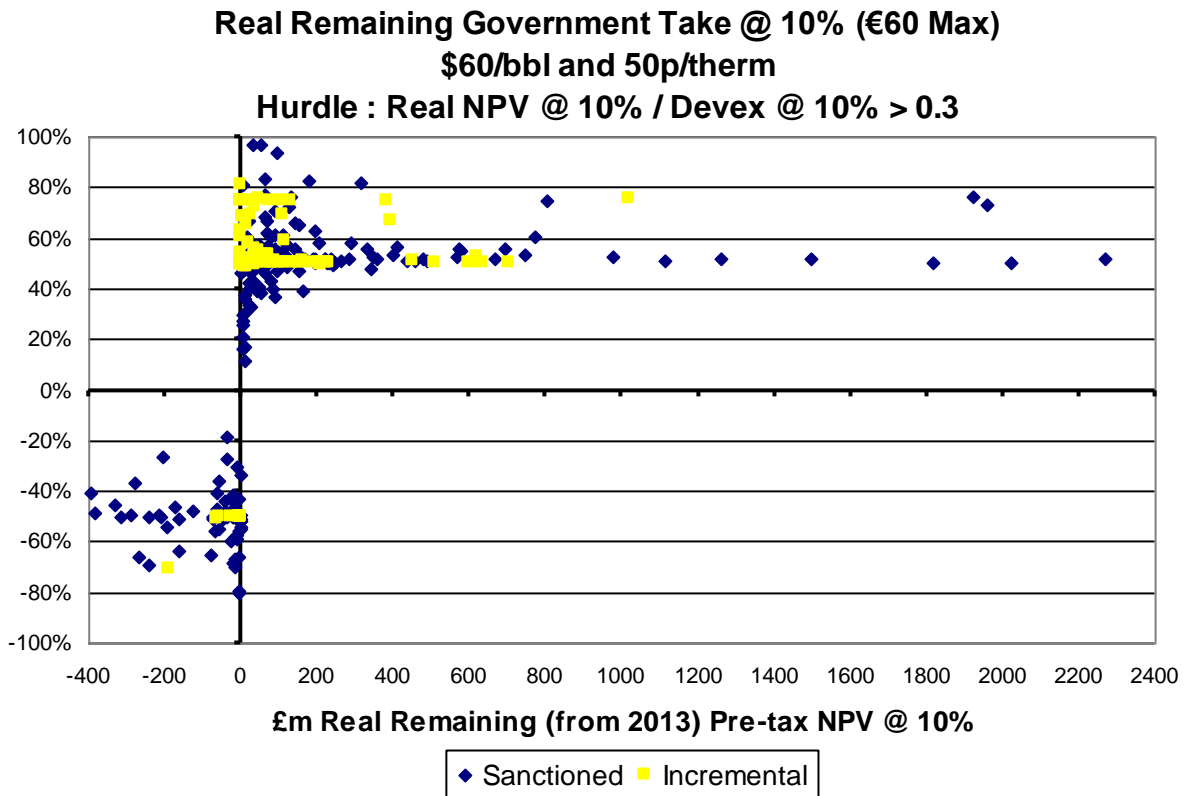


Chart 39 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t. There are 79 sanctioned fields and 15 incremental projects with a real remaining government take at 10% of less than zero. Of these, 17 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 47 of the sanctioned fields and 12 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 118 sanctioned fields and 55 incremental projects which have a real remaining government take at 10% of 60% or more and 143 of the sanctioned fields and 98 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 40

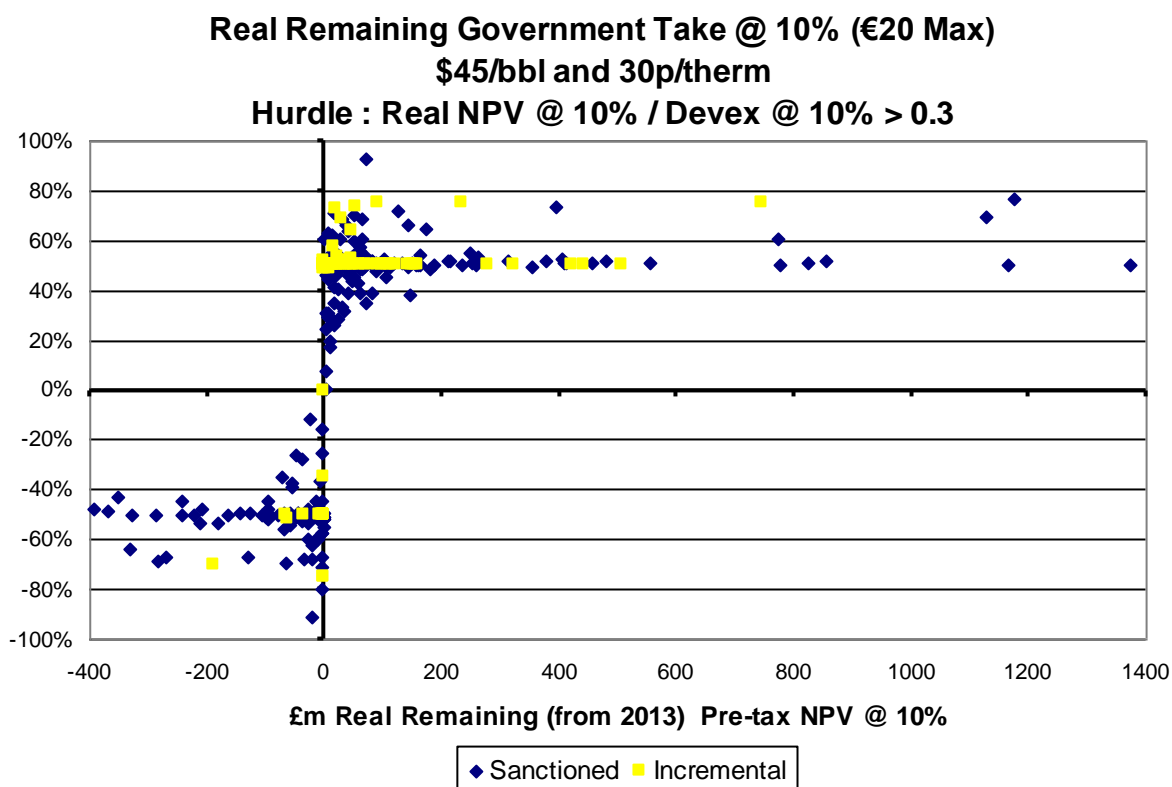


Chart 40 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t. There are 93 sanctioned fields and 19 incremental projects with a real remaining government take at 10% of less than zero. Of these, 17 of the sanctioned fields and 3 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 54 of the sanctioned fields and 16 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 89 sanctioned fields and 37 incremental projects which have a real remaining government take at 10% of 60% or more and 123 of the sanctioned fields and 72 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 41

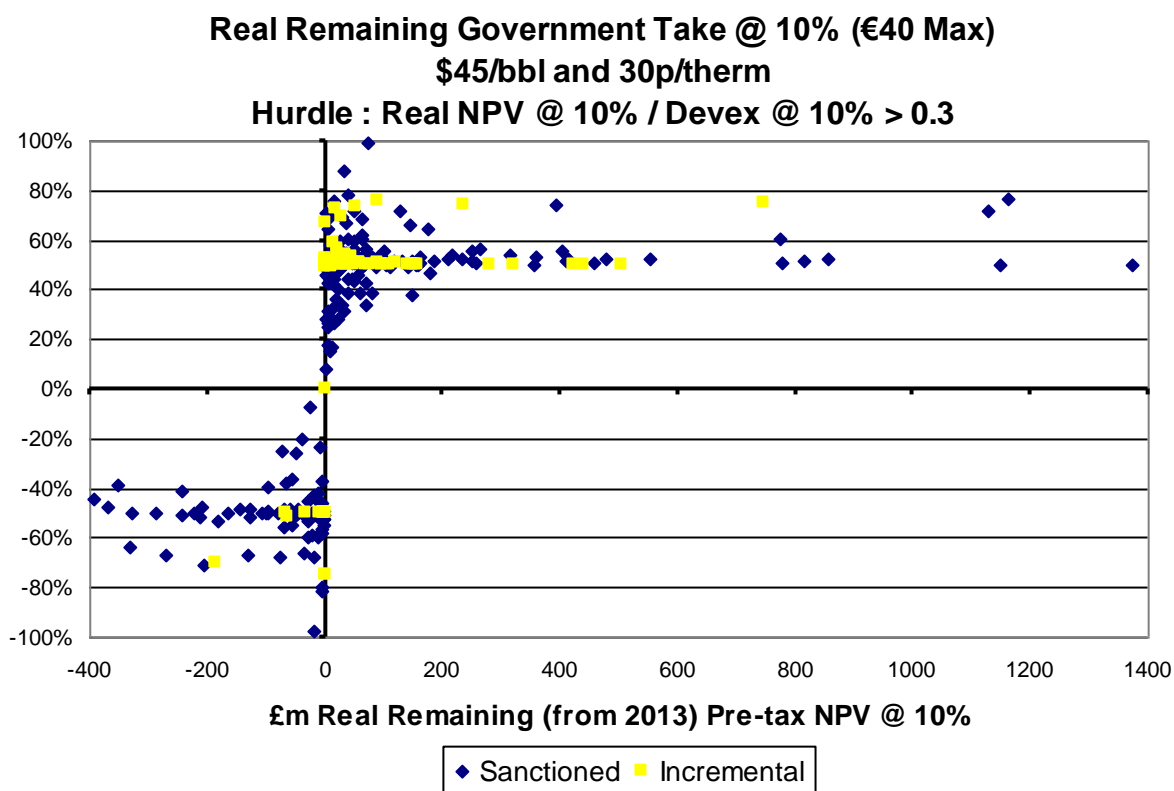


Chart 41 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t. There are 93 sanctioned fields and 18 incremental projects with a real remaining government take at 10% of less than zero. Of these, 16 of the sanctioned fields and 3 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 52 of the sanctioned fields and 16 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 94 sanctioned fields and 37 incremental projects which have a real remaining government take at 10% of 60% or more and 124 of the sanctioned fields and 71 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 42

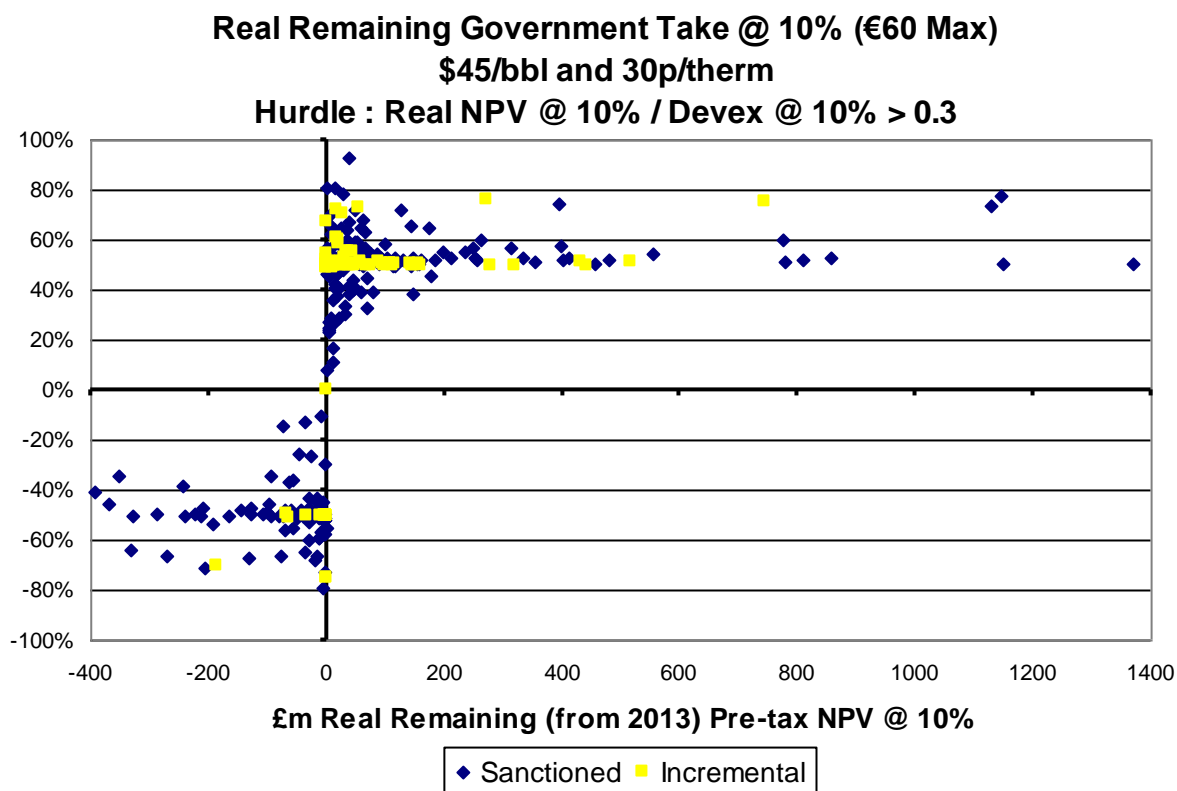


Chart 42 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t. There are 93 sanctioned fields and 18 incremental projects with a real remaining government take at 10% of less than zero. Of these, 18 of the sanctioned fields and 3 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 51 of the sanctioned fields and 16 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 99 sanctioned fields and 35 incremental projects which have a real remaining government take at 10% of 60% or more and 125 of the sanctioned fields and 70 of the incremental projects which have a real remaining government take at 10% of 50% or more.



Chart 43

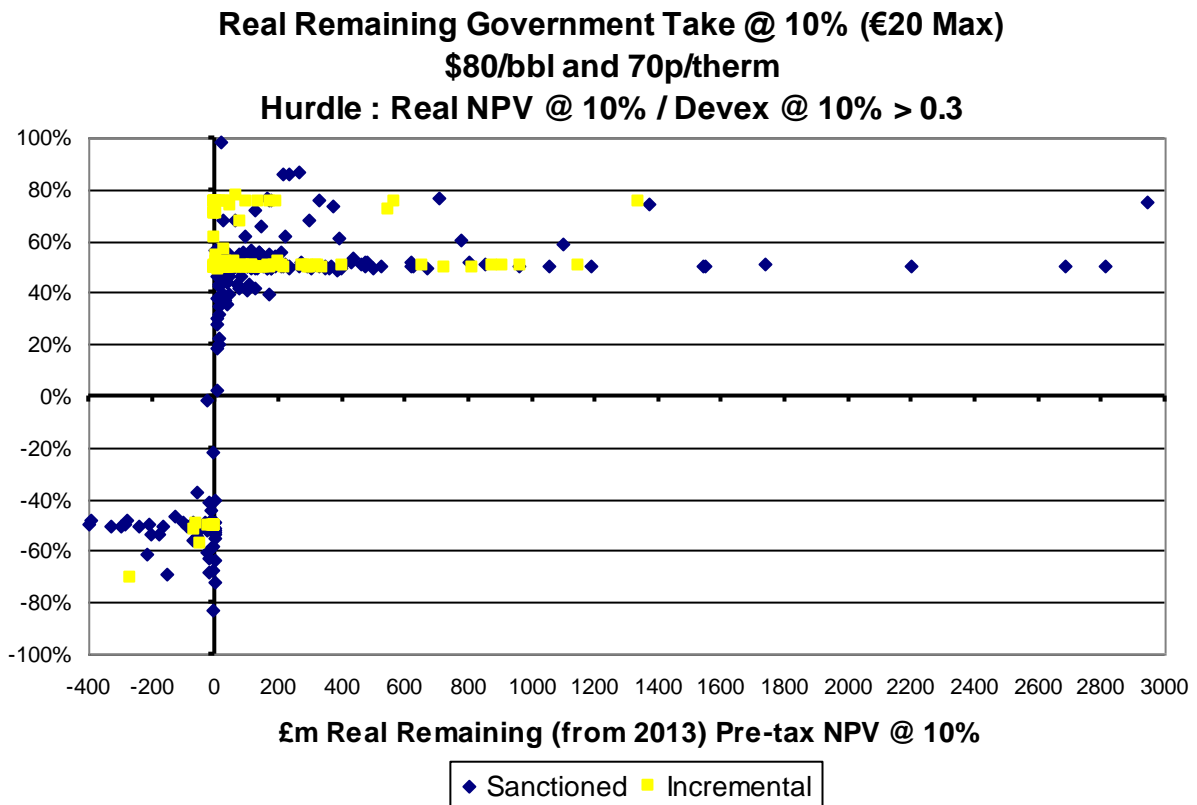


Chart 43 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t. There are 68 sanctioned fields and 16 incremental projects with a real remaining government take at 10% of less than zero. Of these, 15 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 45 of the sanctioned fields and 13 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 121 sanctioned fields and 59 incremental projects which have a real remaining government take at 10% of 60% or more and 163 of the sanctioned fields and 110 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 44

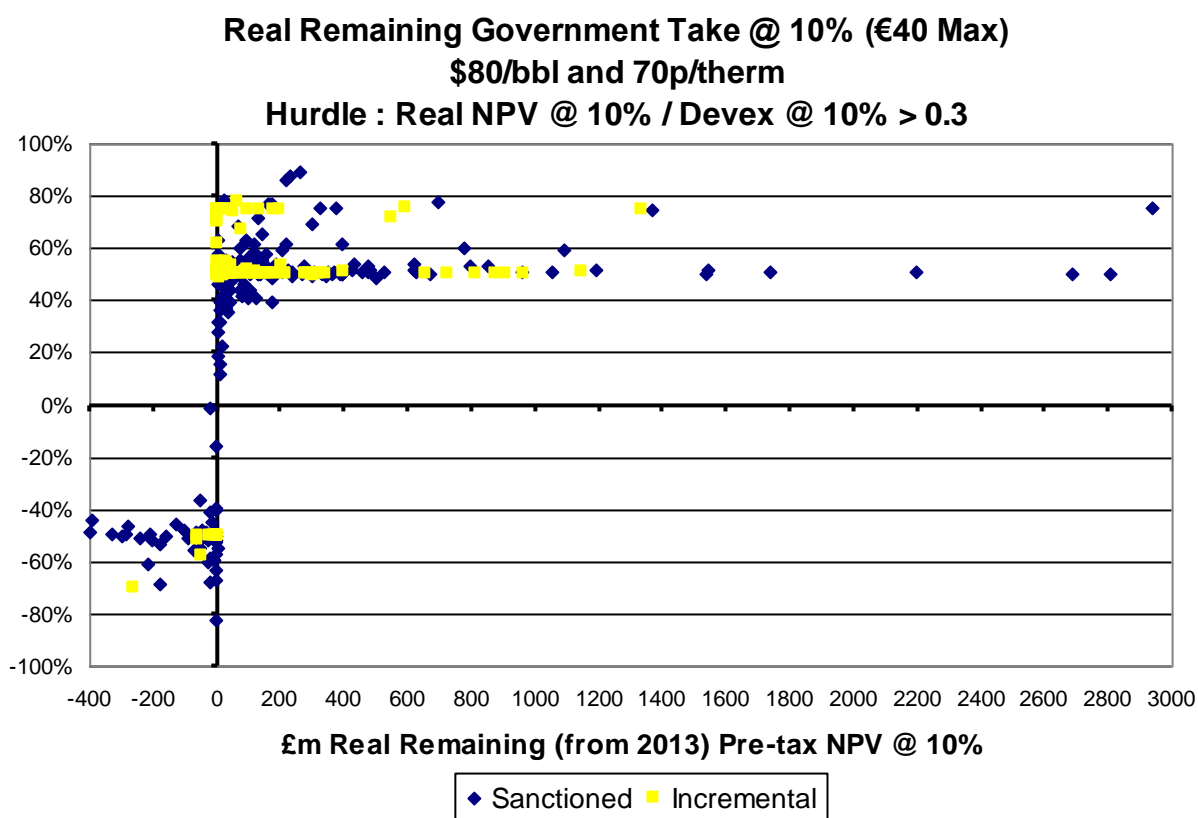


Chart 44 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t. There are 68 sanctioned fields and 16 incremental projects with a real remaining government take at 10% of less than zero. Of these, 13 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 42 of the sanctioned fields and 13 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 128 sanctioned fields and 59 incremental projects which have a real remaining government take at 10% of 60% or more and 163 of the sanctioned fields and 110 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 45

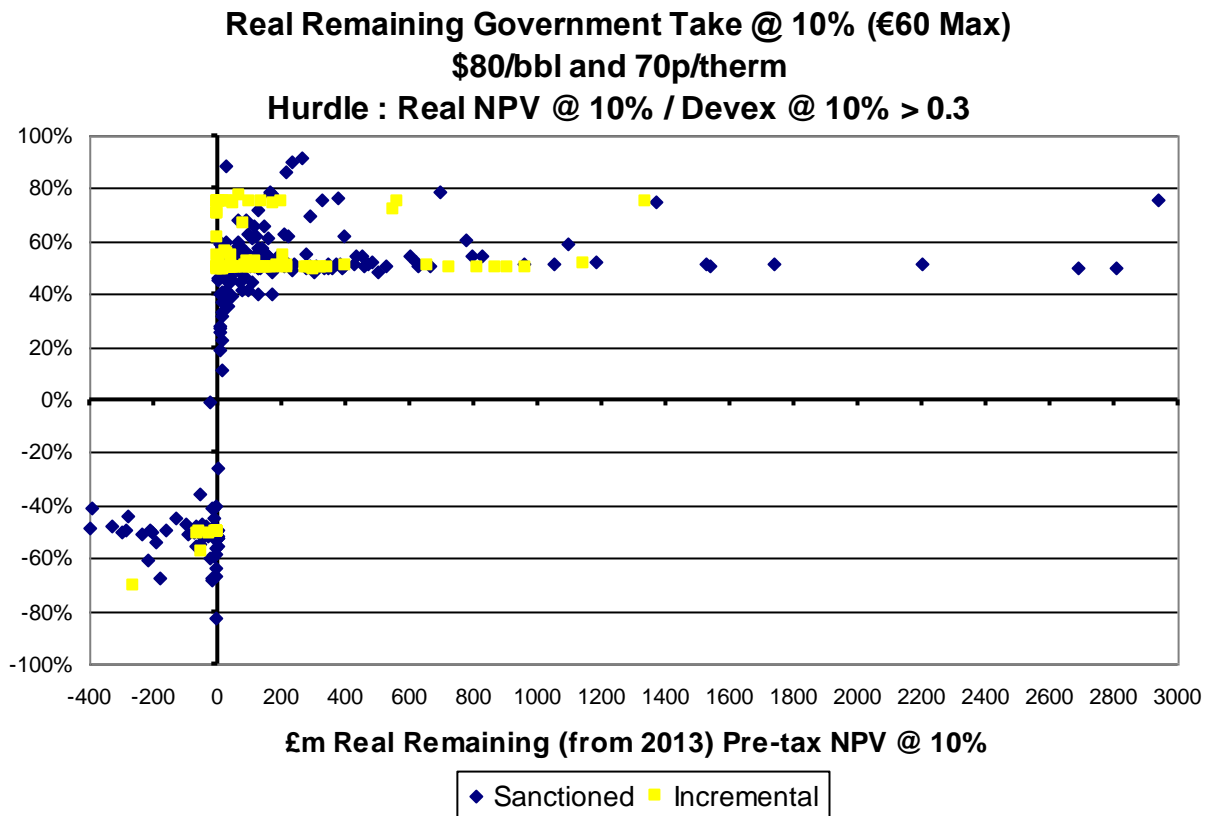


Chart 45 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t. There are 68 sanctioned fields and 16 incremental projects with a real remaining government take at 10% of less than zero. Of these, 14 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 42 of the sanctioned fields and 13 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 131 sanctioned fields and 58 incremental projects which have a real remaining government take at 10% of 60% or more and 164 of the sanctioned fields and 109 of the incremental projects which have a real remaining government take at 10% of 50% or more.

viii) New Field Lifetime Real Government Take at 10%

The real government take at 10% (real lifetime tax plus emission costs) is shown against the real lifetime pre-tax NPV at 10% for the probable, possible and technical reserve fields. By 2013 there are future fields which are at the tail end of their lives or in the process of decommissioning and these results in the remaining NPV being negative.

Chart 46

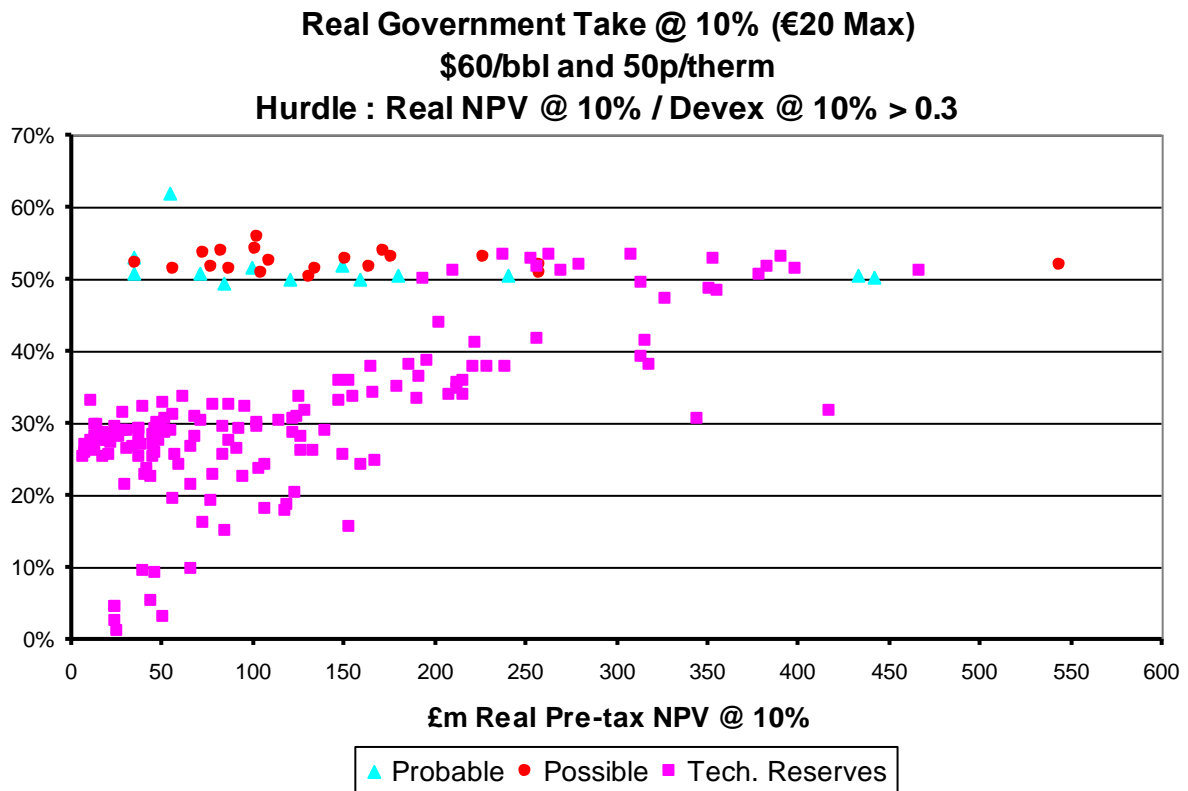


Chart 46 shows the real pre-tax NPV at 10% against real government take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t at the medium price. There are 14 probable fields, 20 possible fields and 18 technical reserve fields which have a real government take at 10% of 60% or more. There are 15 probable fields, 20 possible fields and 26 technical reserve fields which have a real government take at 10% of 50% or

more. There are 15 probable fields, 20 possible fields and 152 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 47

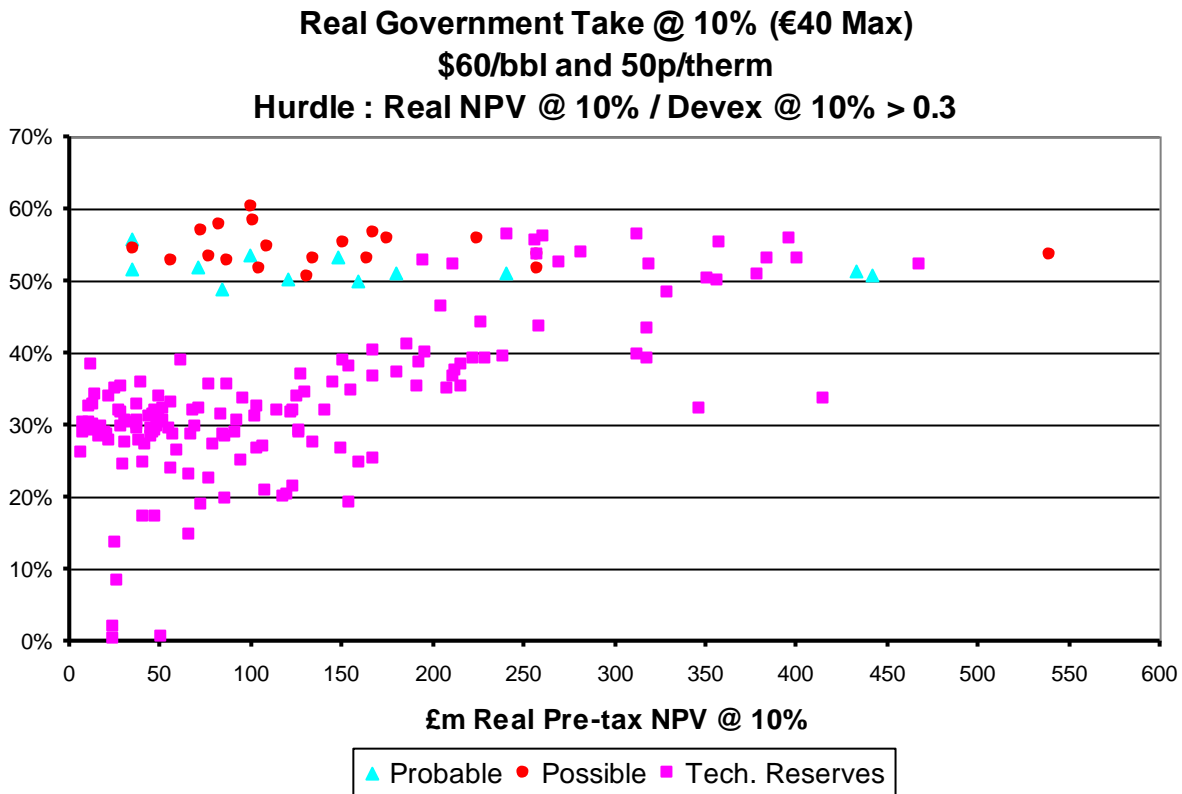


Chart 47 shows the real pre-tax NPV at 10% against real government take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t at the medium price. There are 13 probable fields, 20 possible fields and 20 technical reserve fields which have a real government take at 10% of 60% or more. There are 14 probable fields, 20 possible fields and 29 technical reserve fields which have a real government take at 10% of 50% or more. There are 14 probable fields, 20 possible fields and 151 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 48

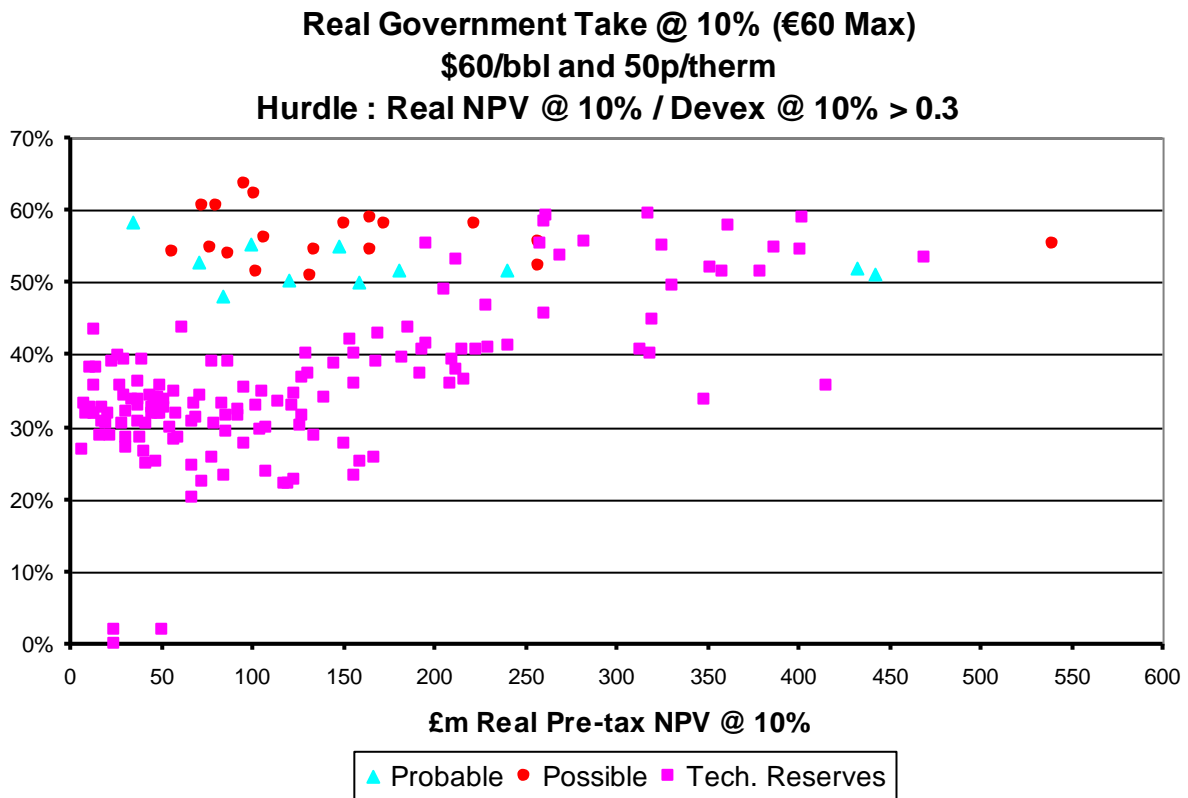


Chart 48 shows the real pre-tax NPV at 10% against real government take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t at the medium price. There are 12 probable fields, 19 possible fields and 20 technical reserve fields which have a real government take at 10% of 60% or more. There are 13 probable fields, 19 possible fields and 40 technical reserve fields which have a real government take at 10% of 50% or more. There are 13 probable fields, 19 possible fields and 148 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 49

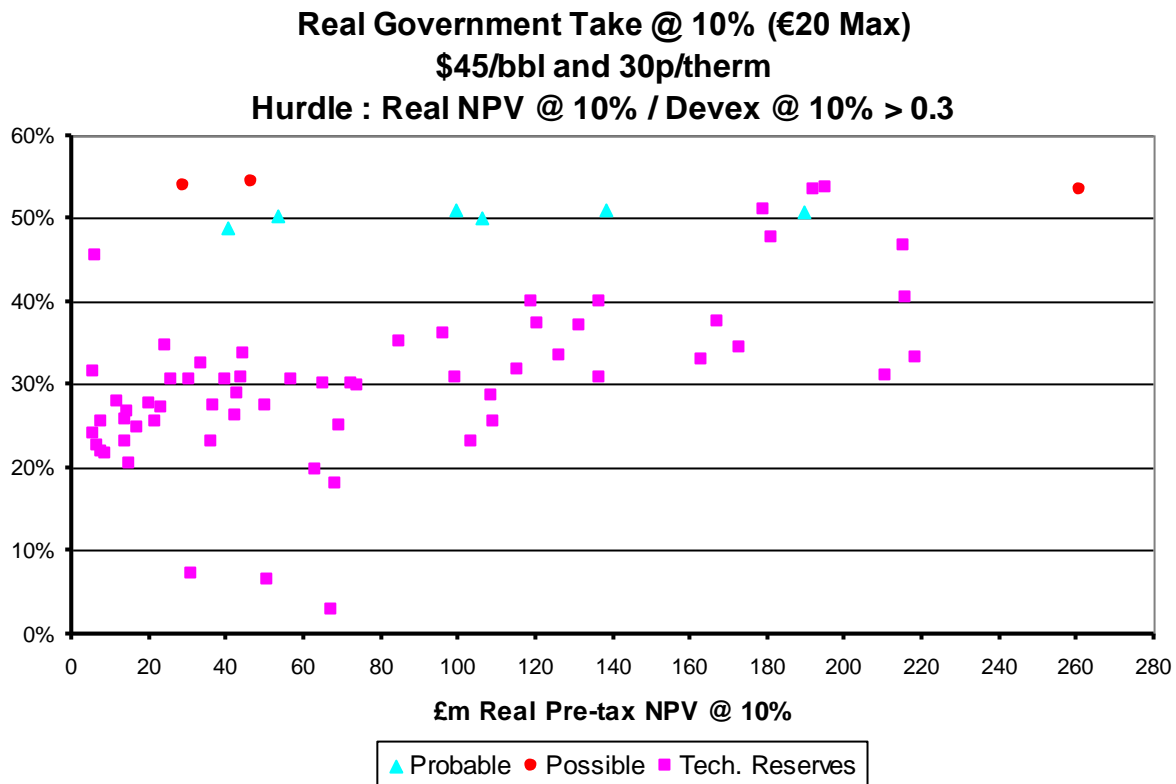


Chart 49 shows the real pre-tax NPV at 10% against real government take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t at the low price. There are 5 probable fields, 3 possible fields and 5 technical reserve fields which have a real government take at 10% of 60% or more. There are 6 probable fields, 3 possible fields and 9 technical reserve fields which have a real government take at 10% of 50% or more. There are 6 probable fields, 3 possible fields and 64 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 50

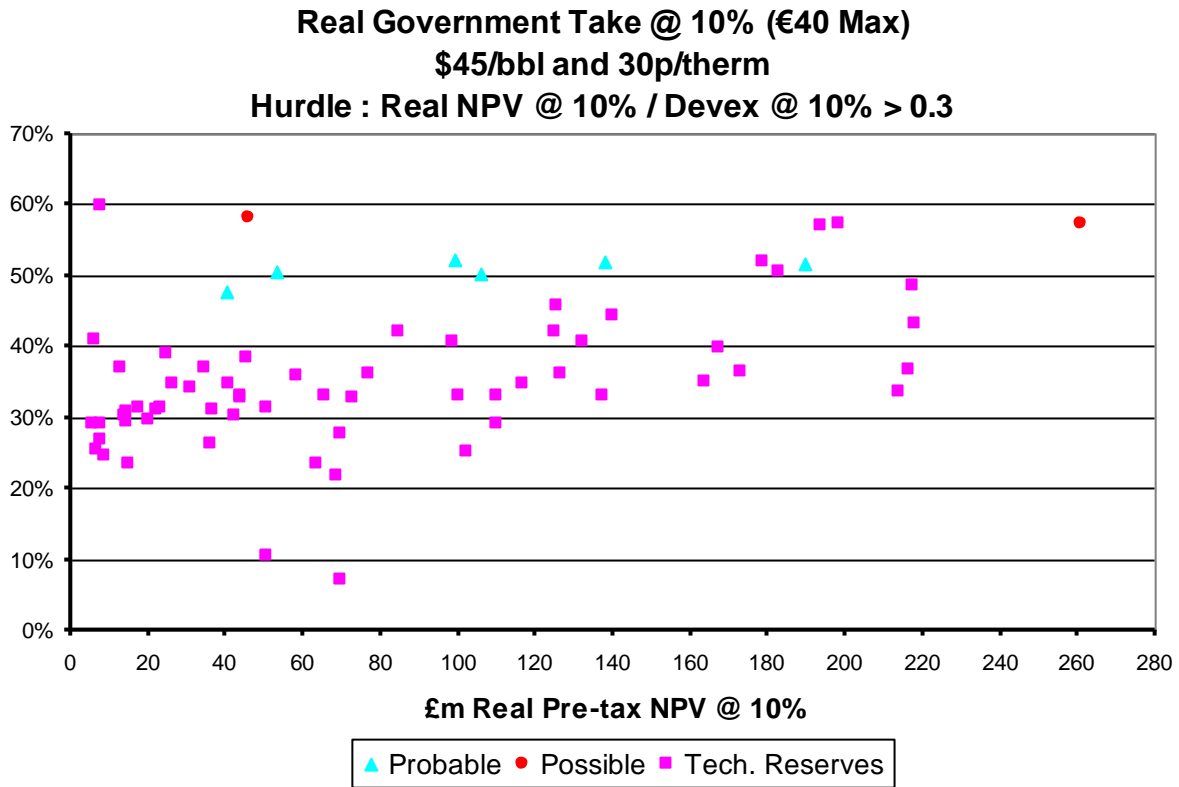


Chart 50 shows the real pre-tax NPV at 10% against real government take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t at the low price. There are 5 probable fields, 2 possible fields and 7 technical reserve fields which have a real government take at 10% of 60% or more. There are 6 probable fields, 2 possible fields and 16 technical reserve fields which have a real government take at 10% of 50% or more. There are 6 probable fields, 2 possible fields and 63 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.



Chart 51

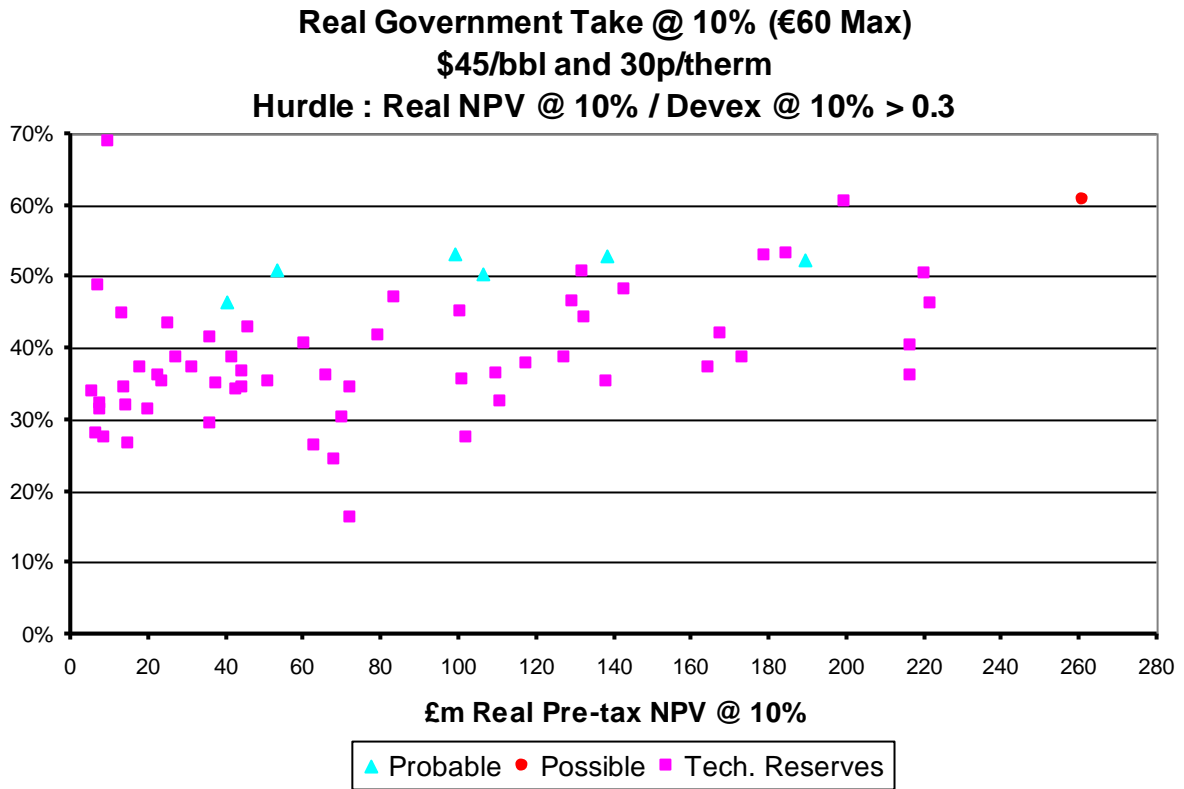


Chart 51 shows the real pre-tax NPV at 10% against real government take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t at the low price. There are 5 probable fields, 1 possible field and 8 technical reserve fields which have a real government take at 10% of 60% or more. There are 6 probable fields, 1 possible field and 23 technical reserve fields which have a real government take at 10% of 50% or more. There are 6 probable fields, 1 possible field and 60 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 52

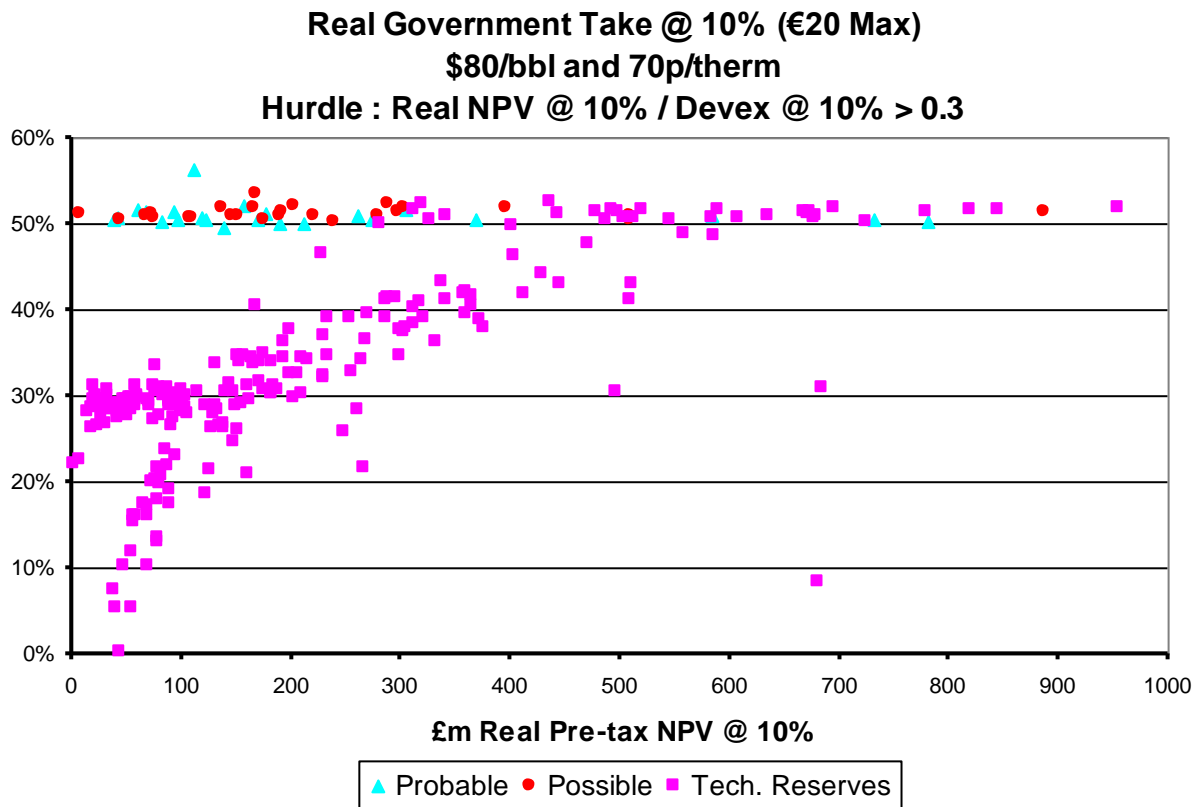


Chart 52 shows the real pre-tax NPV at 10% against real government take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t at the high price. There are 27 probable fields, 26 possible fields and 34 technical reserve fields which have a real government take at 10% of 60% or more. There are 28 probable fields, 26 possible fields and 58 technical reserve fields which have a real government take at 10% of 50% or more. There are 28 probable fields, 26 possible fields and 229 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 53

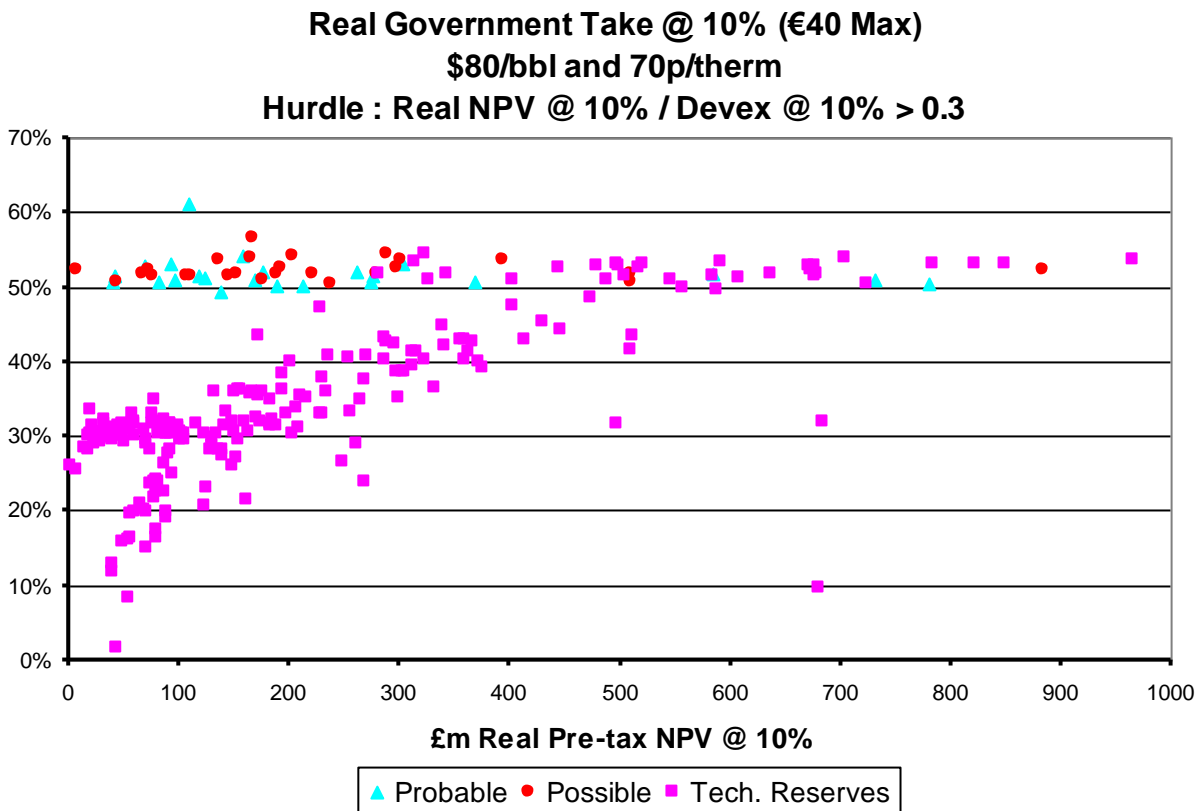


Chart 53 shows the real pre-tax NPV at 10% against real government take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t at the high price. There are 26 probable fields, 26 possible fields and 35 technical reserve fields which have a real government take at 10% of 60% or more. There are 27 probable fields, 26 possible fields and 64 technical reserve fields which have a real government take at 10% of 50% or more. There are 27 probable fields, 26 possible fields and 228 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 54

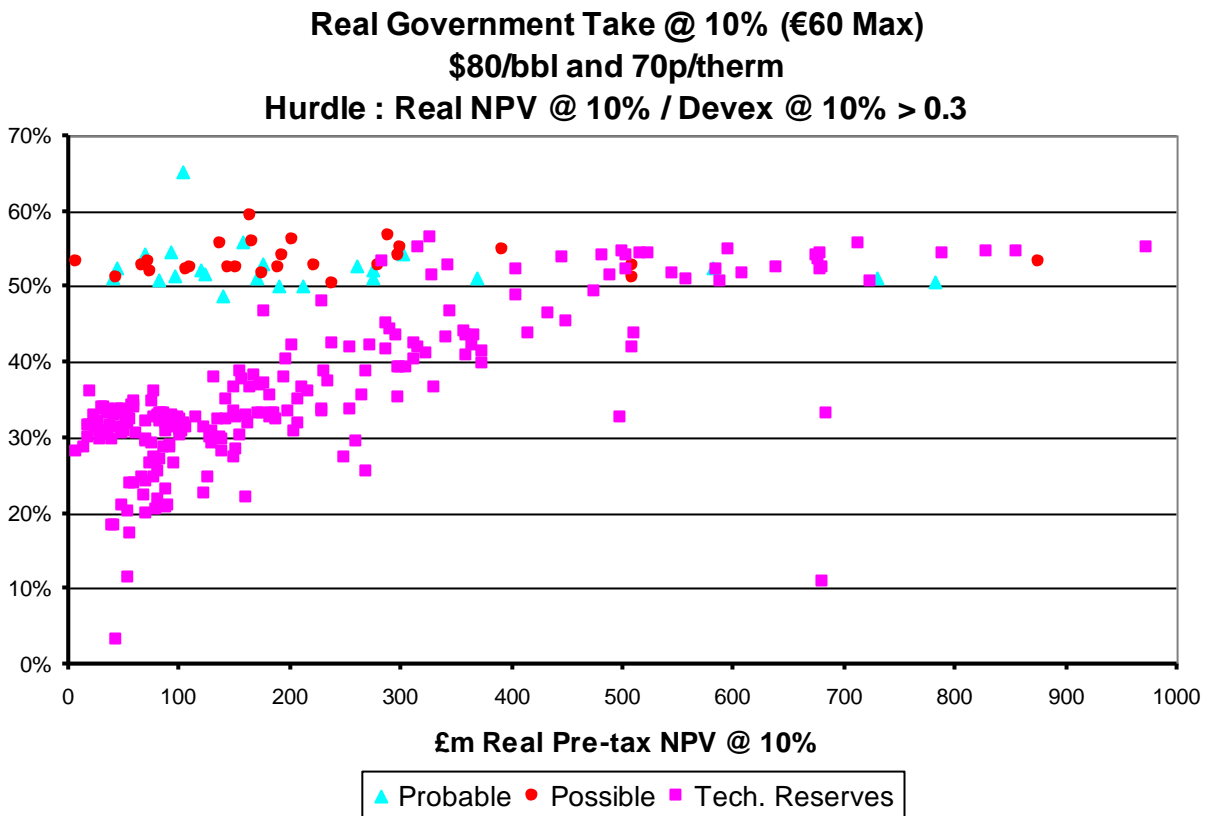
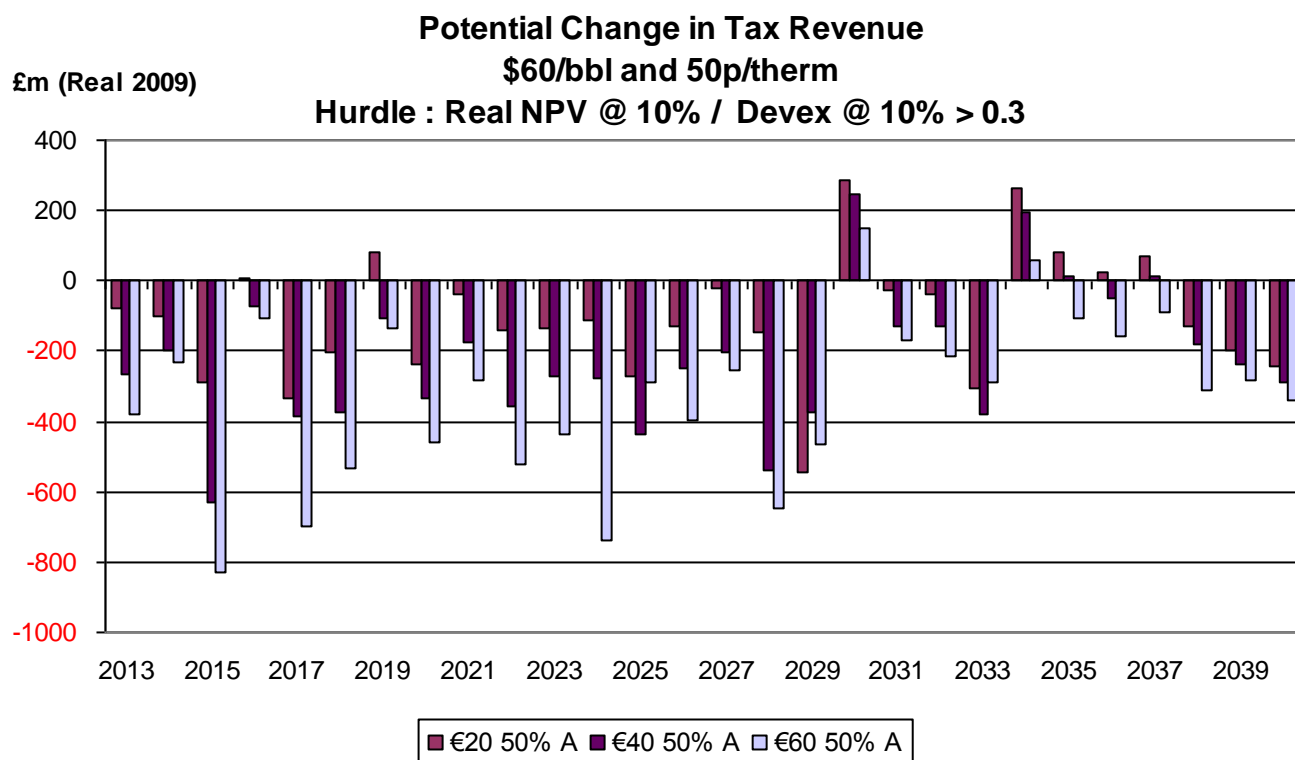


Chart 54 shows the real pre-tax NPV at 10% against real government take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t at the high price. There are 27 probable fields, 26 possible fields and 37 technical reserve fields which have a real government take at 10% of 60% or more. There are 27 probable fields, 26 possible fields and 67 technical reserve fields which have a real government take at 10% of 50% or more. There are 27 probable fields, 26 possible fields and 227 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

## (b) Fifty Per Cent of Emissions from Electricity Generation

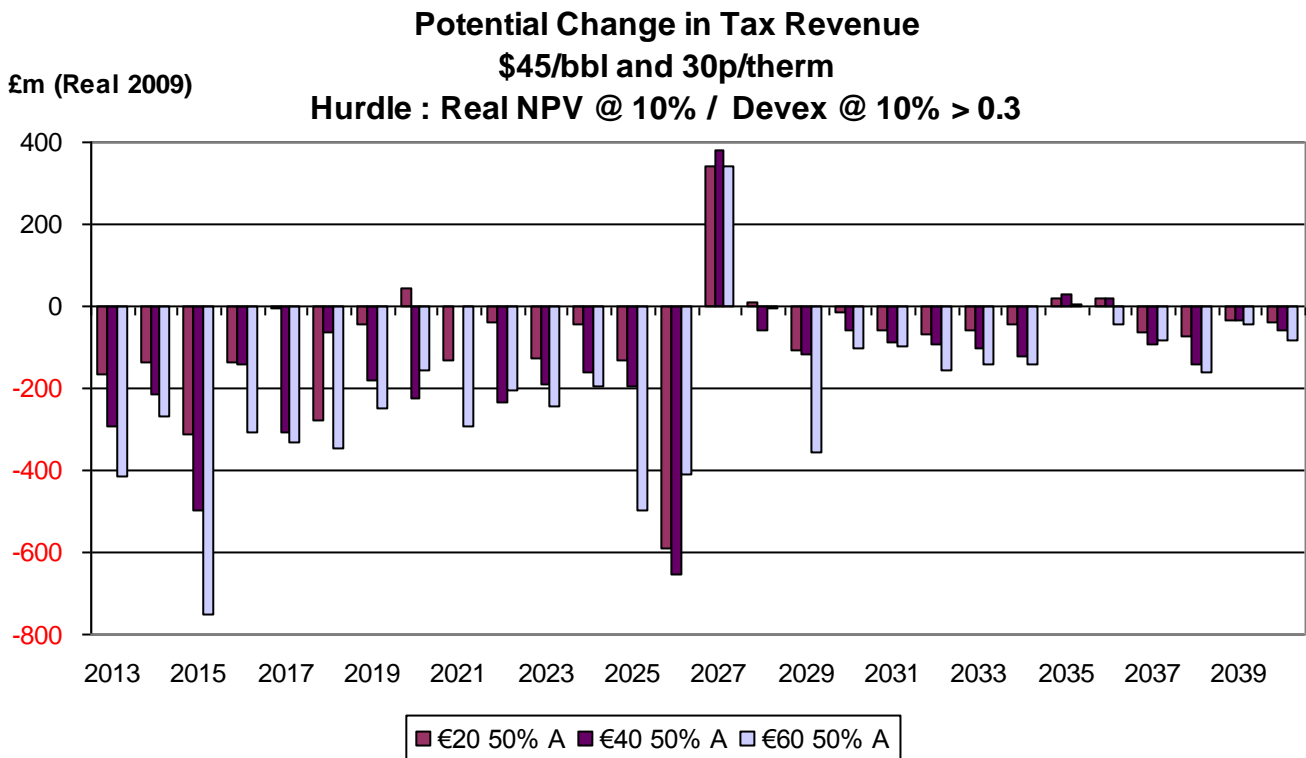
### i) Potential Change in Tax Revenue

Chart 55



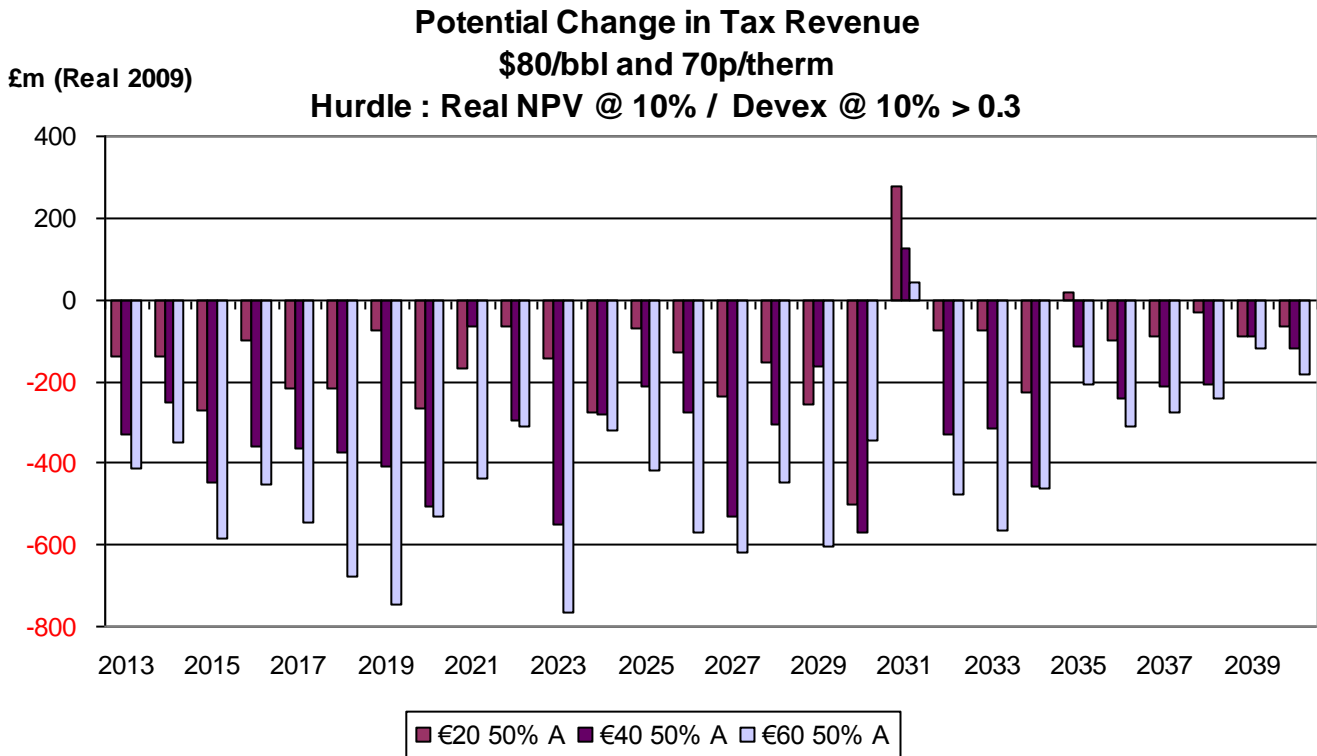
From Chart 55 it is seen that at the medium price, if 50% of emissions arise from electricity generation, with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, real tax revenue could be reduced by £333m in 2017, £238m in 2020, £270m in 2025 and £546m in 2029. The cumulative loss in tax revenue could be £1162m by 2020, £2423m by 2030 and £2928m by 2040. With a CO<sub>2</sub> price of €40/t, real tax revenue could be reduced by £631m in 2015, £385m in 2017, £358m in 2022 and £540m in 2028. The cumulative loss in tax revenue could be £2363m by 2020, £4993m by 2030 and £6162m by 2040. With a CO<sub>2</sub> price of €60/t, real tax revenue could be reduced by £827m in 2015, £699m in 2017, £736m in 2024 and £648m in 2028. The cumulative loss in tax revenue could be £3368m by 2020, £7240m by 2030 and £9144m by 2040.

Chart 56



From Chart 56 it is seen that at the low price, if 50% of emissions arise from electricity generation, with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, real tax revenue could be reduced by £310m in 2015, £278m in 2018, £134m in 2025 and £592m in 2026. The cumulative loss in tax revenue could be £1039m by 2020, £1879m by 2030 and £2280m by 2040. With a CO<sub>2</sub> price of €40/t, real tax revenue could be reduced by £499m in 2015, £309m in 2017, £234m in 2022 and £654m in 2026. The cumulative loss in tax revenue could be £1929m by 2020, £3219m by 2030 and £3893m by 2040. With a CO<sub>2</sub> price of €60/t, real tax revenue could be reduced by £715m in 2015, £348m in 2018, £497m in 2025 and £410m in 2026. The cumulative loss in tax revenue could be £2828m by 2020, £4796m by 2030 and £5736m by 2040.

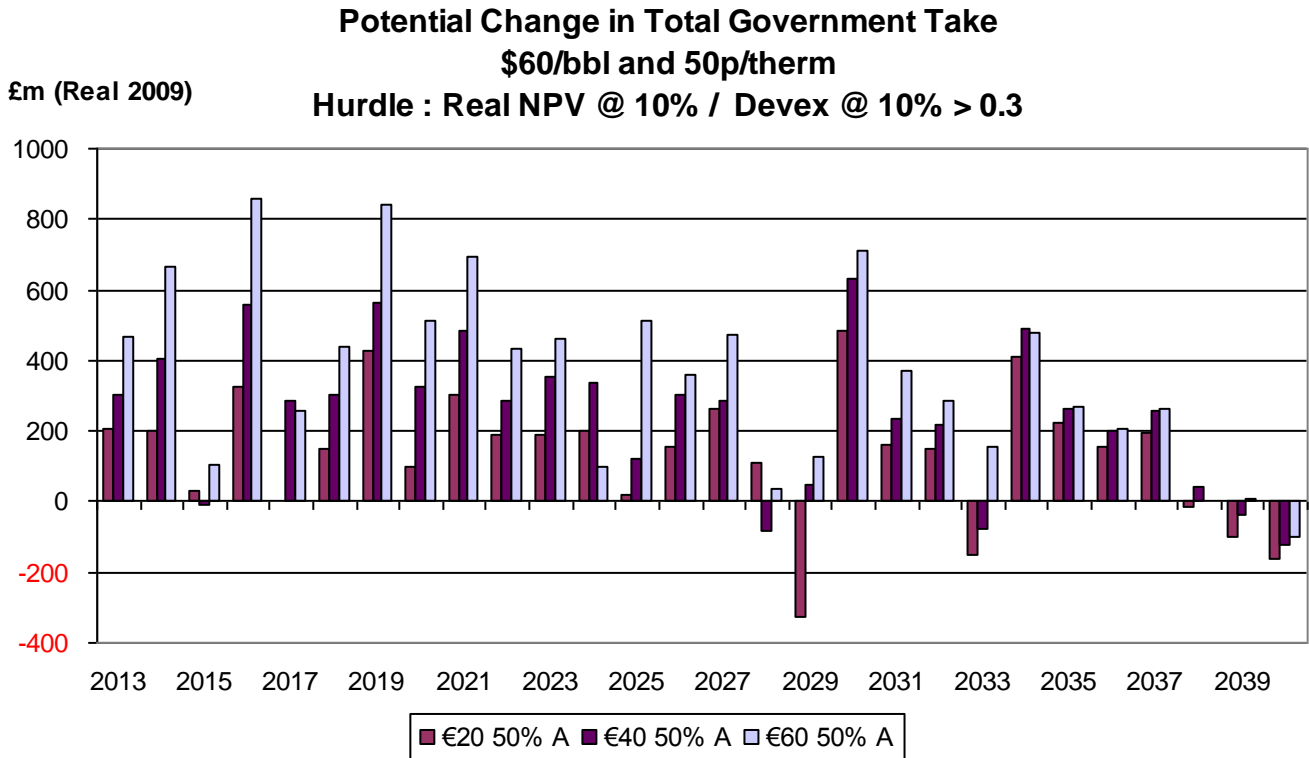
Chart 57



From Chart 57 it is seen that at the high price, if 50% of emissions arise from electricity generation, with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, real tax revenue could be reduced by £271m in 2015, £265m in 2020, £277m in 2024 and £502m in 2030. The cumulative loss in tax revenue could be £1422m by 2020, £3425m by 2030 and £3889m by 2040. With a CO<sub>2</sub> price of €40/t, real tax revenue could be reduced by £449m in 2015, £504m in 2020, £551m in 2023, £529m in 2027 and £570m in 2030. The cumulative loss in tax revenue could be £3037m by 2020, £6283m by 2030 and £8248m by 2040. With a CO<sub>2</sub> price of €60/t, real tax revenue could be reduced by £585m in 2015, £746m in 2019, £768m in 2023 and £605m in 2029. The cumulative loss in tax revenue could be £4306m by 2020, £9140m by 2030 and £11935m by 2040.

ii) Potential Change in Total Government Take

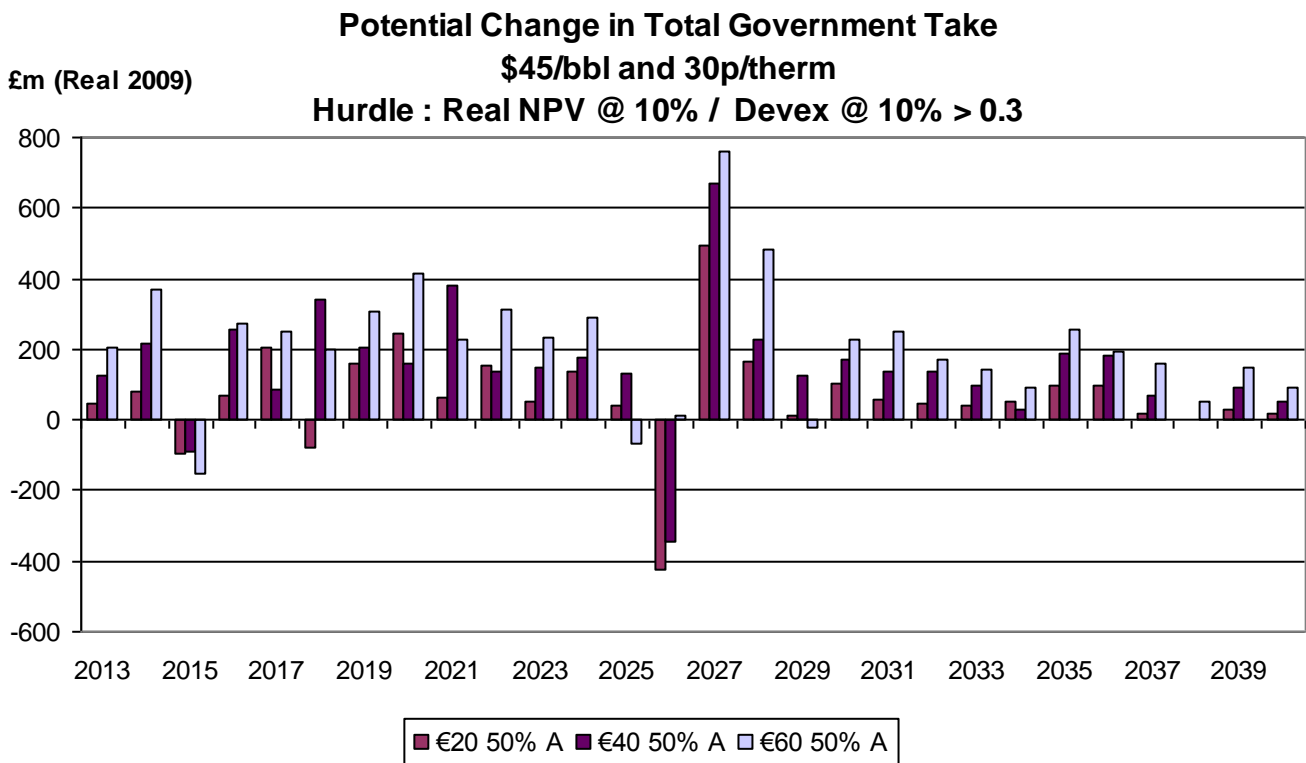
Chart 58



From Chart 58 it is seen that at the medium price, if 50% of emissions arise from electricity generation, with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the real total government take could be increased by £327m in 2016, £426m in 2019, £263m in 2027, £485m in 2030 and £409m in 2034. The cumulative change in total government take could be £1441m by 2020, £3034m by 2030 and £3904m by 2040. With a CO<sub>2</sub> price of €40/t, the real total government take could be increased by £516m in 2016, £563m in 2019, £303m in 2026, £632m in 2030 and £488m in 2034. The cumulative change in total government take could be £2732m by 2020, £5502m by 2030 and £6959m by 2040. With a CO<sub>2</sub> price of €60/t, the real total government take could be increased by £858m in 2016, £841m in 2019, £511m in 2025 and £713m in 2030. The cumulative change in total government take could be £4146m by 2020, £8055m by 2030 and £9991m by 2040.

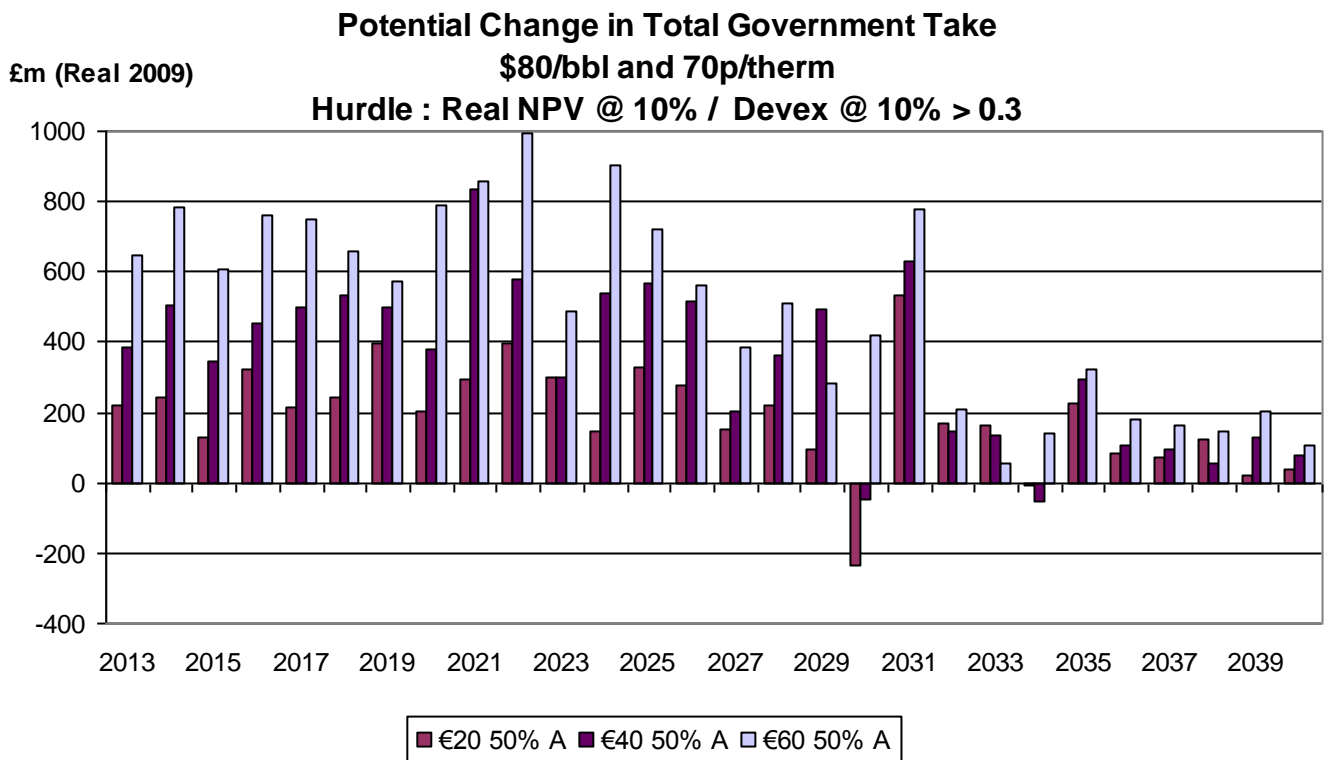


Chart 59



From Chart 59 it is seen that at the low price, if 50% of emissions arise from electricity generation, with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the real total government take could be increased by £207m in 2017, £245m in 2020, £497m in 2027 and £100m in 2036. The cumulative change in total government take could be £639m by 2020, £1435m by 2030 and £1891m by 2040. With a CO<sub>2</sub> price of €40/t, the real total government take could be increased by £256m in 2016, £343m in 2018, £381m in 2021, £670m in 2027 and £187m in 2035. The cumulative change in total government take could be £1300m by 2020, £3119m by 2030 and £4101m by 2040. With a CO<sub>2</sub> price of €60/t, the real total government take could be increased by £366m in 2014, £412m in 2020, £759m in 2027 and £255m in 2035. The cumulative change in total government take could be £1861m by 2020, £4328m by 2030 and £5886m by 2040.

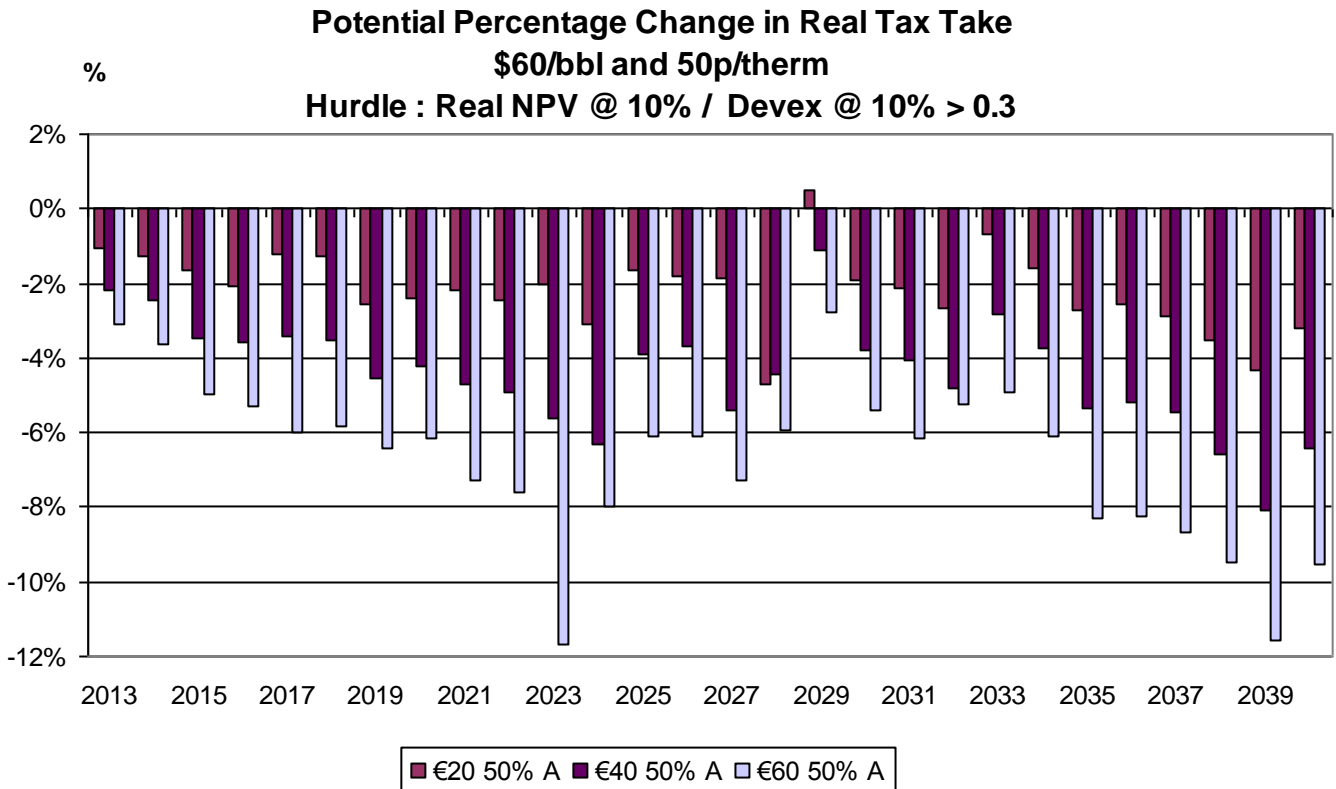
Chart 60



From Chart 60 it is seen that at the high price, if 50% of emissions arise from electricity generation, with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the real total government take could be increased by £324m in 2016, £399m in 2019, £397m in 2022, £535m in 2031 and £225m in 2035. The cumulative change in total government take could be £1975m by 2020, £3957m by 2030 and £5372m by 2040. With a CO<sub>2</sub> price of €40/t, the real total government take could be increased by £535m in 2018, £833m in 2021, £629m in 2031 and £296m in 2035. The cumulative change in total government take could be £3602m by 2020, £7953m by 2030 and £9571m by 2040. With a CO<sub>2</sub> price of €60/t, the real total government take could be increased by £782m in 2014, £992m in 2022, £720m in 2025 and £777m in 2031. The cumulative change in total government take could be £5575m by 2020, £11701m by 2030 and £14009m by 2040.

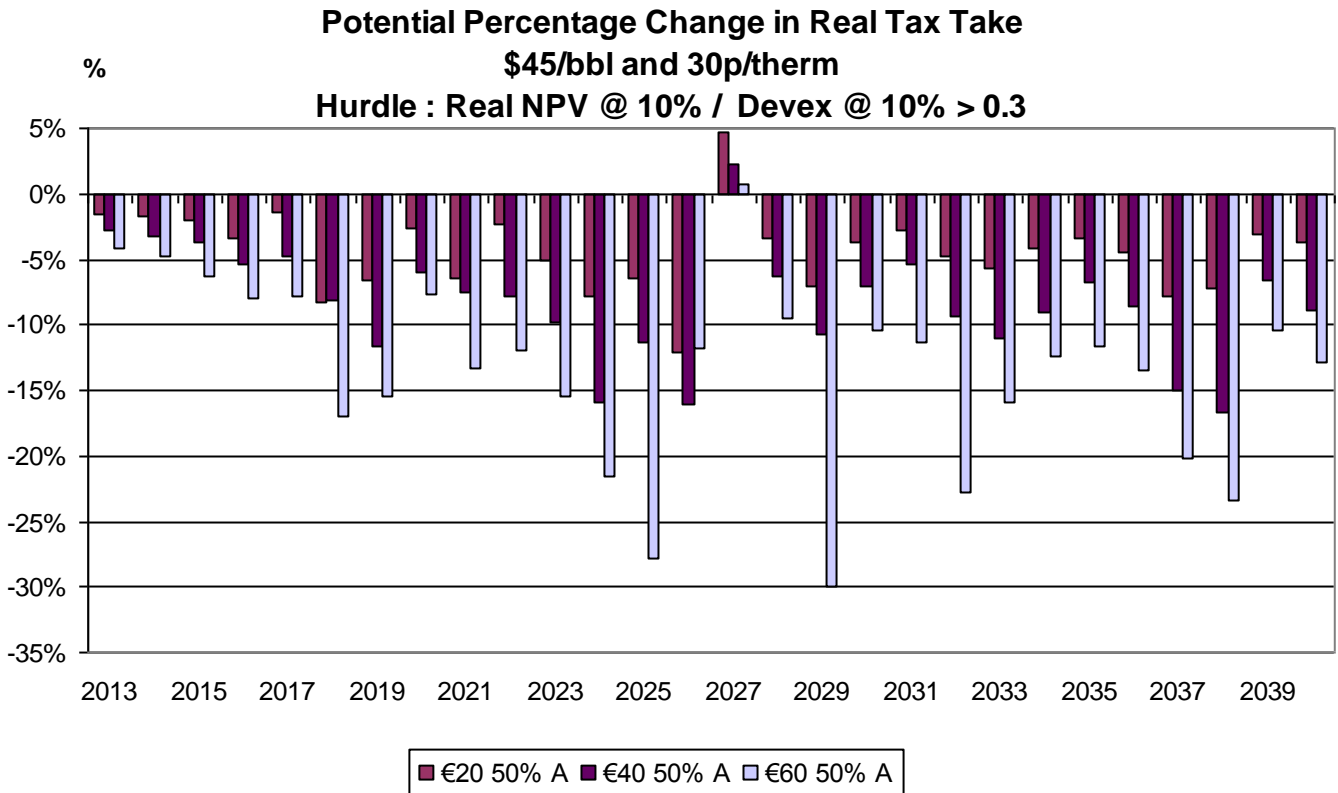
iii) Percentage Change in Tax Take

Chart 61



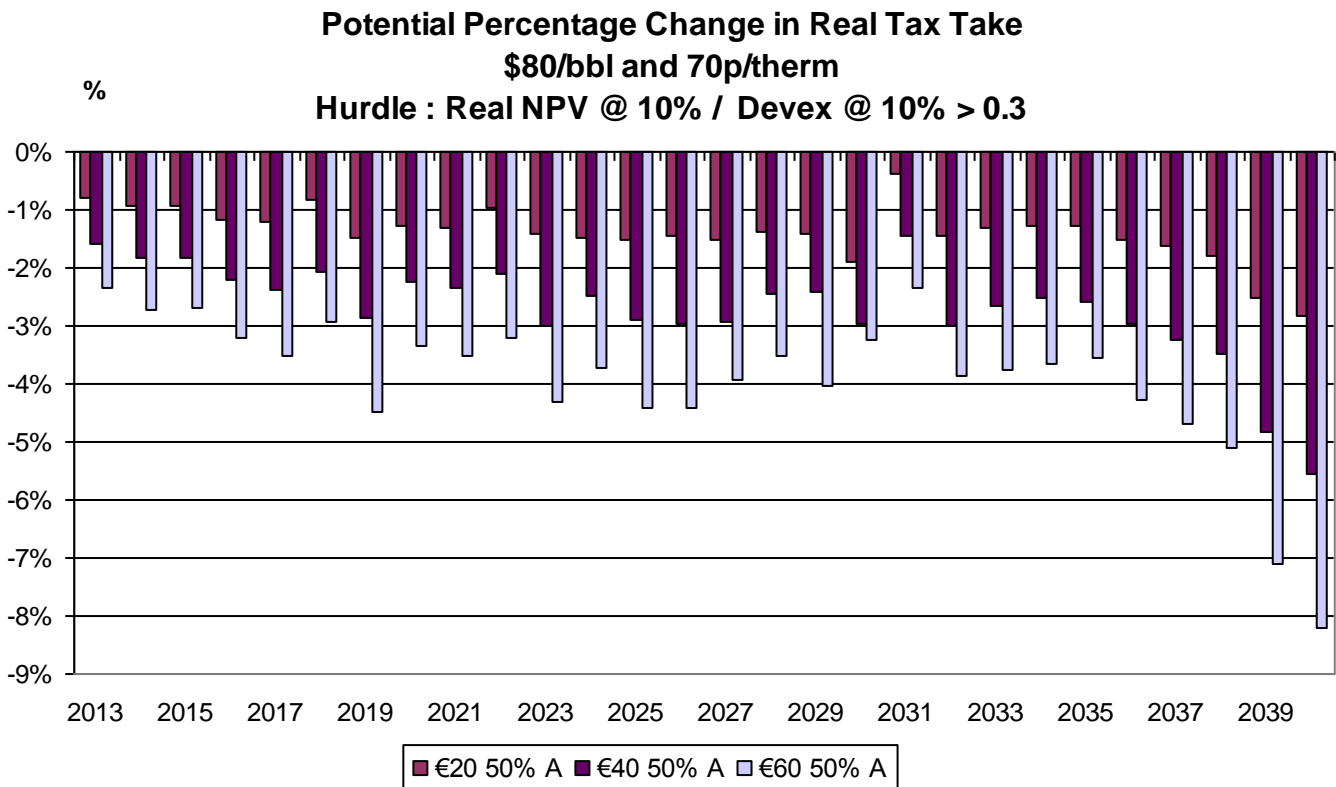
In Chart 61 it is seen that at the medium price, if 50% of emissions arise from electricity generation, with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real tax take could be reduced by 2.1% in 2016, 2.54% in 2019, 3.12% in 2022, 4.72% in 2028 and 4.31% higher in 2039. Over the period to 2040, the average change is a decrease of 2.18%. With a CO<sub>2</sub> price of €40/t, the percentage real tax take could be reduced by 3.58% in 2016, 4.56% in 2019, 6.3% in 2024, 5.35% in 2035 and 8.07% higher in 2039. Over the period to 2040, the average change is a decrease of 4.42%. With a CO<sub>2</sub> price of €60/t, the percentage real tax take could be reduced by 6% lower in 2017, 11.7% in 2023, 7.29% in 2027 and 11.55% in 2039. Over the period to 2040, the average change is a decrease of 6.7%.

Chart 62



In Chart 62 it is seen that at the low price, if 50% of emissions arise from electricity generation, with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real tax take could be reduced by 8.32% in 2018, 7.76% in 2024, 12.12% higher in 2026 and 7.76% in 2037. Over the period to 2040, the average change is a decrease of 4.44%. With a CO<sub>2</sub> price of €40/t, the percentage real tax take could be reduced by 5.38% in 2016, 11.64% in 2019, 15.88% in 2024, 16.14% in 2026 and 16.62% in 2038. Over the period to 2040, the average change is a decrease of 8.33%. With a CO<sub>2</sub> price of €60/t, the percentage real tax take could be reduced by 17.03% lower in 2018, 13.27% in 2021, 27.88% in 2025, 22.73% in 2032 and 23.44% lower in 2038. Over the period to 2040, the average change is a decrease of 13.45%.

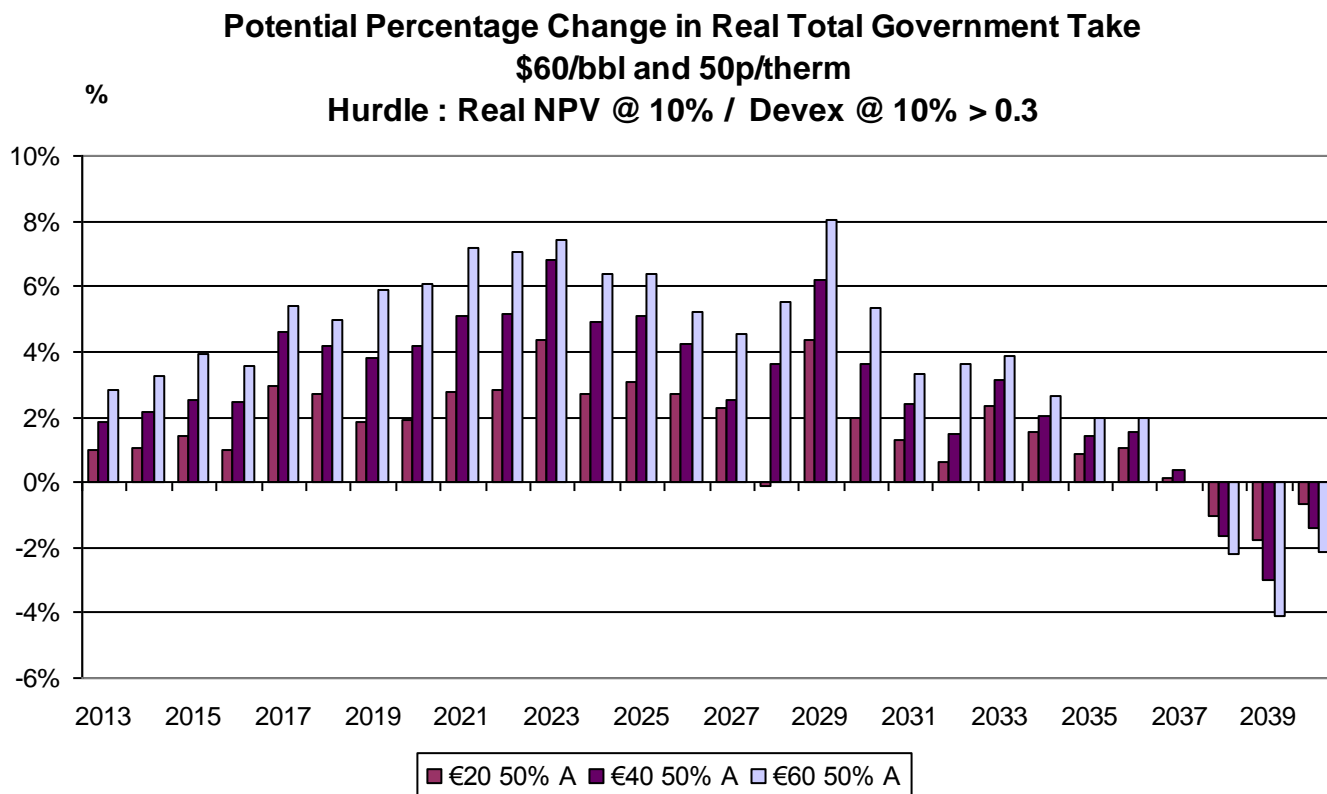
Chart 63



In Chart 63 it is seen that at the high price, if 50% of emissions arise from electricity generation, with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real tax take could be reduced by 1.49% in 2019, 1.5% in 2025, 1.88% in 2030 and 2.82% in 2040. Over the period to 2040, the average change is a decrease of 1.39%. With a CO<sub>2</sub> price of €40/t, the percentage real tax take could be reduced by 2.4% in 2017, 2.98% in 2023, 2.97% in 2030, 2.99% in 2032 and 5.55% higher in 2040. Over the period to 2040, the average change is a decrease of 2.71%. With a CO<sub>2</sub> price of €60/t, the percentage real tax take could be reduced by 3.5% in 2017, 4.49% in 2019, 4.43% in 2026, 4.03% in 2029 and 8.21% in 2040. Over the period to 2040, the average change is a decrease of 3.94%.

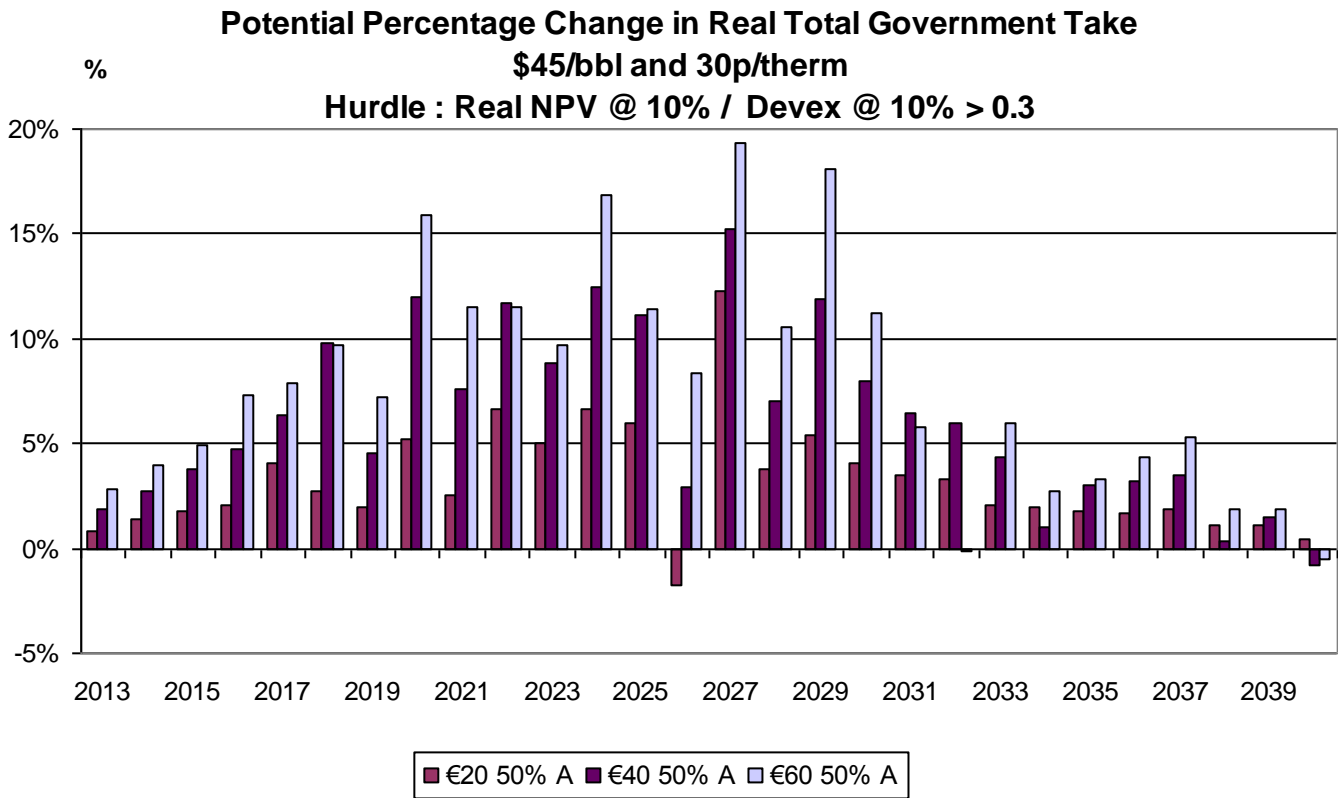
iv) Percentage Change in Government Take

Chart 64



In Chart 64 it is seen that at the medium price, if 50% of emissions arise from electricity generation, with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real government take could be 2.96% higher in 2017, 4.34% higher in 2023, 4.36% higher in 2029 and 2.31% higher in 2033. Over the period to 2040, the average change is an increase of 1.61%. With a CO<sub>2</sub> price of €40/t, the percentage real government take could be 4.62% higher in 2017, 6.84% higher in 2023, 6.21% higher in 2029 and 3.16% higher in 2033. Over the period to 2040, the average change is an increase of 2.84%. With a CO<sub>2</sub> price of €60/t, the percentage real government take could be 5.43% higher in 2017, 7.16% higher in 2021, 8.01% higher in 2029 and 3.89% higher in 2033. Over the period to 2040, the average change is an increase of 3.86%.

Chart 65

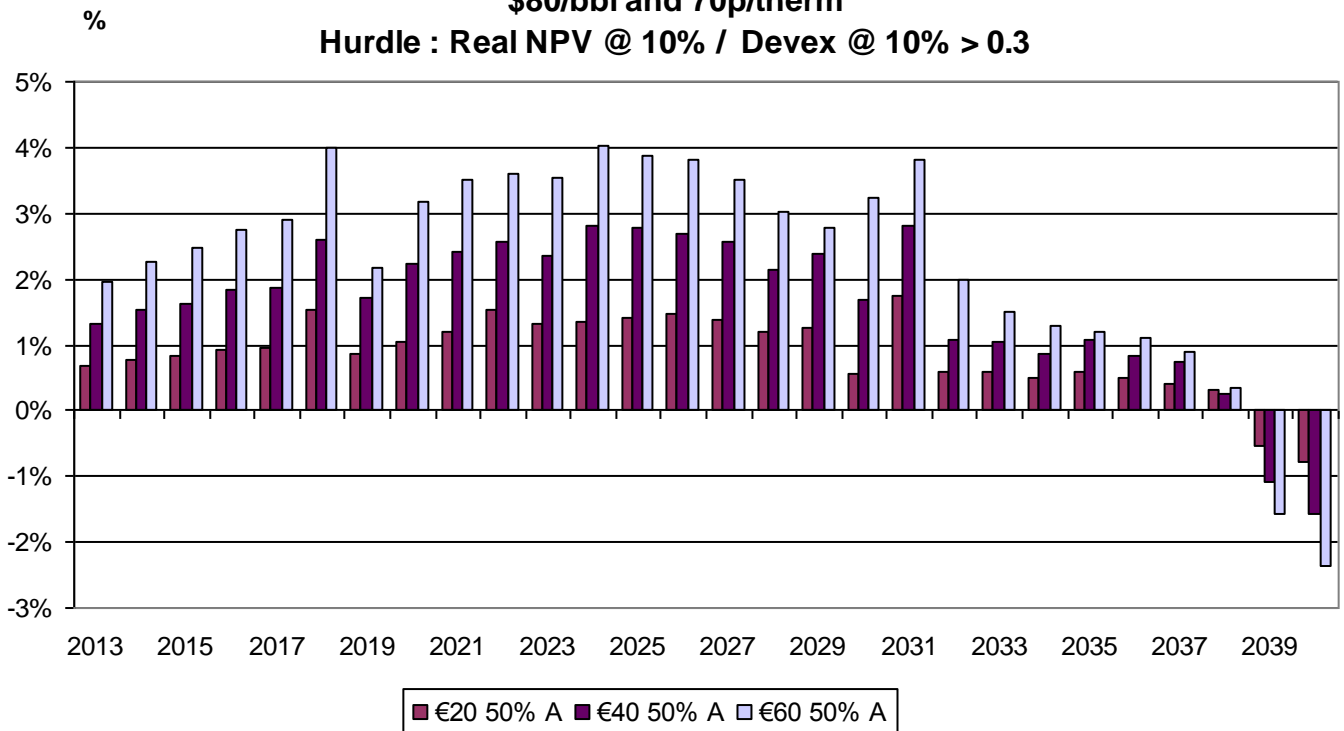


In Chart 65 it is seen that at the low price, if 50% of emissions arise from electricity generation, with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real government take could be 4.08% higher in 2017, 6.67% higher in 2022, 12.22% higher in 2027 and 5.41% higher in 2029. Over the period to 2040, the average change is an increase of 3.19%. With a CO<sub>2</sub> price of €40/t, the percentage real government take could be 9.79% higher in 2018, 12% higher in 2020, 12.47% higher in 2024 and 15.22% higher in 2027. Over the period to 2040, the average change is an increase of 6.11%. With a CO<sub>2</sub> price of €60/t, the percentage real government take could be 9.71% higher in 2018, 15.9% higher in 2020, 16.88% higher in 2024 and 19.32% higher in 2027. Over the period to 2040, the average change is an increase of 7.81%.

Chart 66

**Potential Percentage Change in Real Total Government Take  
\$80/bbl and 70p/therm**

**Hurdle : Real NPV @ 10% / Devex @ 10% > 0.3**



In Chart 66 it is seen that at the high price, if 50% of emissions arise from electricity generation, with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real government take could be 1.52% higher in 2018, 1.52% higher in 2022, 1.46% higher in 2026 and 1.75% higher in 2031. Over the period to 2040, the average change is an increase of 0.86%. With a CO<sub>2</sub> price of €40/t, the percentage real government take could be 2.59% higher in 2018, 2.8% higher in 2024, 2.4% higher in 2029 and 2.8% higher in 2031. Over the period to 2040, the average change is an increase of 1.61%. With a CO<sub>2</sub> price of €60/t, the percentage real government take could be 3.99% higher in 2018, 3.6% higher in 2022, 4.03% higher in 2024 and 3.82% higher in 2031. Over the period to 2040, the average change is an increase of 2.32%.



v) Remaining Percentage Tax Take (Sanctioned Fields and Incremental Projects)

Chart 67

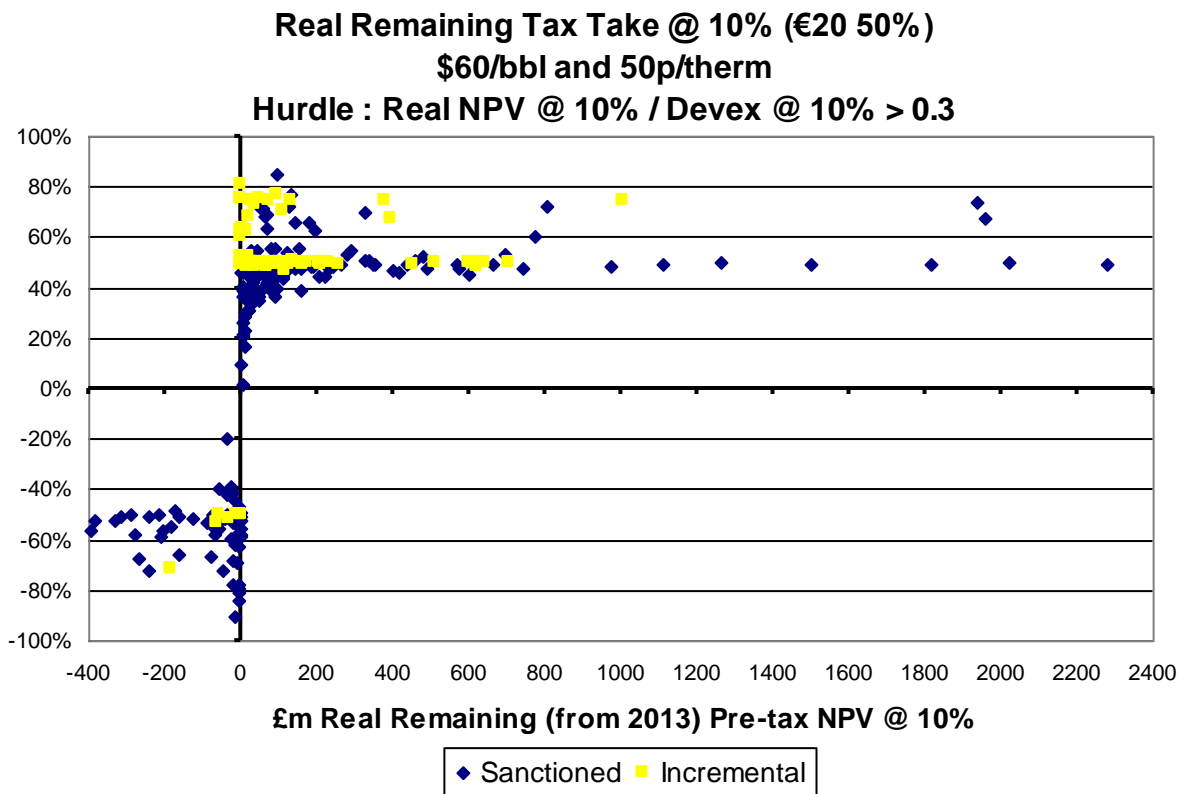


Chart 67 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where 50% of emissions arise from electricity generation. There are 79 sanctioned fields and 15 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 21 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 68 of the sanctioned fields and 12 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 34 sanctioned fields and 35 incremental projects which have a real remaining tax take at 10% of 60% or more and 132 of the sanctioned fields and 99 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 68

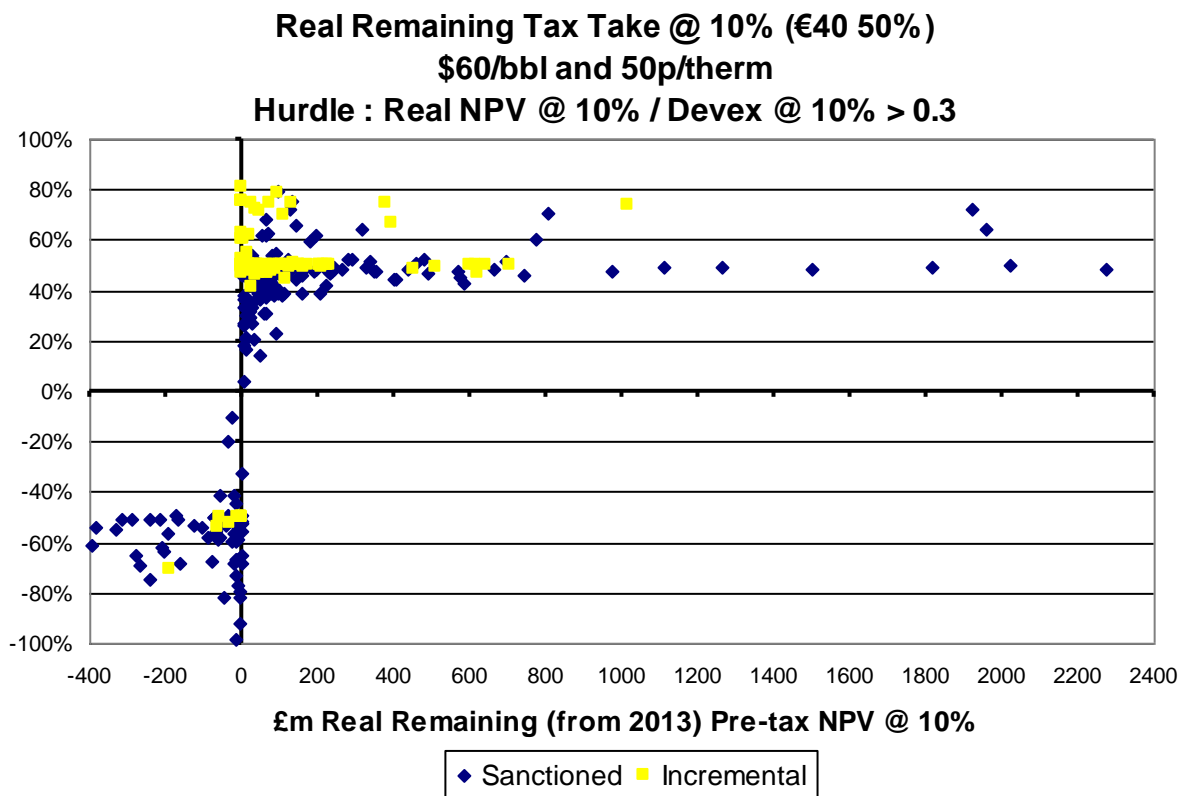


Chart 68 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where 50% of emissions arise from electricity generation. There are 80 sanctioned fields and 15 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 26 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 68 of the sanctioned fields and 12 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 28 sanctioned fields and 32 incremental projects which have a real remaining tax take at 10% of 60% or more and 122 of the sanctioned fields and 98 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 69

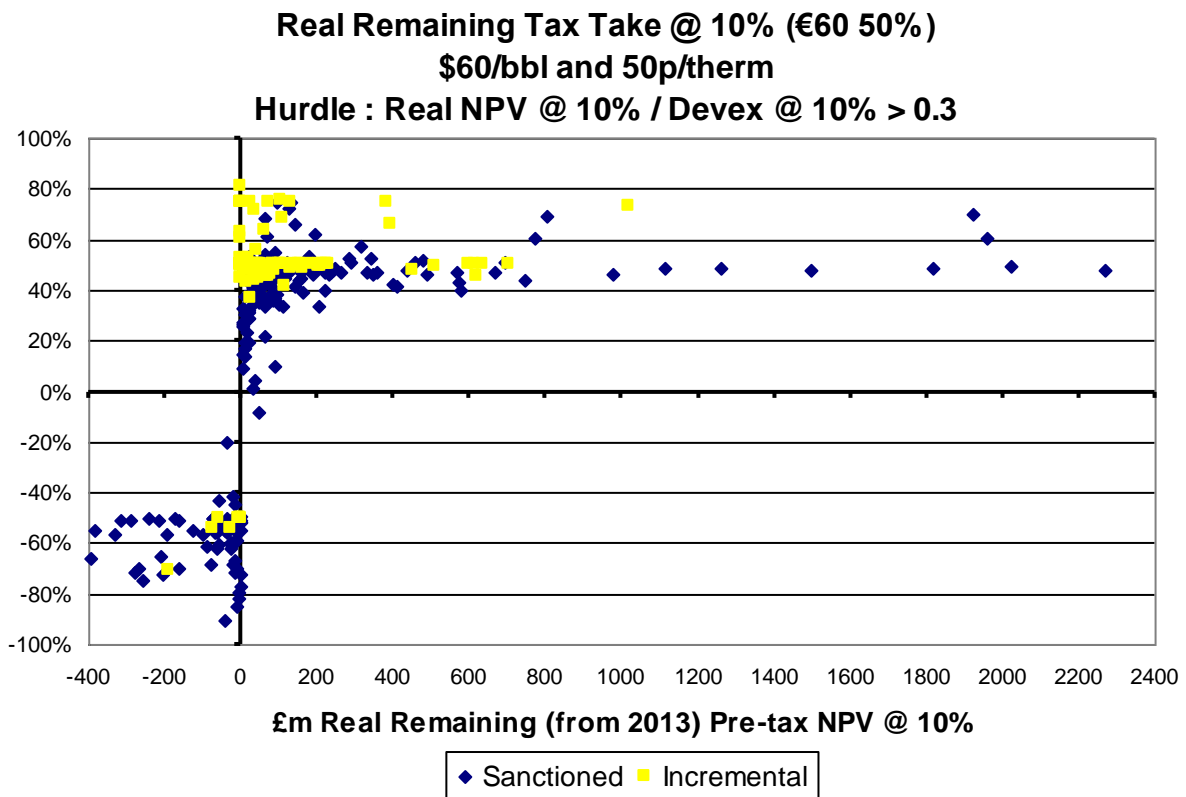


Chart 69 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where 50% of emissions arise from electricity generation. There are 82 sanctioned fields and 15 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 32 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 74 of the sanctioned fields and 12 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 27 sanctioned fields and 32 incremental projects which have a real remaining tax take at 10% of 60% or more and 117 of the sanctioned fields and 97 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 70

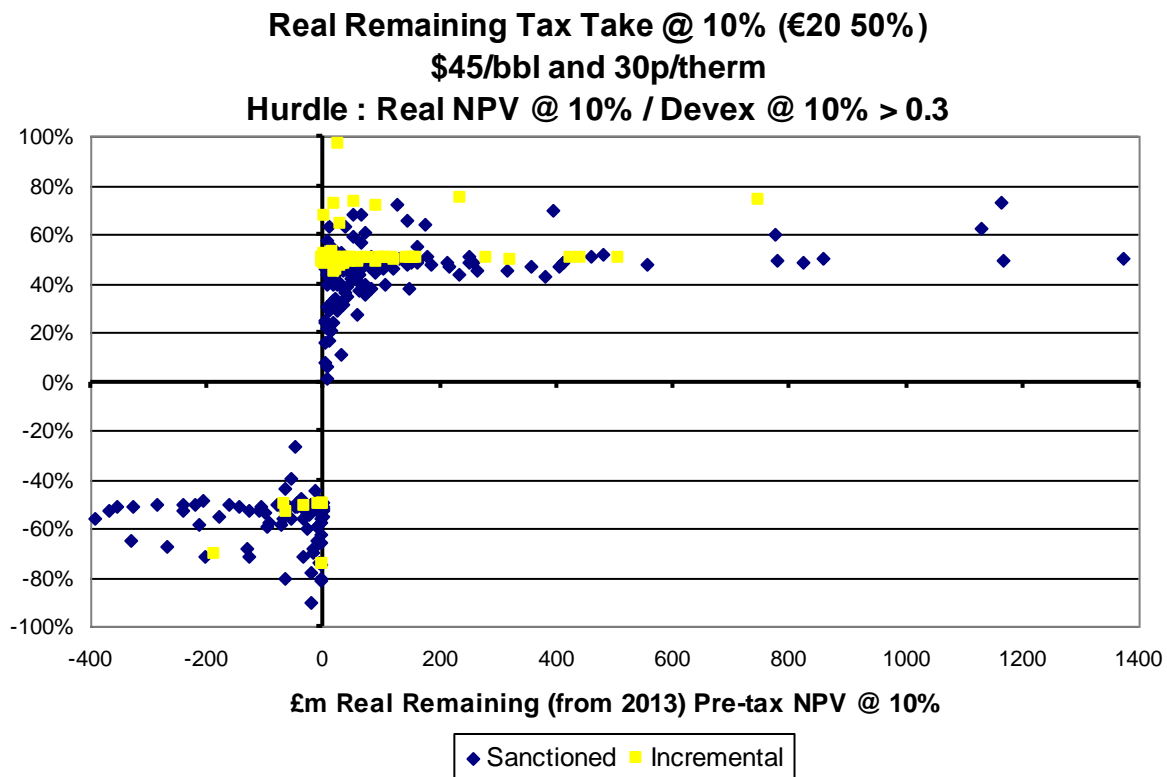


Chart 70 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where 50% of emissions arise from electricity generation. There are 94 sanctioned fields and 18 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 25 of the sanctioned fields and 3 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 83 of the sanctioned fields and 16 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 27 sanctioned fields and 19 incremental projects which have a real remaining tax take at 10% of 60% or more and 110 of the sanctioned fields and 71 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 71

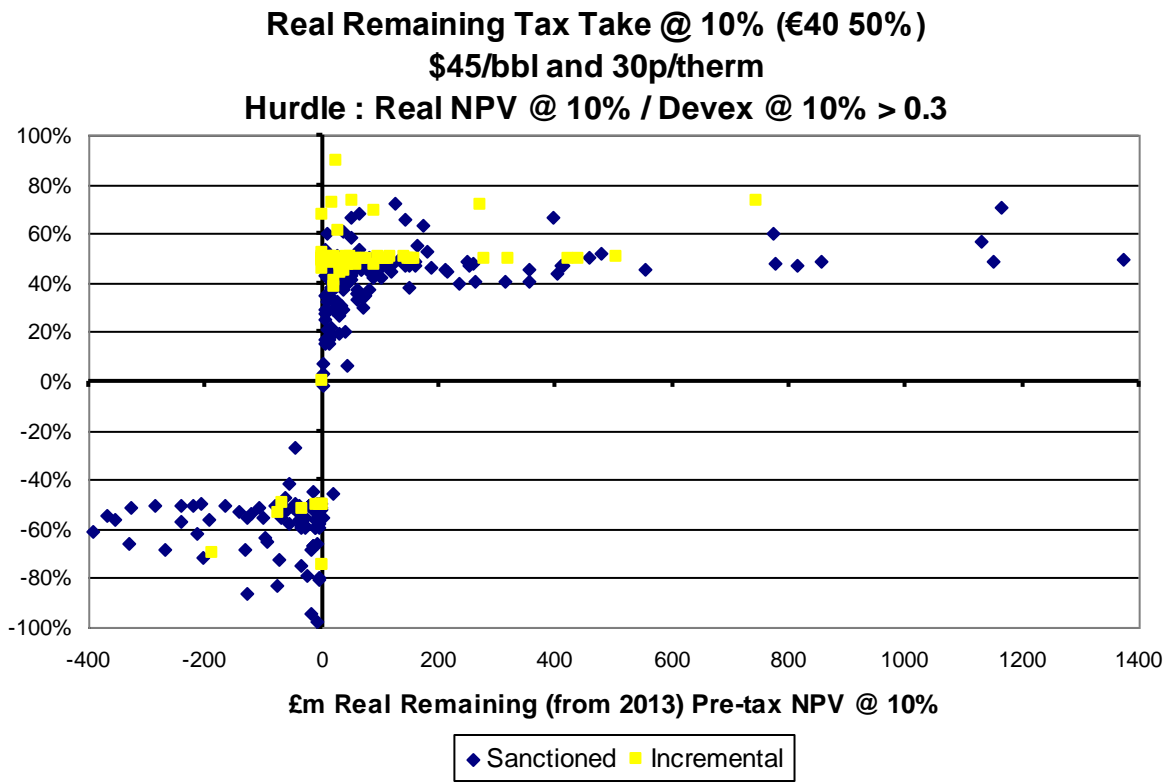


Chart 71 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where 50% of emissions arise from electricity generation. There are 95 sanctioned fields and 18 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 29 of the sanctioned fields and 3 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 84 of the sanctioned fields and 16 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 21 sanctioned fields and 19 incremental projects which have a real remaining tax take at 10% of 60% or more and 101 of the sanctioned fields and 70 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 72

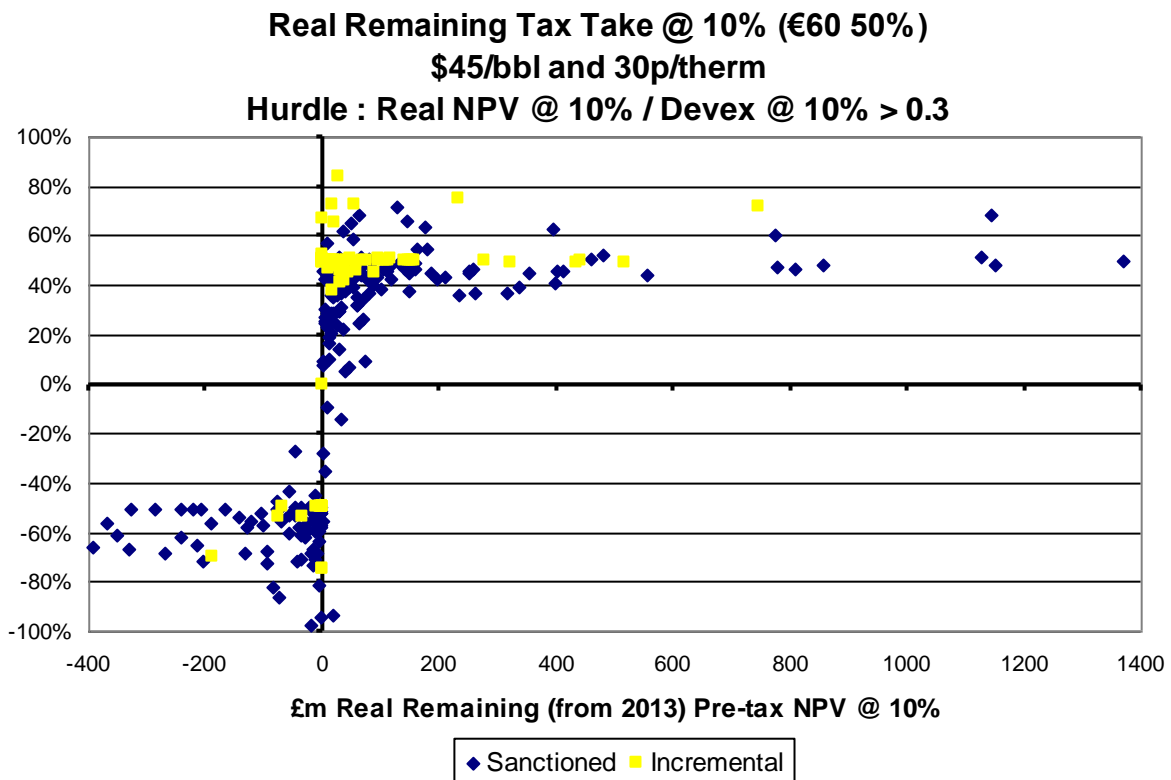


Chart 72 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where 50% of emissions arise from electricity generation. There are 99 sanctioned fields and 18 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 39 of the sanctioned fields and 3 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 87 of the sanctioned fields and 16 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 20 sanctioned fields and 19 incremental projects which have a real remaining tax take at 10% of 60% or more and 87 of the sanctioned fields and 68 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 73

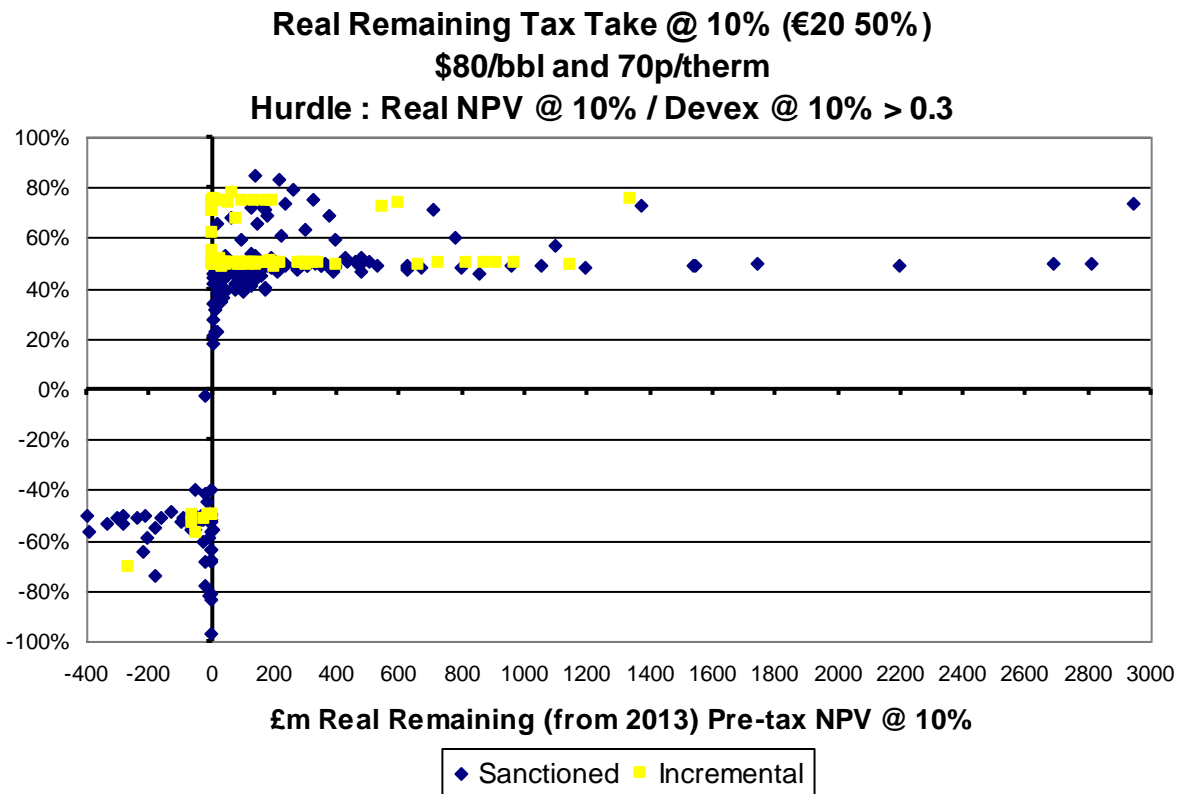


Chart 73 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where 50% of emissions arise from electricity generation. There are 68 sanctioned fields and 16 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 19 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 59 of the sanctioned fields and 13 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 38 sanctioned fields and 40 incremental projects which have a real remaining tax take at 10% of 60% or more and 159 of the sanctioned fields and 110 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 74

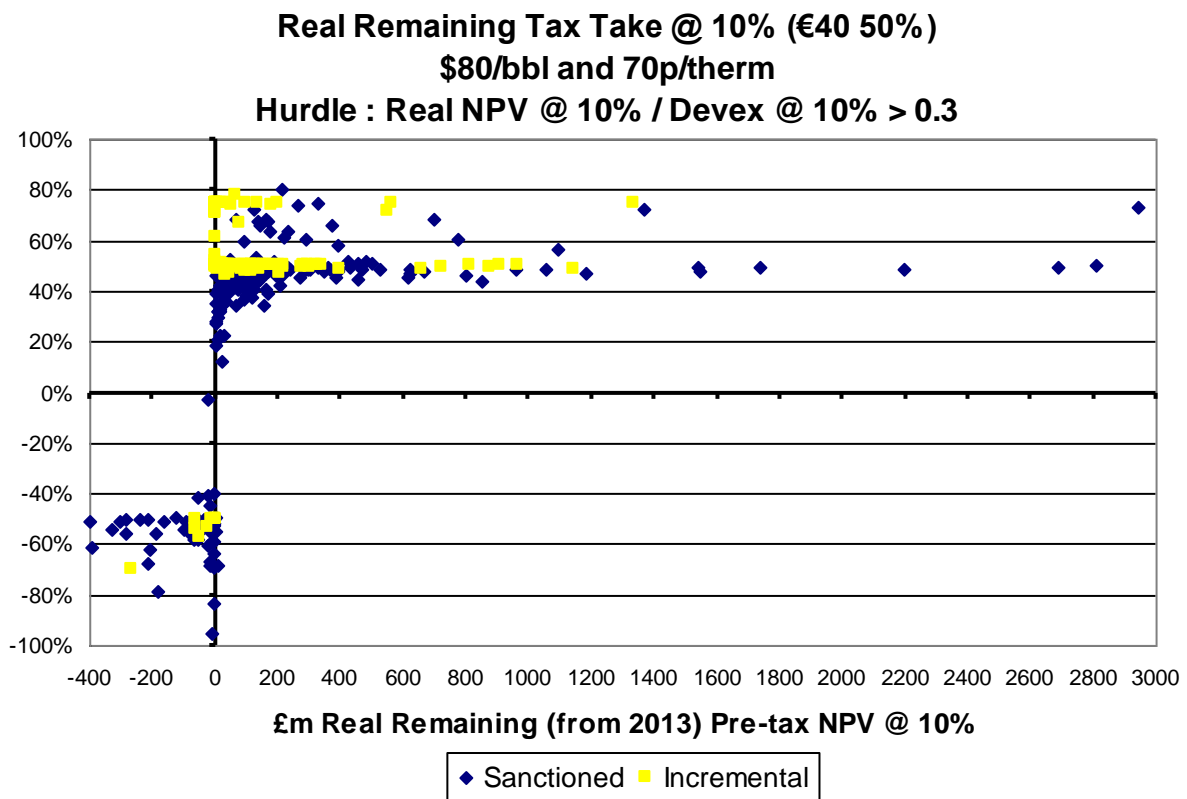


Chart 74 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where 50% of emissions arise from electricity generation. There are 69 sanctioned fields and 16 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 21 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 60 of the sanctioned fields and 13 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 34 sanctioned fields and 39 incremental projects which have a real remaining tax take at 10% of 60% or more and 149 of the sanctioned fields and 110 of the incremental projects which have a real remaining tax take at 10% of 50% or more.



Chart 75

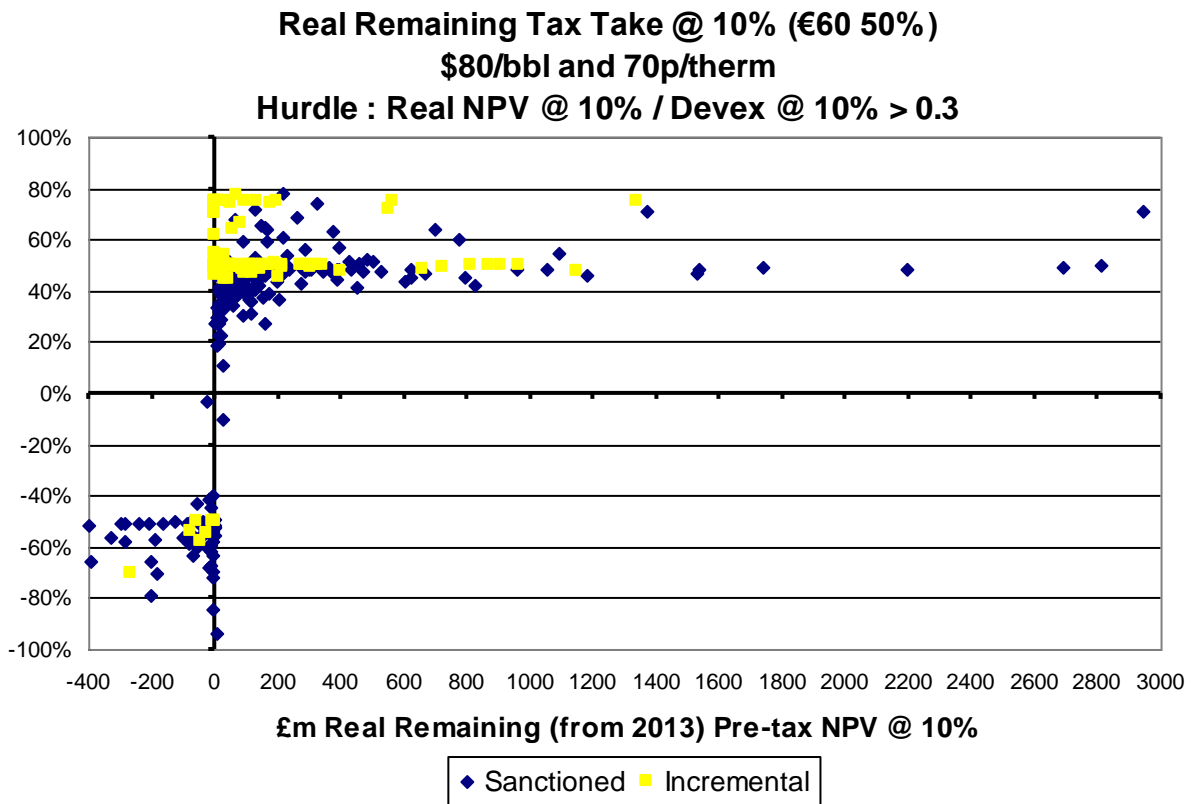


Chart 75 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where 50% of emissions arise from electricity generation. There are 71 sanctioned fields and 16 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 24 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 62 of the sanctioned fields and 13 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 31 sanctioned fields and 39 incremental projects which have a real remaining tax take at 10% of 60% or more and 138 of the sanctioned fields and 110 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

vi) New Field Percentage Lifetime Tax Take

Chart 76

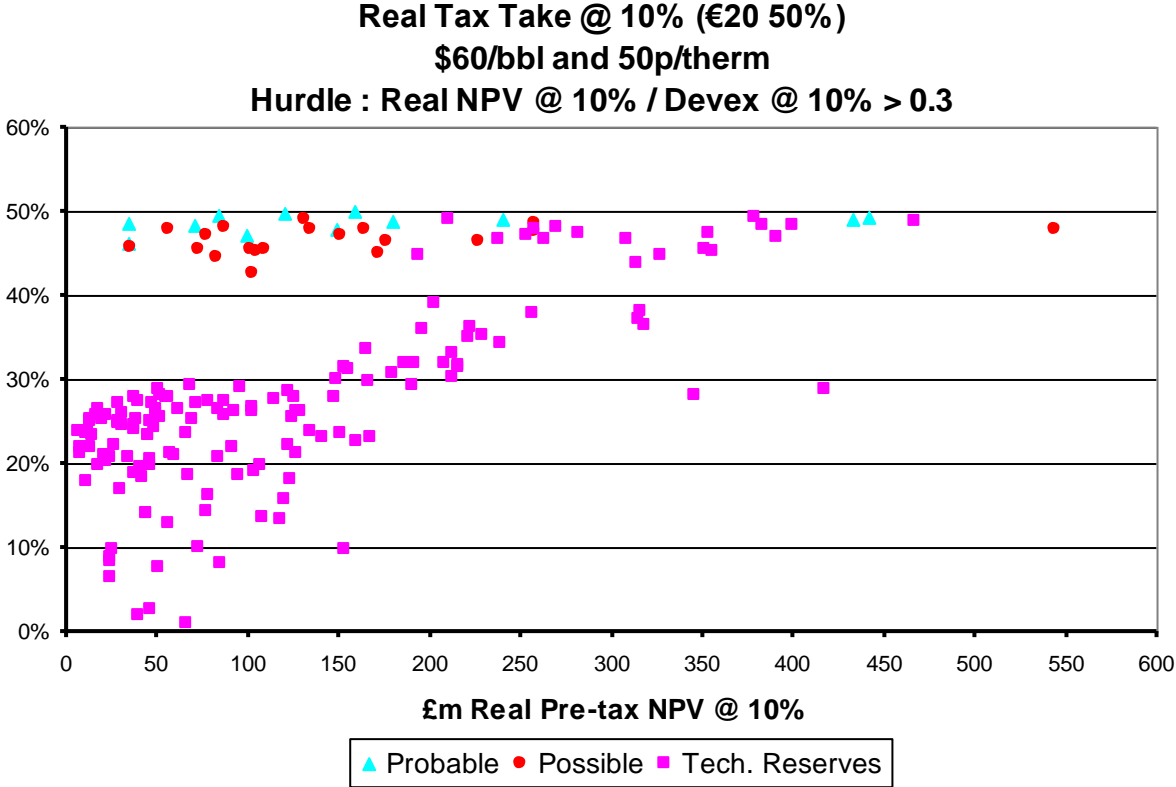


Chart 76 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t at the medium price for the scenario where 50% of emissions arise from electricity generation. There are 14 probable fields, 20 possible fields and 25 technical reserve fields which have a real tax take at 10% of 50% or more. There are 14 probable fields, 20 possible fields and 152 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 77

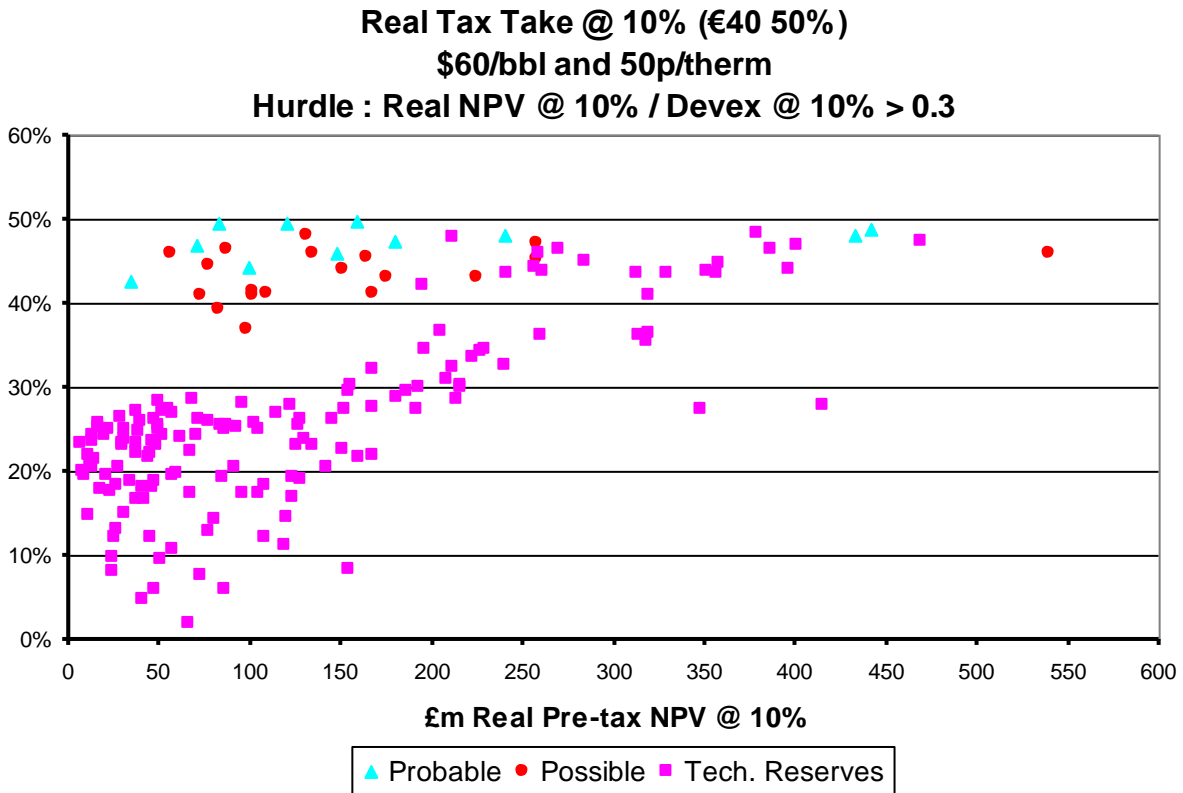


Chart 77 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t at the medium price for the scenario where 50% of emissions arise from electricity generation. There are 13 probable fields, 17 possible fields and 22 technical reserve fields which have a real tax take at 10% of 50% or more. There are 13 probable fields, 19 possible fields and 151 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 78

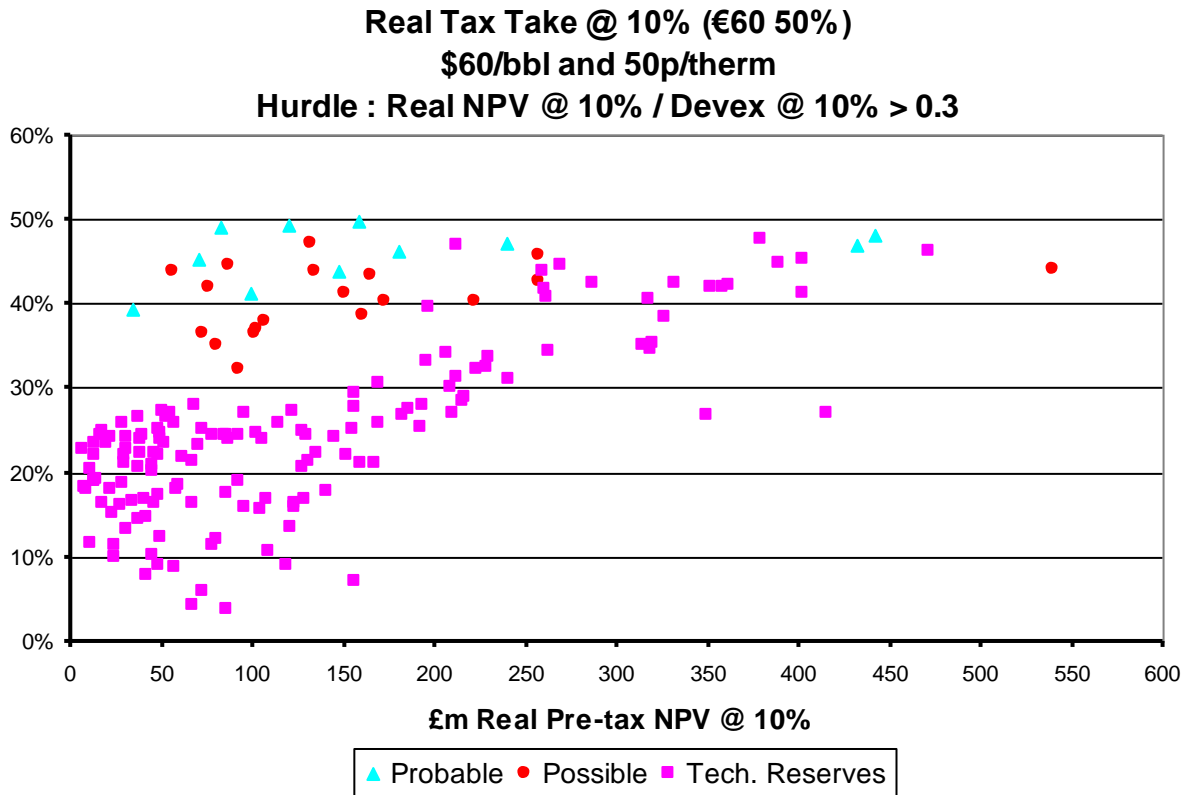


Chart 78 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t at the medium price for the scenario where 50% of emissions arise from electricity generation. There are 12 probable fields, 12 possible fields and 20 technical reserve fields which have a real tax take at 10% of 50% or more. There are 13 probable fields, 19 possible fields and 149 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 79

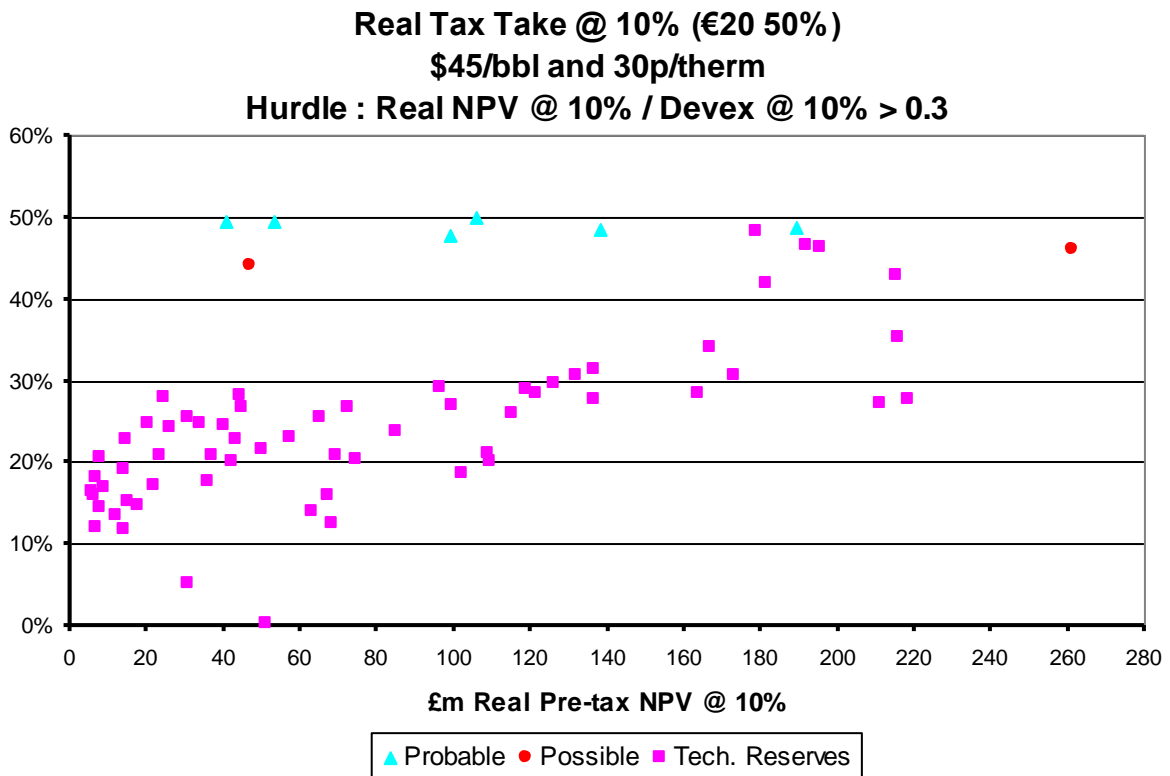


Chart 79 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t at the low price for the scenario where 50% of emissions arise from electricity generation. There are 6 probable fields, 2 possible fields and 7 technical reserve fields which have a real tax take at 10% of 50% or more. There are 6 probable fields, 2 possible fields and 64 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 80

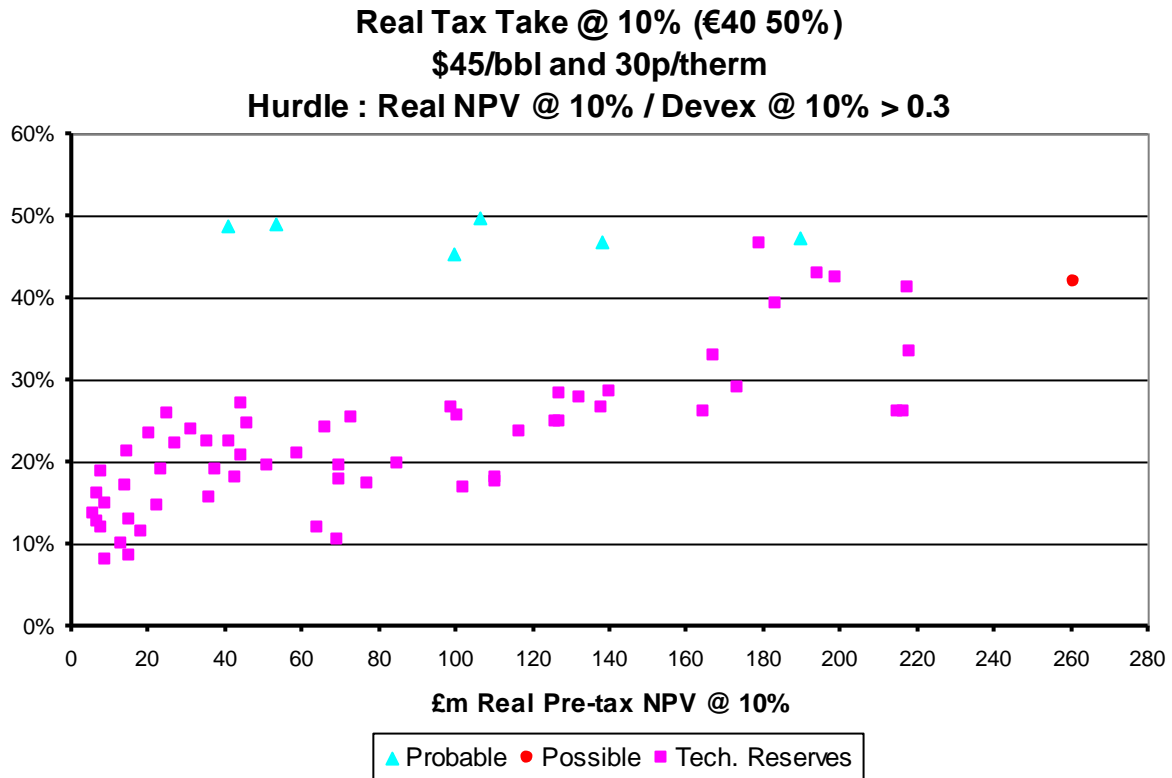


Chart 80 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t at the low price for the scenario where 50% of emissions arise from electricity generation. There are 6 probable fields, 1 possible field and 6 technical reserve fields which have a real tax take at 10% of 50% or more. There are 6 probable fields, 1 possible field and 62 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 81

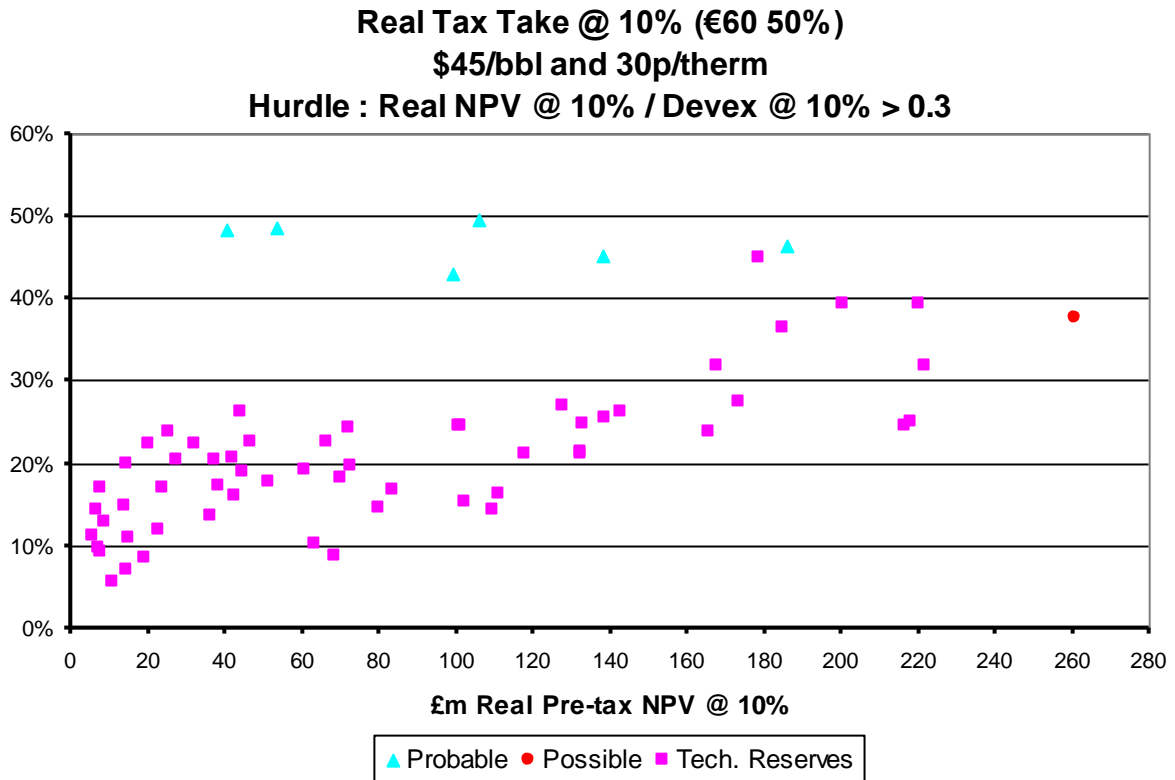


Chart 81 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t at the low price for the scenario where 50% of emissions arise from electricity generation. There are 6 probable fields and 6 technical reserve fields which have a real tax take at 10% of 50% or more. There are 6 probable fields, 1 possible field and 60 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 82

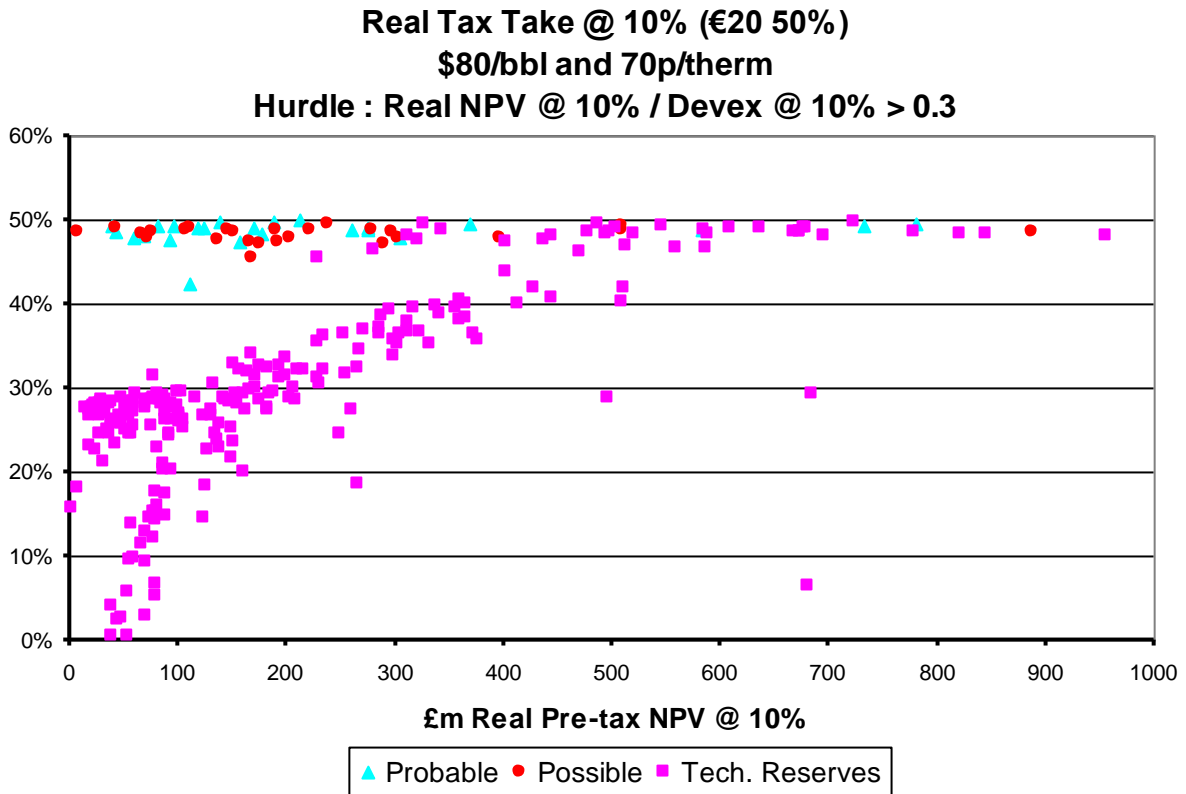


Chart 82 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t at the high price for the scenario where 50% of emissions arise from electricity generation. There are 28 probable fields, 26 possible fields and 47 technical reserve fields which have a real tax take at 10% of 50% or more. There are 28 probable fields, 26 possible fields and 229 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.



Chart 83

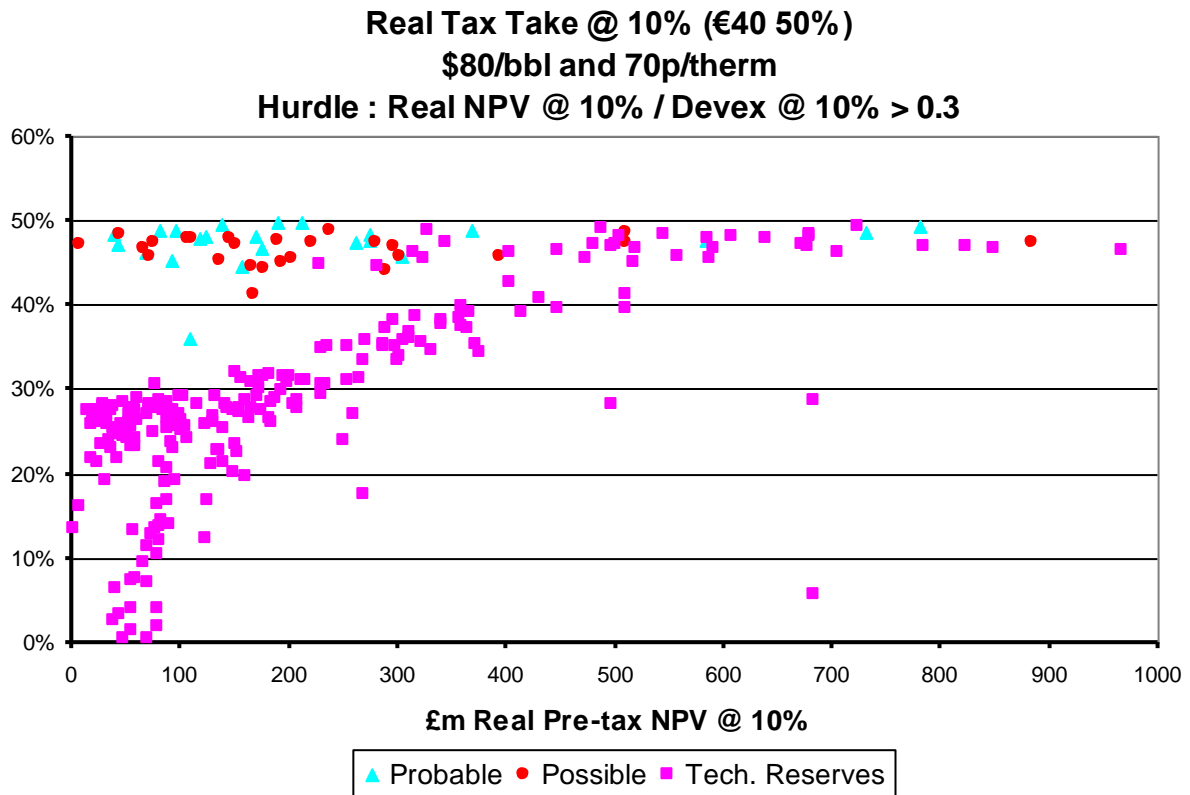


Chart 83 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t at the high price for the scenario where 50% of emissions arise from electricity generation. There are 26 probable fields, 26 possible fields and 42 technical reserve fields which have a real tax take at 10% of 50% or more. There are 27 probable fields, 26 possible fields and 228 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 84

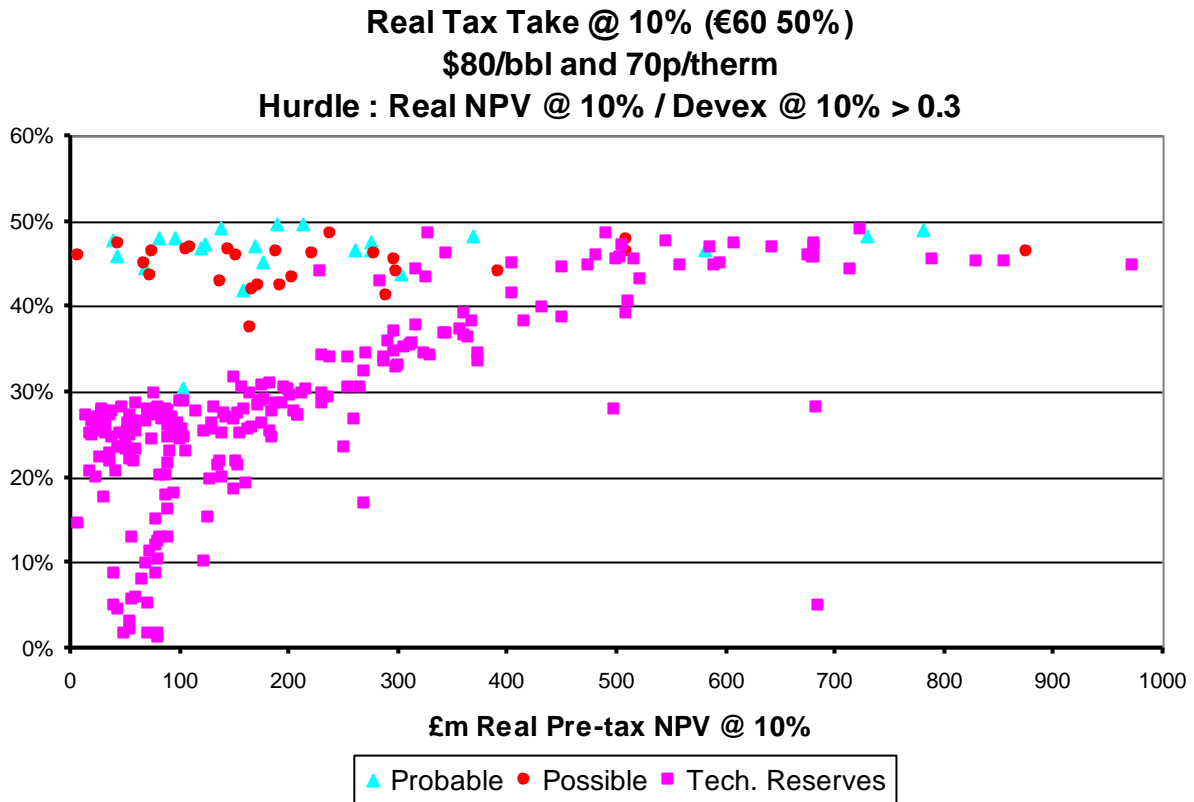


Chart 84 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t at the high price for the scenario where 50% of emissions arise from electricity generation. There are 25 probable fields, 25 possible fields and 41 technical reserve fields which have a real tax take at 10% of 50% or more. There are 26 probable fields, 26 possible fields and 227 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

vii) Remaining Percentage Government Take (Sanctioned Fields and Incremental projects)

Chart 85

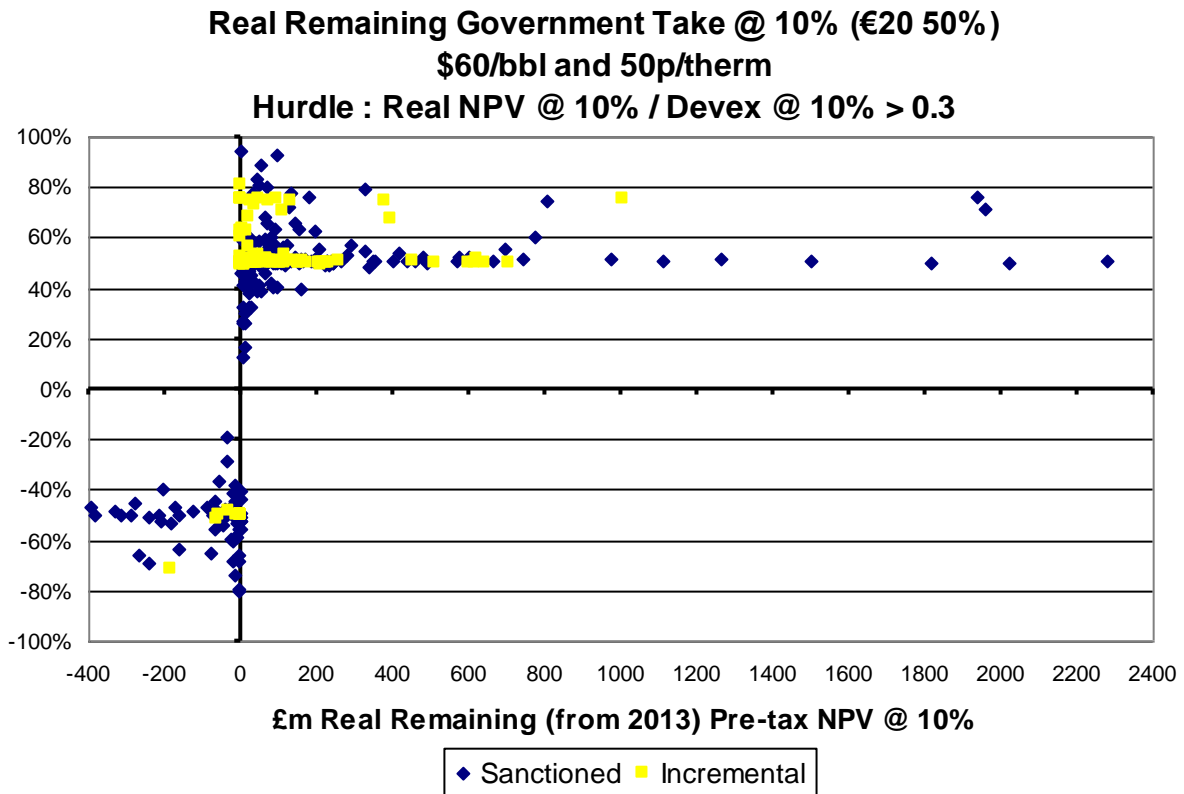


Chart 85 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where 50% of emissions arise from electricity generation. There are 79 sanctioned fields and 15 incremental projects with a real remaining government take at 10% of less than zero. Of these, 18 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 47 of the sanctioned fields and 11 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 118 sanctioned fields and 59 incremental projects which have a real remaining government take at 10% of 60% or more and 148 of the sanctioned fields and 99 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 86

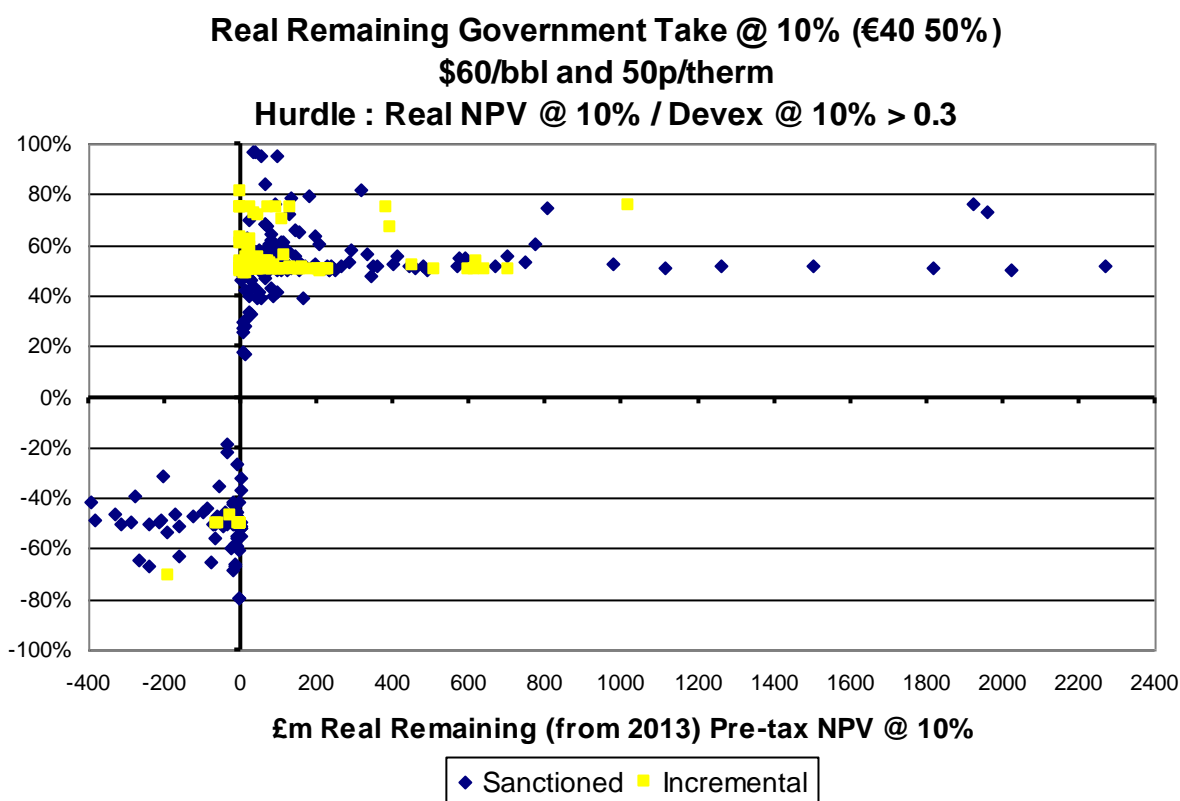


Chart 86 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where 50% of emissions arise from electricity generation. There are 79 sanctioned fields and 15 incremental projects with a real remaining government take at 10% of less than zero. Of these, 17 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 42 of the sanctioned fields and 11 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 129 sanctioned fields and 59 incremental projects which have a real remaining government take at 10% of 60% or more and 148 of the sanctioned fields and 98 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 87

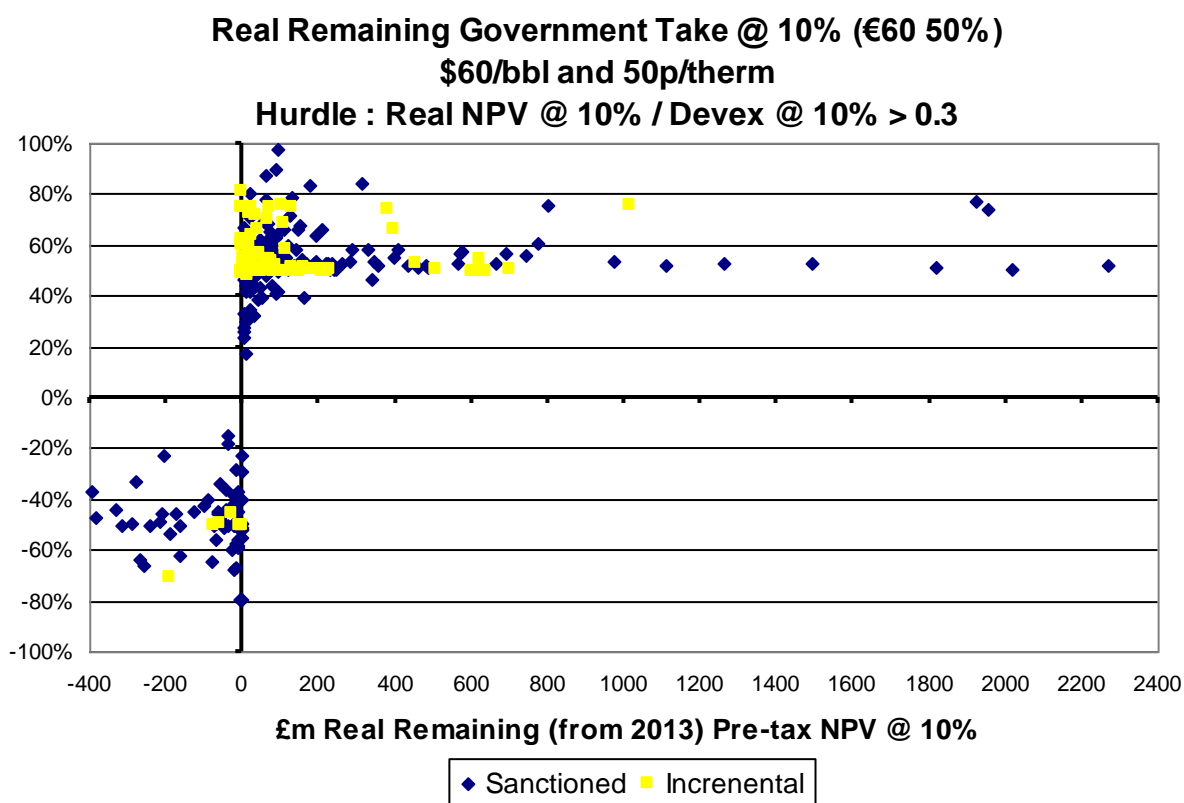


Chart 87 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where 50% of emissions arise from electricity generation. There are 80 sanctioned fields and 15 incremental projects with a real remaining government take at 10% of less than zero. Of these, 14 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 40 of the sanctioned fields and 11 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 130 sanctioned fields and 59 incremental projects which have a real remaining government take at 10% of 60% or more and 148 of the sanctioned fields and 98 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 88

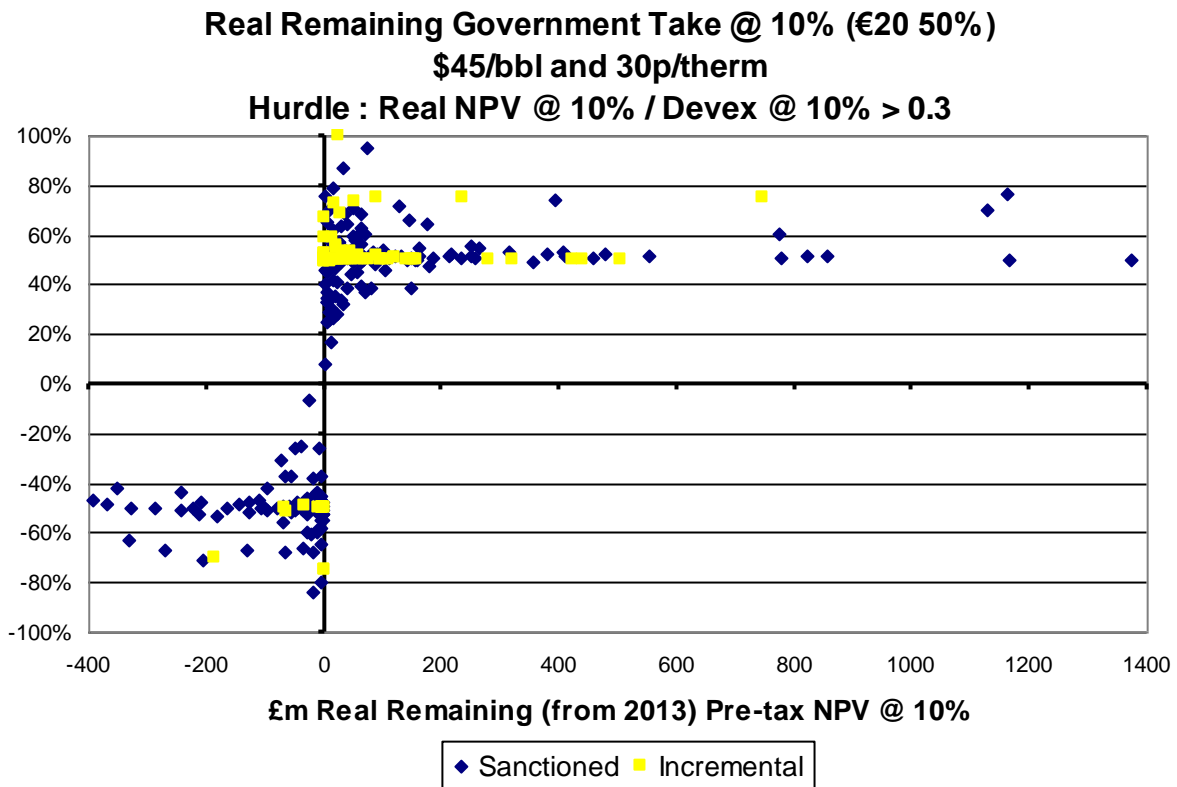


Chart 88 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where 50% of emissions arise from electricity generation. There are 93 sanctioned fields and 18 incremental projects with a real remaining government take at 10% of less than zero. Of these, 17 of the sanctioned fields and 3 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 50 of the sanctioned fields and 15 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 99 sanctioned fields and 37 incremental projects which have a real remaining government take at 10% of 60% or more and 124 of the sanctioned fields and 71 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 89

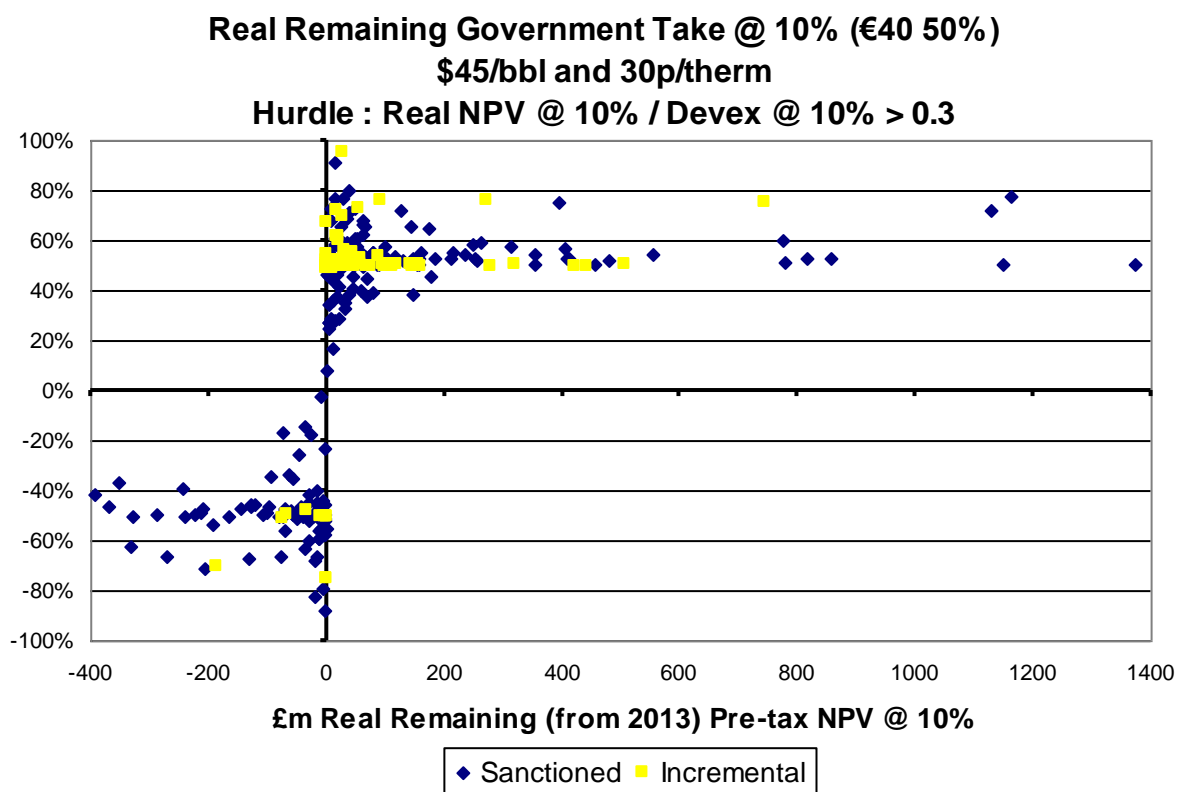


Chart 89 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where 50% of emissions arise from electricity generation. There are 93 sanctioned fields and 18 incremental projects with a real remaining government take at 10% of less than zero. Of these, 18 of the sanctioned fields and 3 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 46 of the sanctioned fields and 15 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 110 sanctioned fields and 37 incremental projects which have a real remaining government take at 10% of 60% or more and 125 of the sanctioned fields and 71 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 90

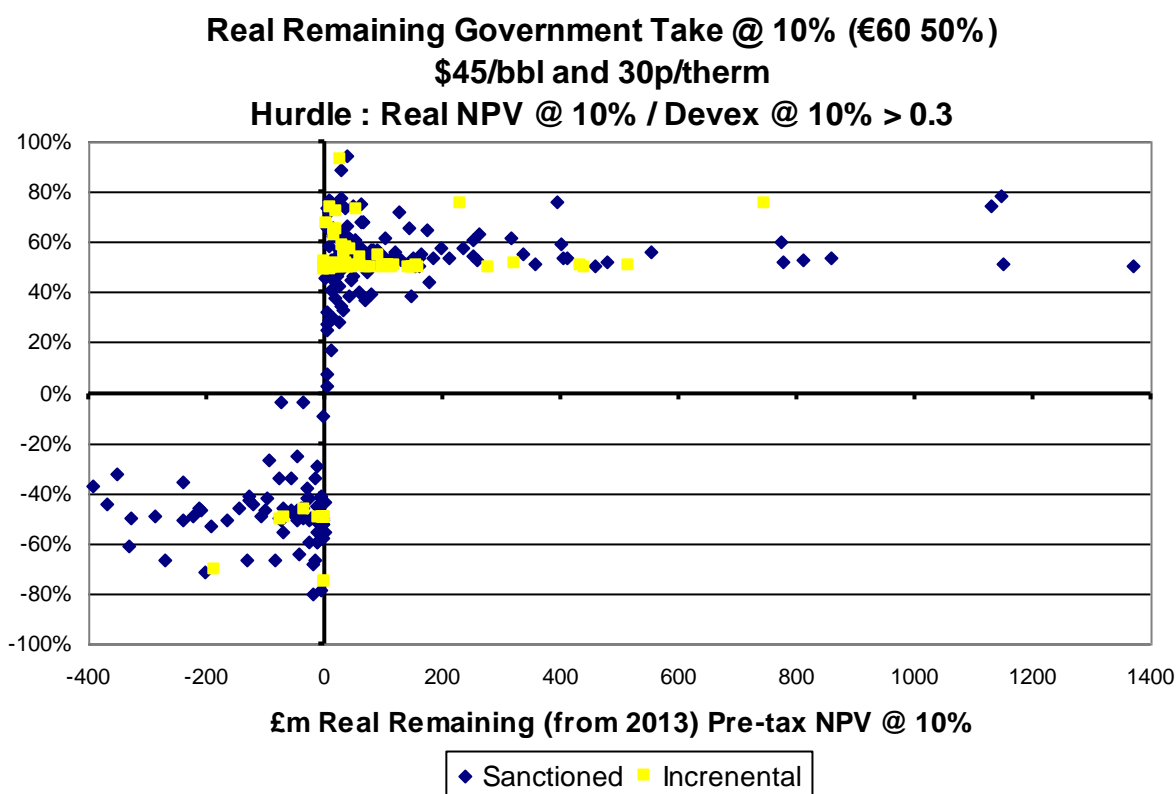


Chart 90 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where 50% of emissions arise from electricity generation. There are 93 sanctioned fields and 18 incremental projects with a real remaining government take at 10% of less than zero. Of these, 18 of the sanctioned fields and 3 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 45 of the sanctioned fields and 15 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 113 sanctioned fields and 39 incremental projects which have a real remaining government take at 10% of 60% or more and 127 of the sanctioned fields and 69 of the incremental projects which have a real remaining government take at 10% of 50% or more.



Chart 91

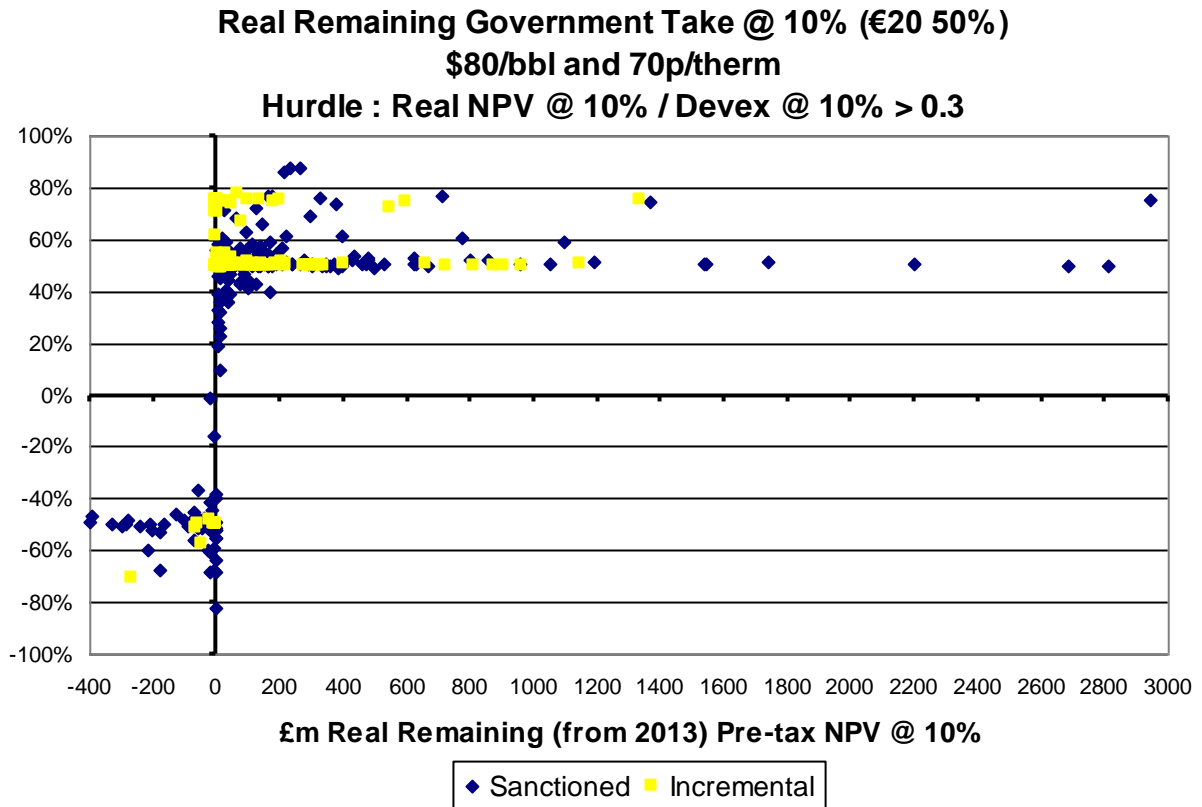


Chart 91 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where 50% of emissions arise from electricity generation. There are 68 sanctioned fields and 16 incremental projects with a real remaining government take at 10% of less than zero. Of these, 14 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 42 of the sanctioned fields and 12 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 131 sanctioned fields and 62 incremental projects which have a real remaining government take at 10% of 60% or more and 164 of the sanctioned fields and 110 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 92

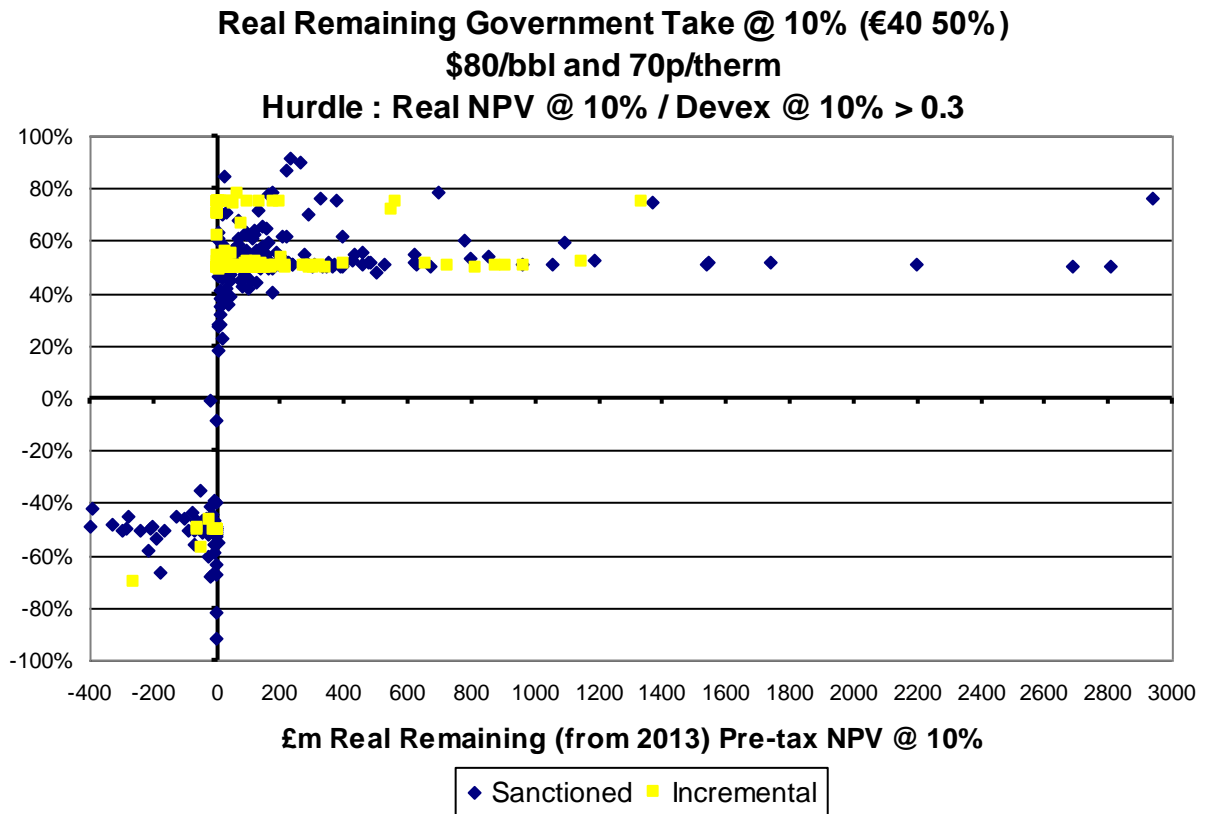


Chart 92 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where 50% of emissions arise from electricity generation. There are 68 sanctioned fields and 16 incremental projects with a real remaining government take at 10% of less than zero. Of these, 14 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 39 of the sanctioned fields and 12 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 143 sanctioned fields and 62 incremental projects which have a real remaining government take at 10% of 60% or more and 166 of the sanctioned fields and 110 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 93

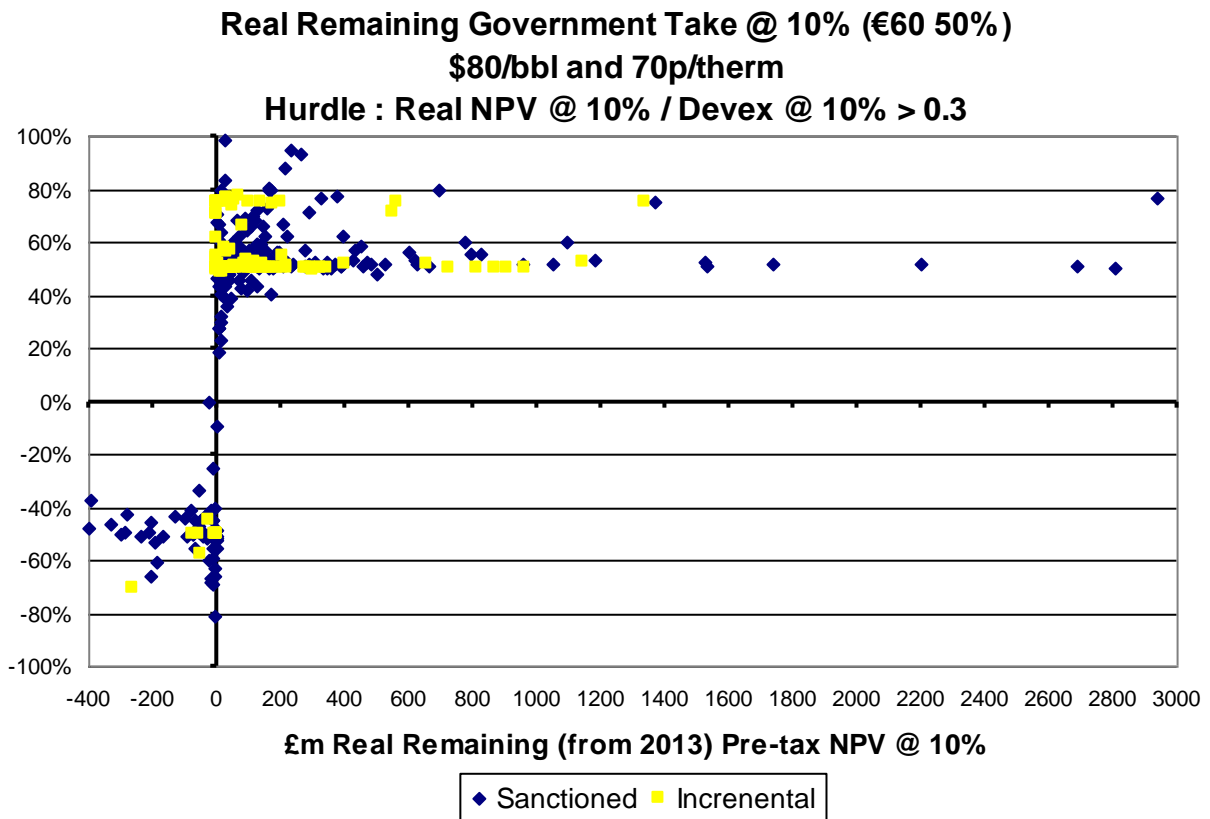


Chart 93 shows the real remaining pre-tax NPV at 10% against real remaining government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where 50% of emissions arise from electricity generation. There are 69 sanctioned fields and 16 incremental projects with a real remaining government take at 10% of less than zero. Of these, 16 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 39 of the sanctioned fields and 12 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 145 sanctioned fields and 64 incremental projects which have a real remaining government take at 10% of 60% or more and 167 of the sanctioned fields and 110 of the incremental projects which have a real remaining government take at 10% of 50% or more.

viii) New Field Percentage Government Take

Chart 94

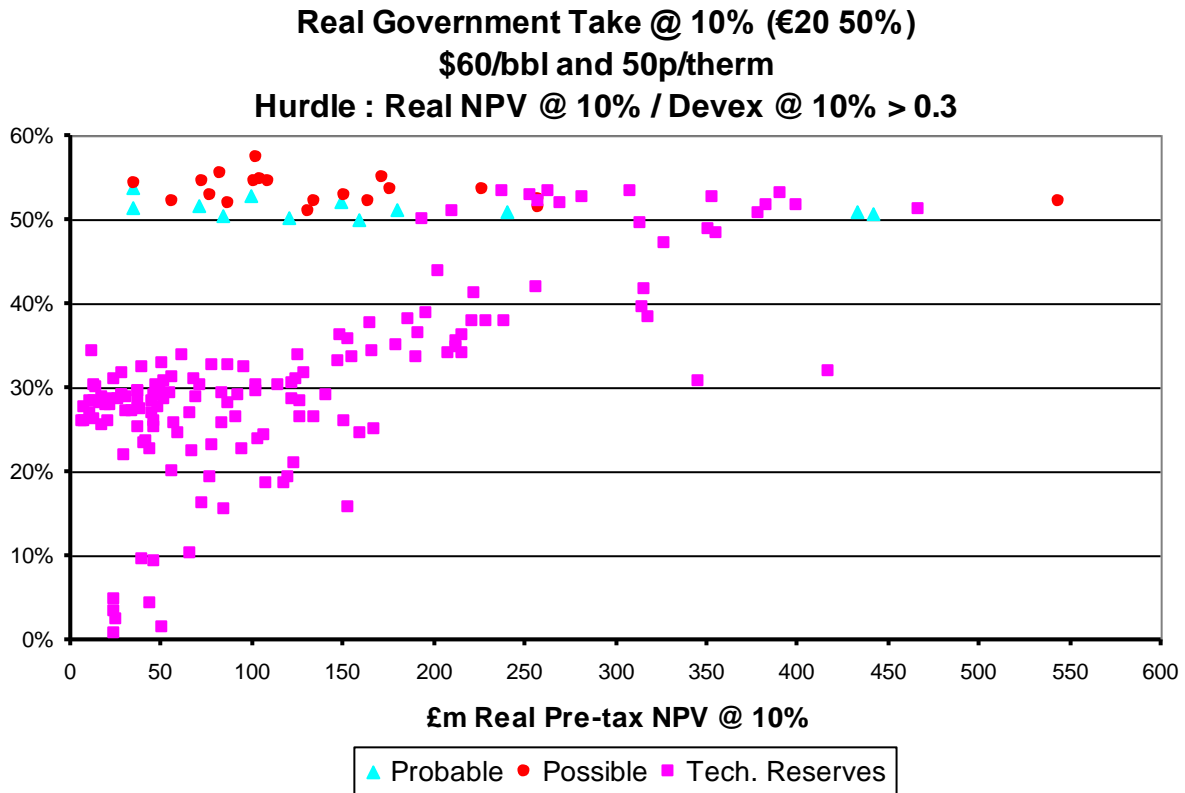


Chart 94 shows the real pre-tax NPV at 10% against the real government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where 50% of emissions arise from electricity generation. There are 14 probable fields, 20 possible fields and 18 technical reserve fields which have a real government take at 10% of 60% or more. There are 14 probable fields, 20 possible fields and 26 technical reserve fields which have a real government take at 10% of 50% or more. There are 14 probable fields, 20 possible fields and 152 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 95

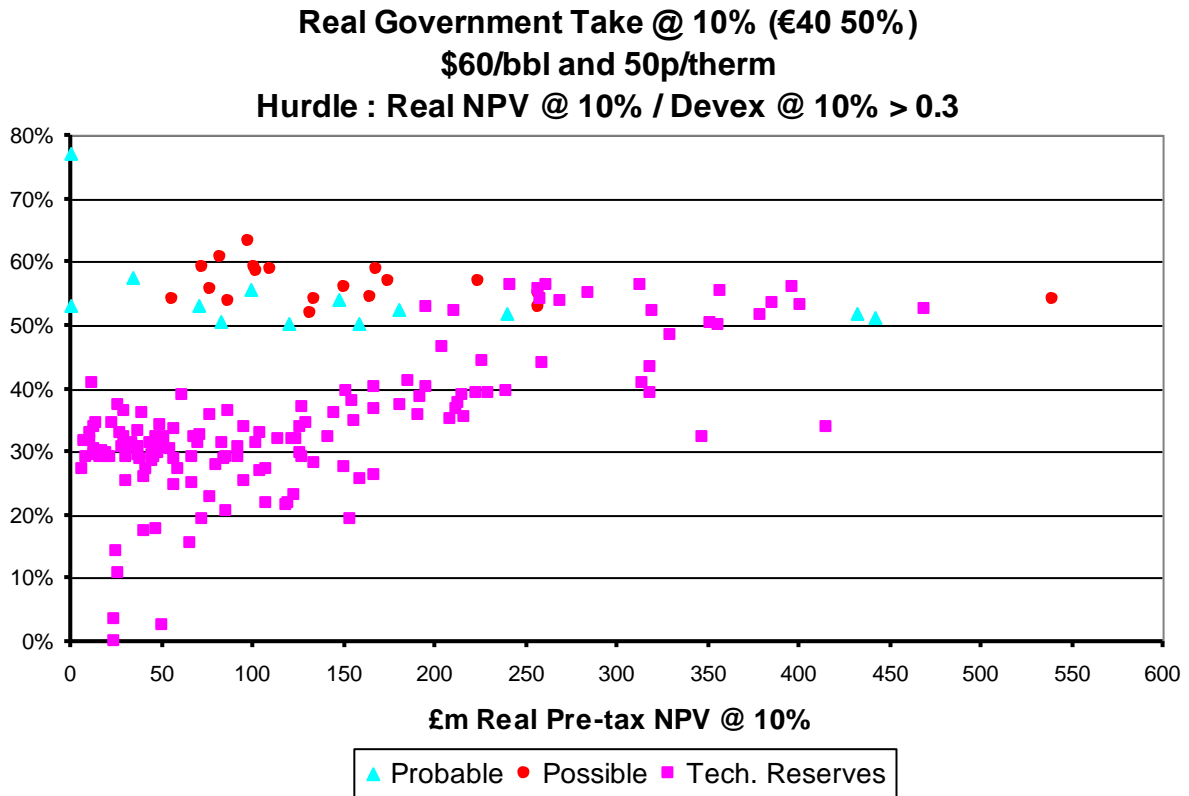


Chart 95 shows the real pre-tax NPV at 10% against the real government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where 50% of emissions arise from electricity generation. There are 13 probable fields, 19 possible fields and 20 technical reserve fields which have a real government take at 10% of 60% or more. There are 13 probable fields, 19 possible fields and 31 technical reserve fields which have a real government take at 10% of 50% or more. There are 13 probable fields, 19 possible fields and 151 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 96

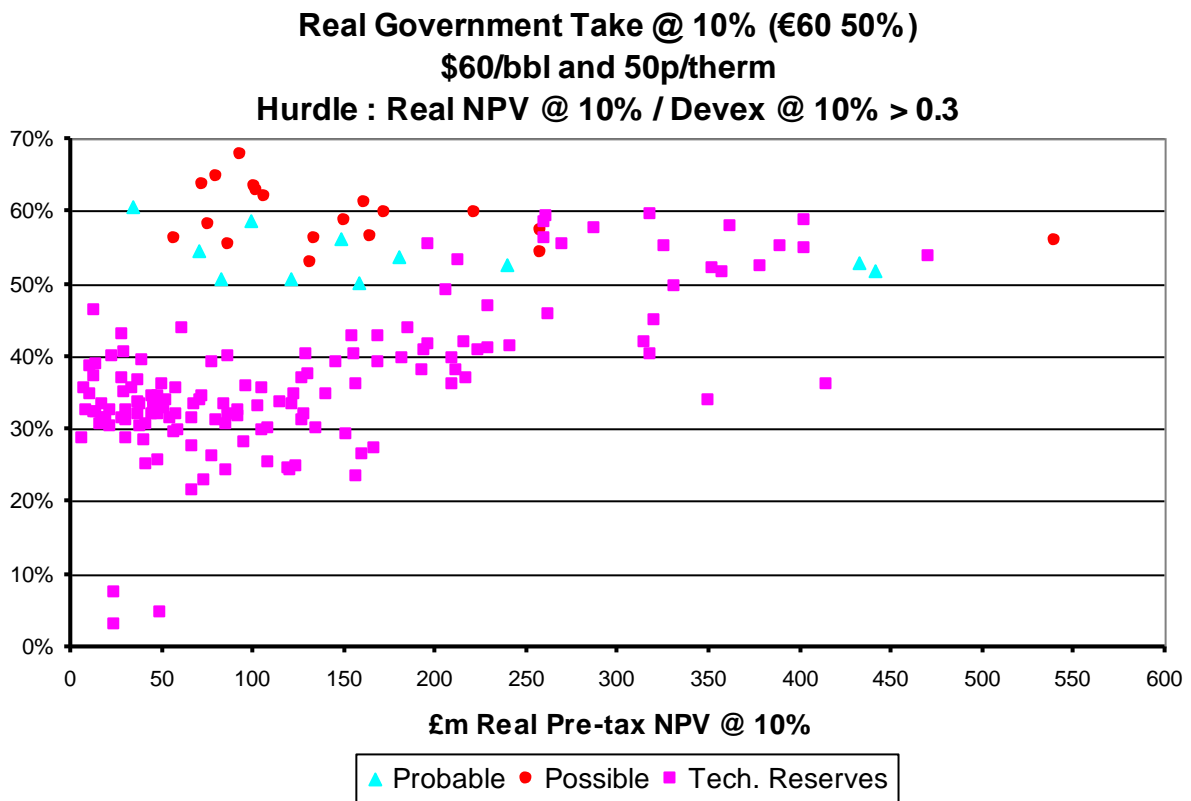


Chart 96 shows the real pre-tax NPV at 10% against the real government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where 50% of emissions arise from electricity generation. There are 13 probable fields, 19 possible fields and 20 technical reserve fields which have a real government take at 10% of 60% or more. There are 13 probable fields, 19 possible fields and 43 technical reserve fields which have a real government take at 10% of 50% or more. There are 13 probable fields, 19 possible fields and 149 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 97

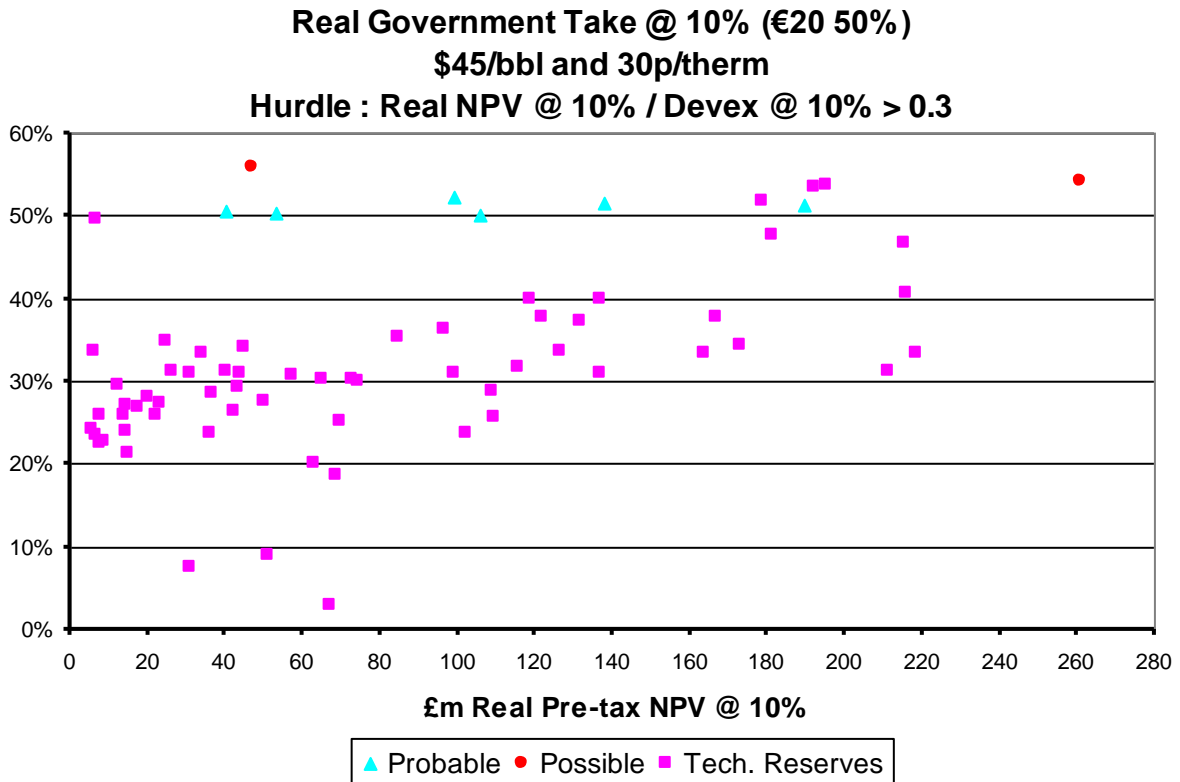


Chart 97 shows the real pre-tax NPV at 10% against the real government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where 50% of emissions arise from electricity generation. There are 6 probable fields, 2 possible fields and 5 technical reserve fields which have a real government take at 10% of 60% or more. There are 6 probable fields, 2 possible fields and 10 technical reserve fields which have a real government take at 10% of 50% or more. There are 6 probable fields, 2 possible fields and 64 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 98

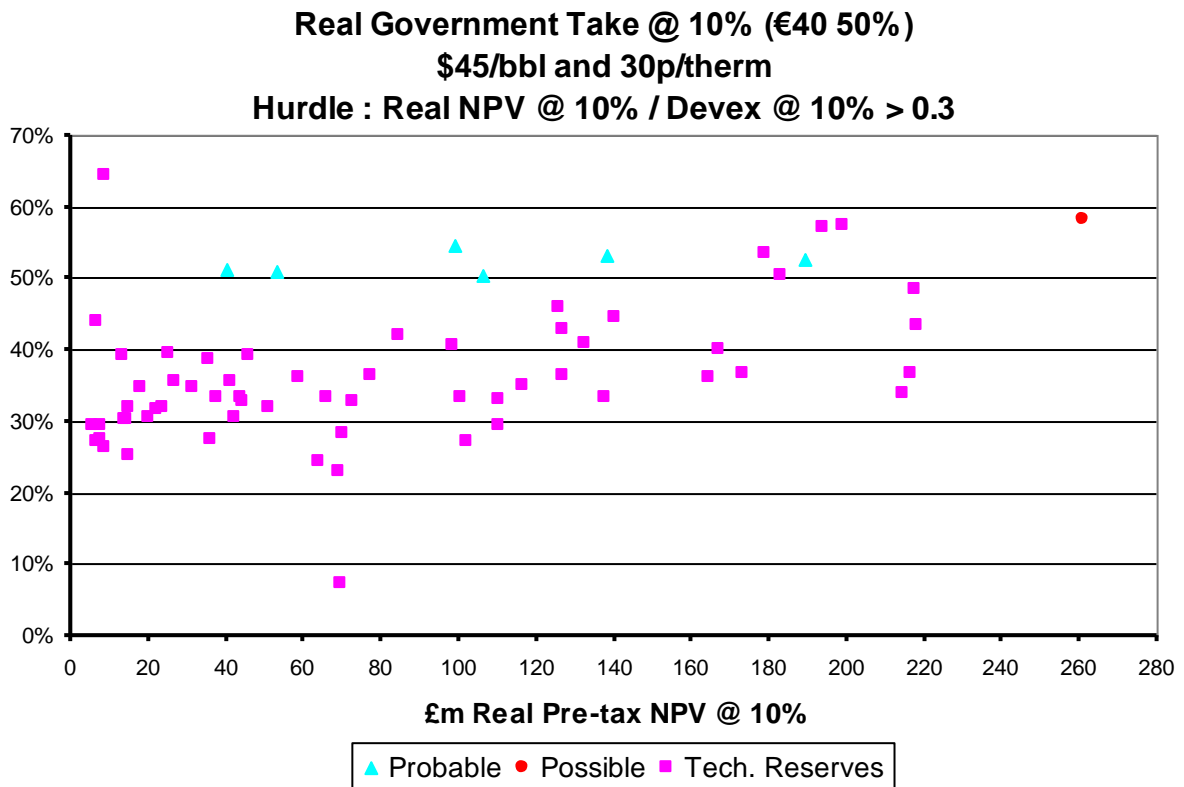


Chart 98 shows the real pre-tax NPV at 10% against the real government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where 50% of emissions arise from electricity generation. There are 6 probable fields, 1 possible field and 7 technical reserve fields which have a real government take at 10% of 60% or more. There are 6 probable fields, 1 possible field and 16 technical reserve fields which have a real government take at 10% of 50% or more. There are 6 probable fields, 1 possible field and 62 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.



Chart 99

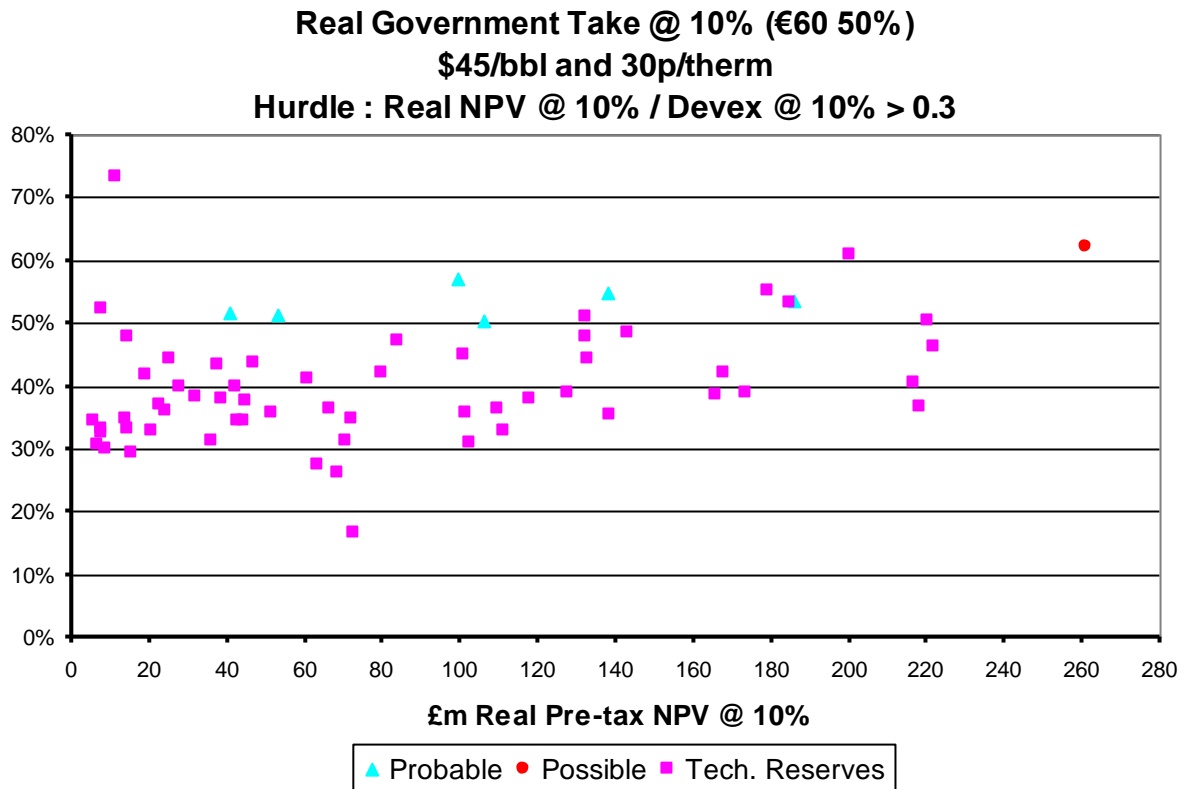


Chart 99 shows the real pre-tax NPV at 10% against the real government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where 50% of emissions arise from electricity generation. There are 6 probable fields, 1 possible field and 9 technical reserve fields which have a real government take at 10% of 60% or more. There are 6 probable fields, 1 possible field and 24 technical reserve fields which have a real government take at 10% of 50% or more. There are 6 probable fields, 1 possible field and 60 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 100

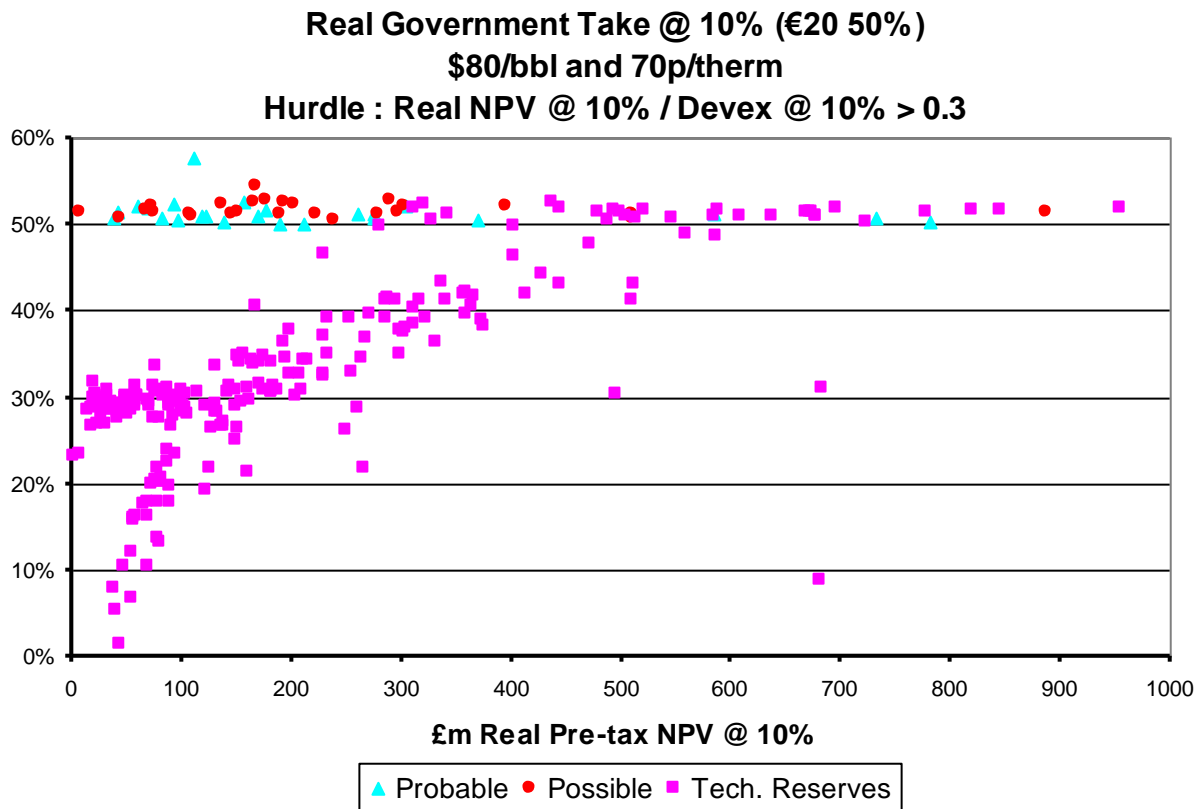


Chart 100 shows the real pre-tax NPV at 10% against the real government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where 50% of emissions arise from electricity generation. There are 28 probable fields, 26 possible fields and 34 technical reserve fields which have a real government take at 10% of 60% or more. There are 28 probable fields, 26 possible fields and 58 technical reserve fields which have a real government take at 10% of 50% or more. There are 28 probable fields, 26 possible fields and 229 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 101

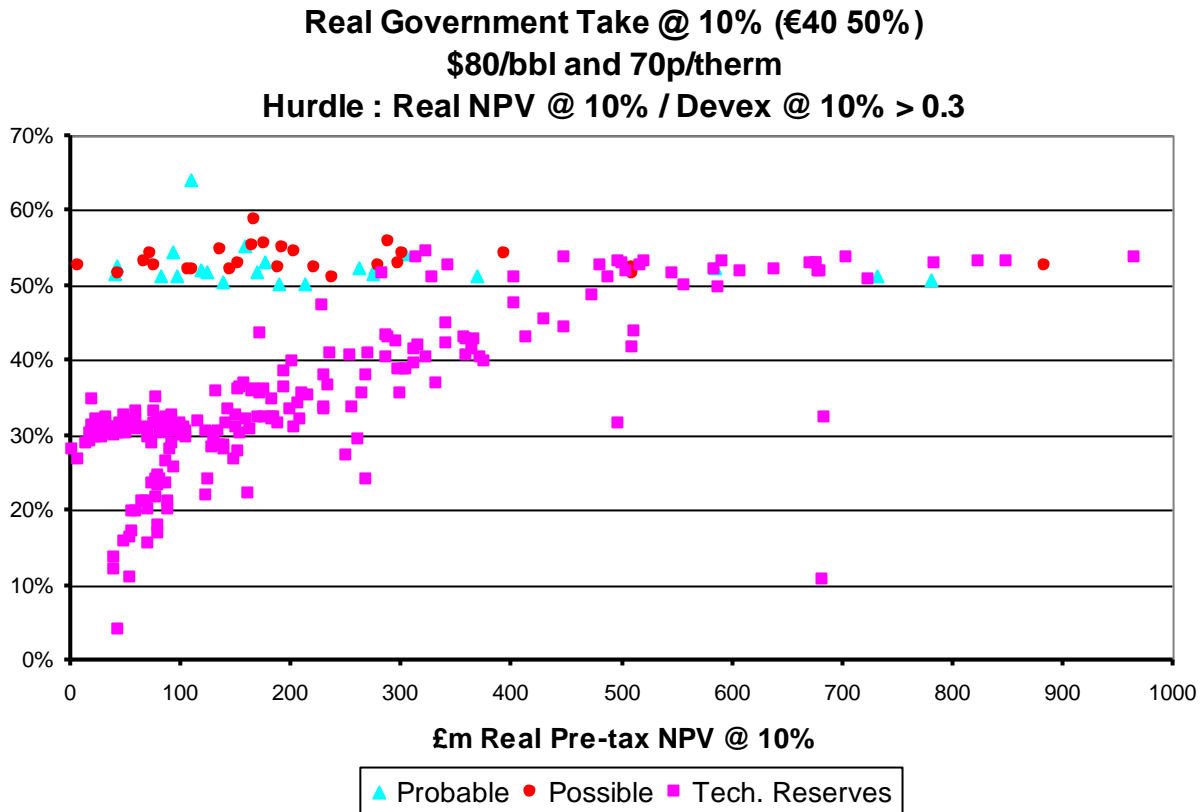


Chart 101 shows the real pre-tax NPV at 10% against the real government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where 50% of emissions arise from electricity generation. There are 27 probable fields, 26 possible fields and 35 technical reserve fields which have a real government take at 10% of 60% or more. There are 27 probable fields, 26 possible fields and 64 technical reserve fields which have a real government take at 10% of 50% or more. There are 27 probable fields, 26 possible fields and 228 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 102

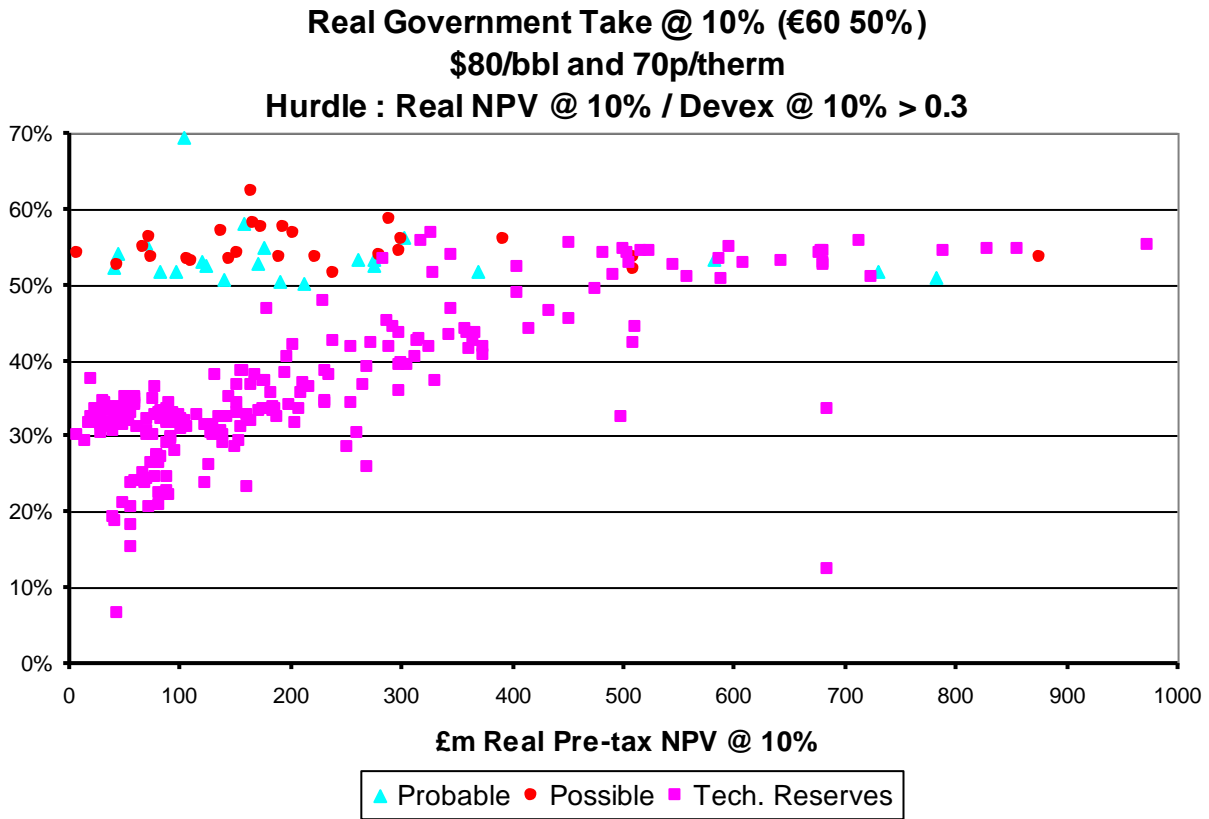
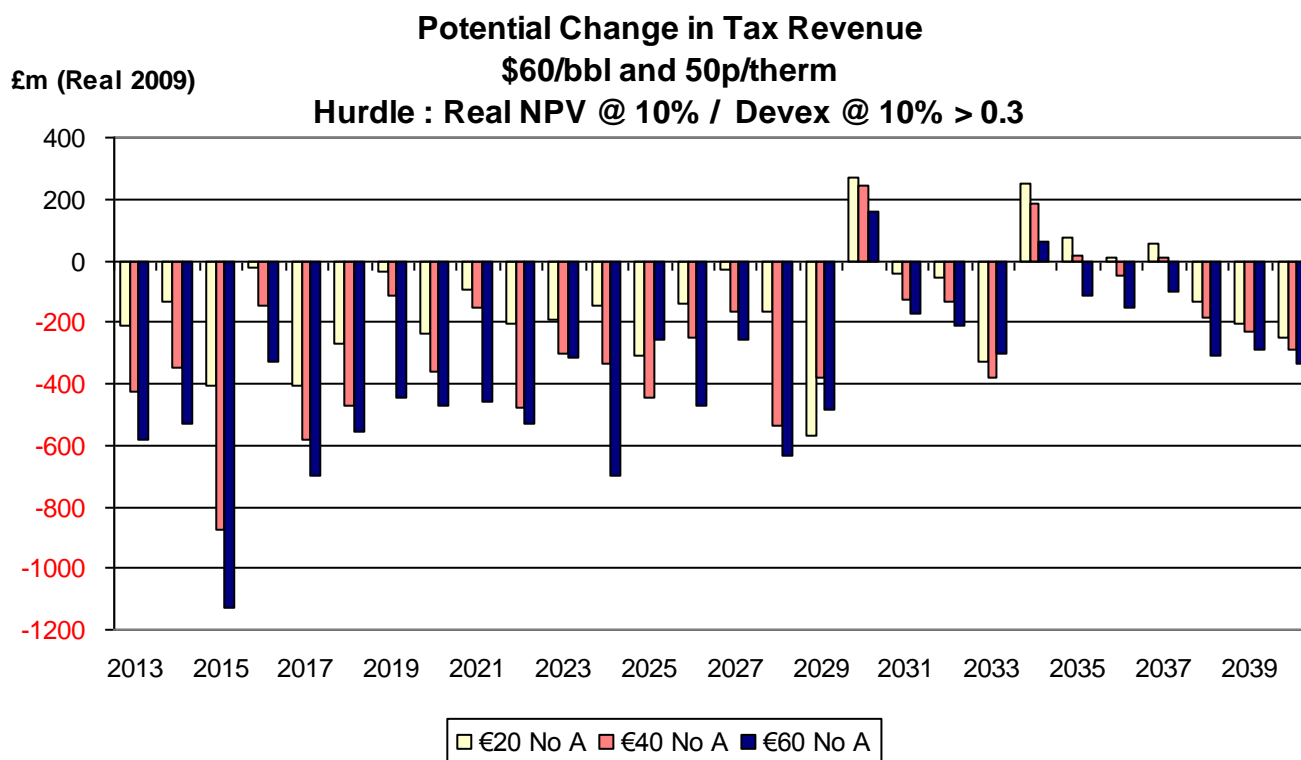


Chart 102 shows the real pre-tax NPV at 10% against the real government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where 50% of emissions arise from electricity generation. There are 26 probable fields, 26 possible fields and 37 technical reserve fields which have a real government take at 10% of 60% or more. There are 26 probable fields, 26 possible fields and 69 technical reserve fields which have a real government take at 10% of 50% or more. There are 26 probable fields, 26 possible fields and 227 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

**(c) No Free Allowances**

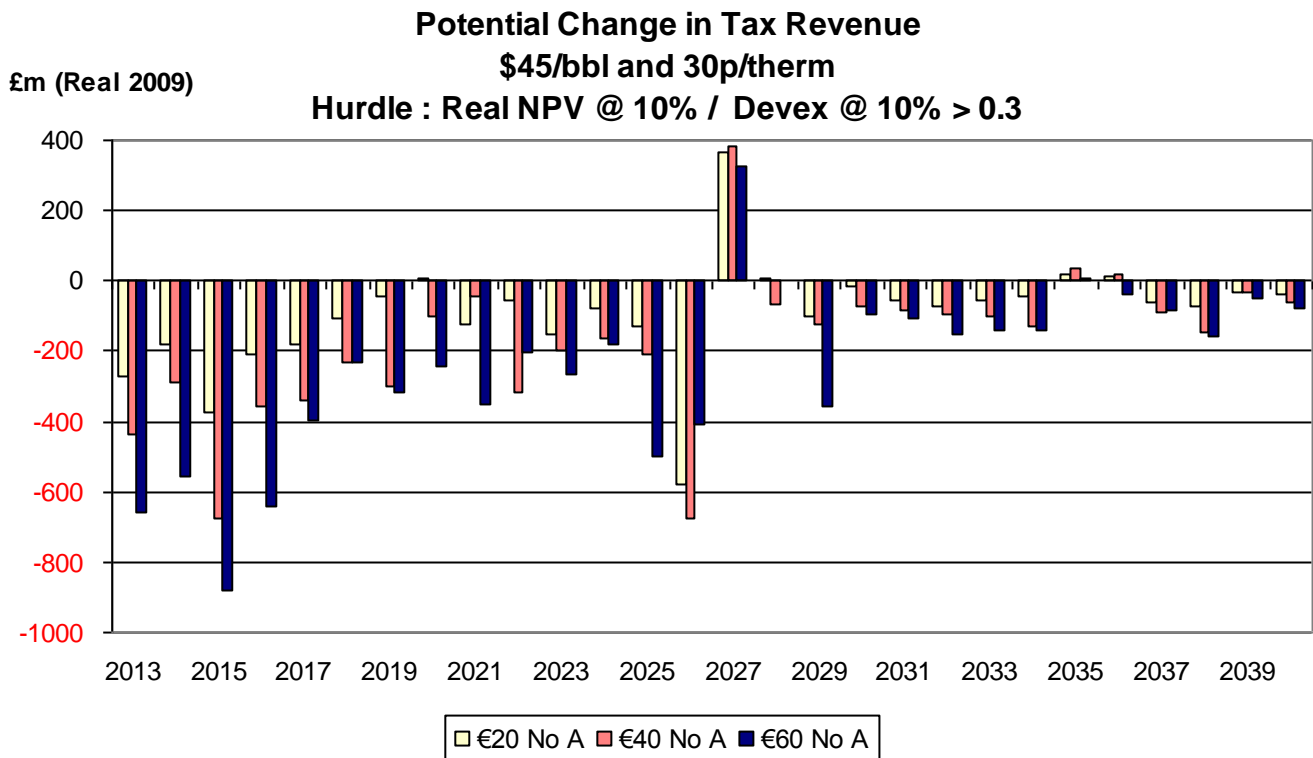
i) Potential Change in Tax Revenue

Chart 103



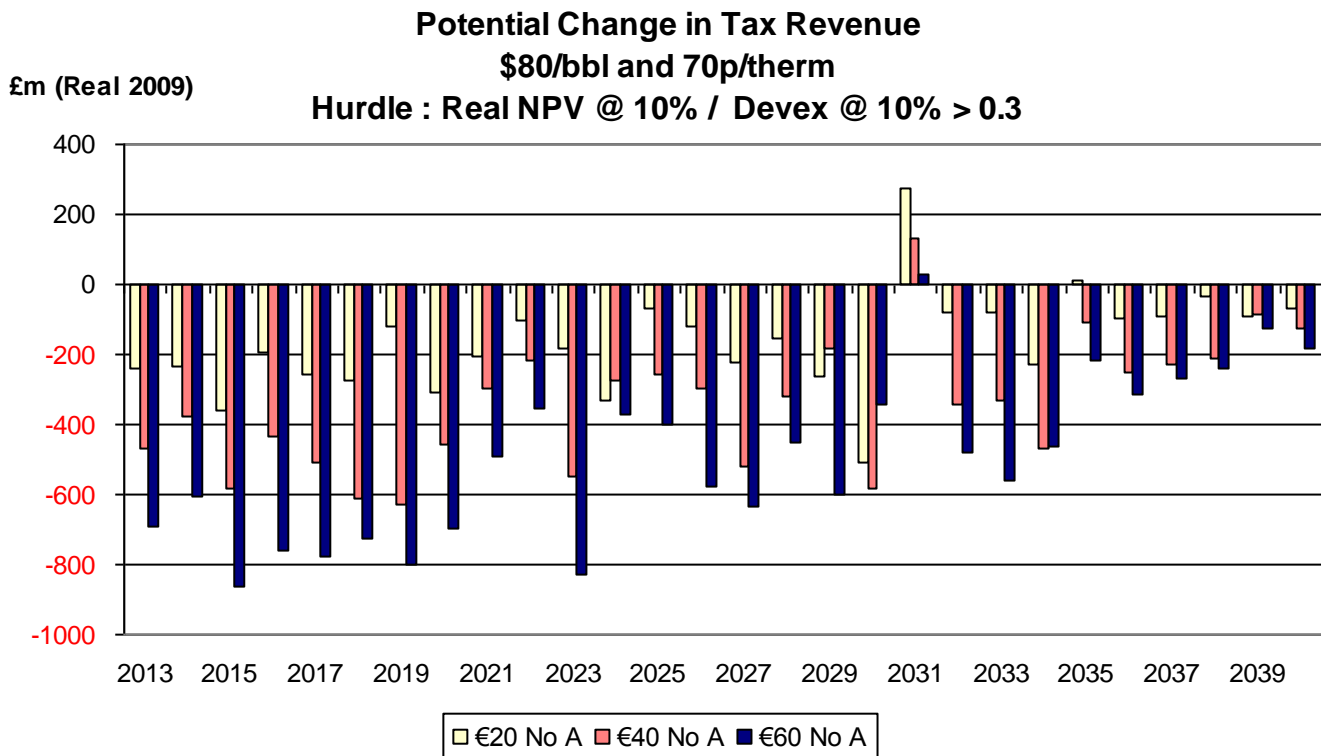
From Chart 103 it is seen that at the medium price with no free allowances and EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, real tax revenue could be reduced by £408m in 2015 and 2017, £235m in 2020, £306m in 2025 and £571m in 2029. The cumulative loss in tax revenue could be £1726m by 2020, £3299m by 2030 and £3922m by 2040. With a CO<sub>2</sub> price of €40/t, real tax revenue could be reduced by £877m in 2015, £583m in 2017, £477m in 2022 and £534m in 2028. The cumulative loss in tax revenue could be £3324m by 2020, £6126m by 2030 and £7312m by 2040. With a CO<sub>2</sub> price of €60/t, real tax revenue could be reduced by £1125m in 2015, £702m in 2017, £702m in 2024 and £635m in 2028. The cumulative loss in tax revenue could be £4744m by 2020, £8699m by 2030 and £10619m by 2040.

Chart 104



From Chart 104 it is seen that at the low price with no free allowances and EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, real tax revenue could be reduced by £376m in 2015, £206m in 2016, £150m in 2023 and £577m in 2026. The cumulative loss in tax revenue could be £1358m by 2020, £2220m by 2030 and £2626m by 2040. With a CO<sub>2</sub> price of €40/t, real tax revenue could be reduced by £674m in 2015, £355m in 2016, £317m in 2022 and £673m in 2026. The cumulative loss in tax revenue could be £2723m by 2020, £4203m by 2030 and £4888m by 2040. With a CO<sub>2</sub> price of €60/t, real tax revenue could be reduced by £878m in 2015, £640m in 2016, £501m in 2025 and £407m in 2026. The cumulative loss in tax revenue could be £3920m by 2020, £5963m by 2030 and £6905m by 2040.

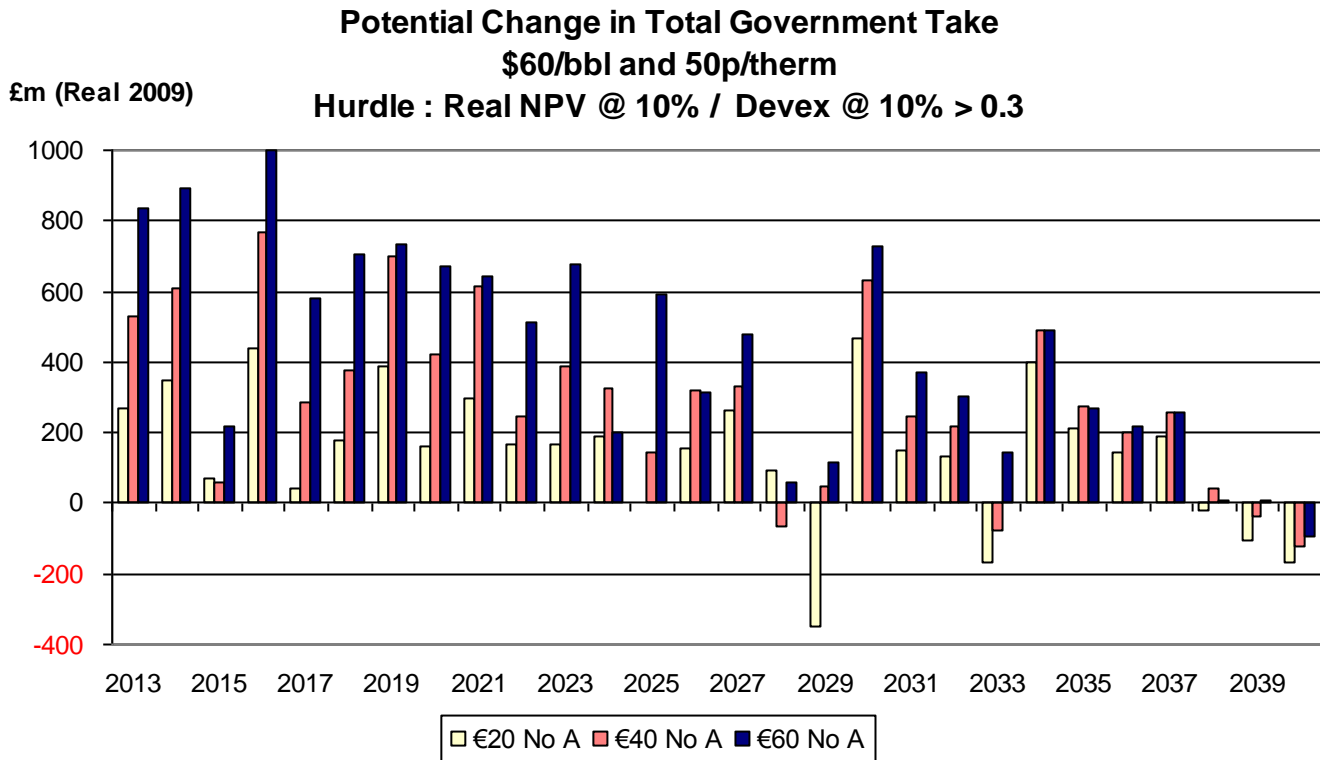
Chart 105



From Chart 105 it is seen that at the high price with no free allowances and EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, real tax revenue could be reduced by £361m in 2015, £306m in 2020, £322m in 2024 and £508m in 2030. The cumulative loss in tax revenue could be £1984m by 2020, £4152m by 2030 and £4643m by 2040. With a CO<sub>2</sub> price of €40/t, real tax revenue could be reduced by £584m in 2015, £627m in 2019, £548m in 2023, £520m in 2027 and £582m in 2030. The cumulative loss in tax revenue could be £4063m by 2020, £7556m by 2030 and £9574m by 2040. With a CO<sub>2</sub> price of €60/t, real tax revenue could be reduced by £865m in 2015, £780m in 2017, £830m in 2023 and £637m in 2027. The cumulative loss in tax revenue could be £5929m by 2020, £10985m by 2030 and £13808m by 2040.

ii) Potential Change in Total Government Take

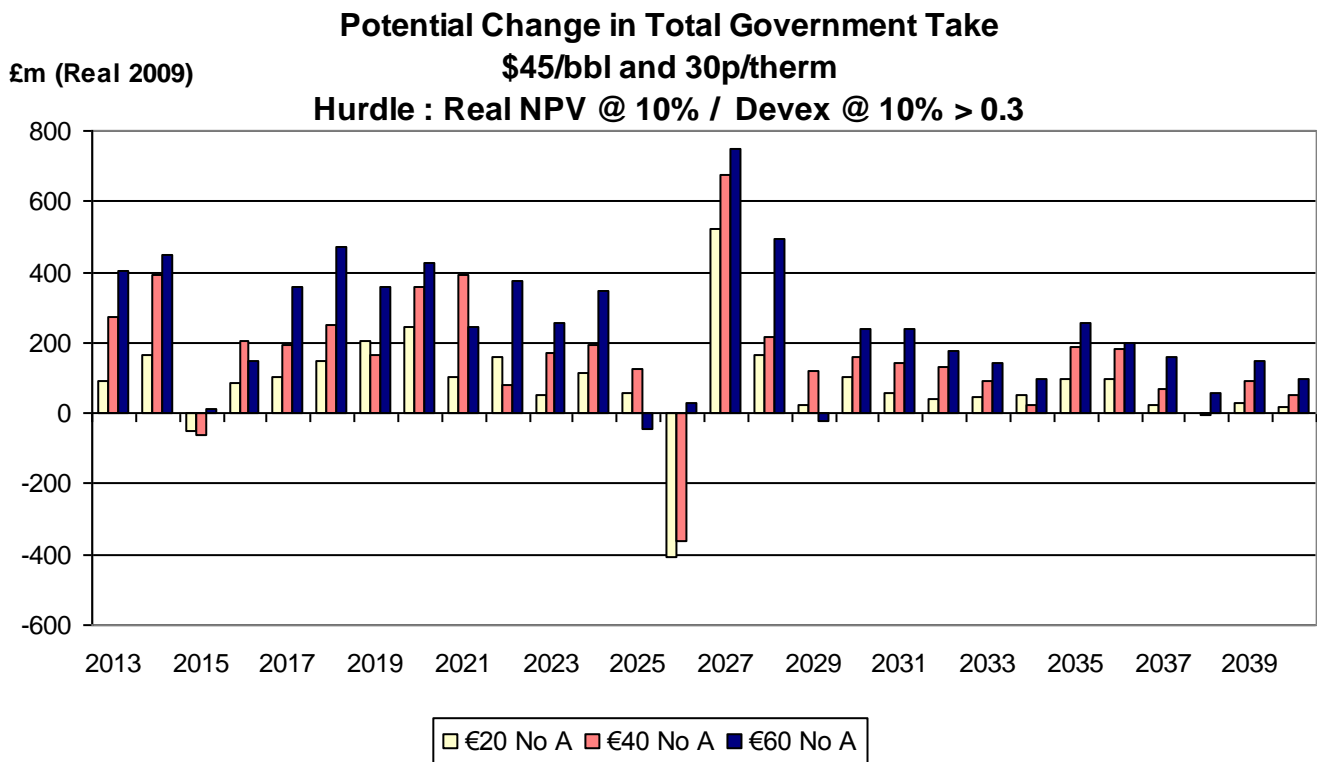
Chart 106



From Chart 106 it is seen that at the medium price with no free allowances and EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the real total government take could be increased by £437m in 2016, £388m in 2019, £263m in 2027, £470m in 2030 and £399m in 2034. The cumulative change in total government take could be £1898m by 2020, £3357m by 2030 and £4121m by 2040. With a CO<sub>2</sub> price of €40/t, the real total government take could be increased by £757m in 2016, £700m in 2019, £614m in 2021, £631m in 2030 and £487m in 2034. The cumulative change in total government take could be £3478m by 2020, £6729m by 2030 and £8216m by 2040. With a CO<sub>2</sub> price of €60/t, the real total government take could be increased by £1002m in 2016, £734m in 2019, £591m in 2025, £726m in 2030 and £487m in 2034. The cumulative change in total government take could be £5643m by 2020, £9956m by 2030 and £11926m by 2040.

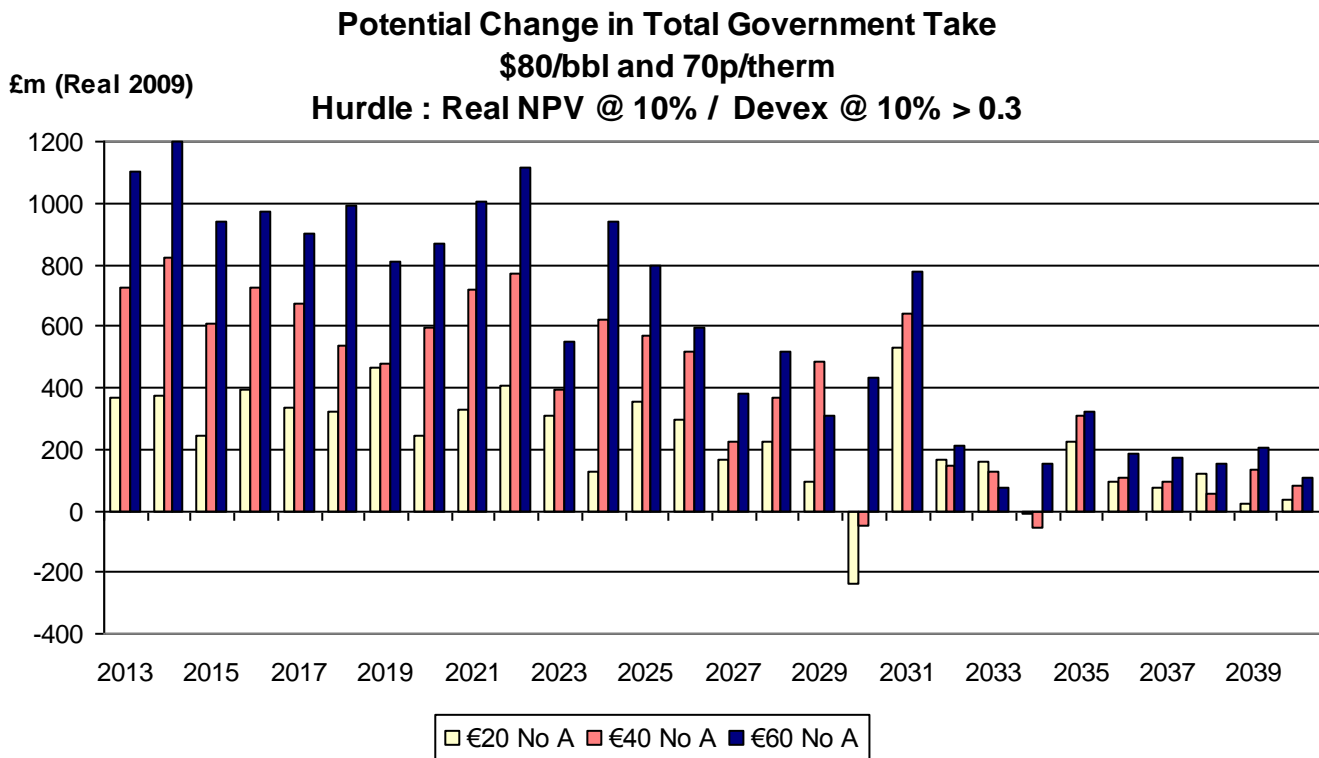


Chart 107



From Chart 107 it is seen that at the low price with no free allowances and EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the real total government take could be increased by £246m in 2020, £520m in 2027, £165m in 2028 and £104m in 2030. The cumulative change in total government take could be £997m by 2020, £1886m by 2030 and £2346m by 2040. With a CO<sub>2</sub> price of €40/t, the real total government take could be increased by £393m in 2014, £252m in 2018, £393m in 2021, £673m in 2027 and £190m in 2035. The cumulative change in total government take could be £1774m by 2020, £3545m by 2030 and £4513m by 2040. With a CO<sub>2</sub> price of €60/t, the real total government take could be increased by £471m in 2018, £428m in 2020, £747m in 2027 and £242m in 2031. The cumulative change in total government take could be £2631m by 2020, £5298m by 2030 and £6873m by 2040.

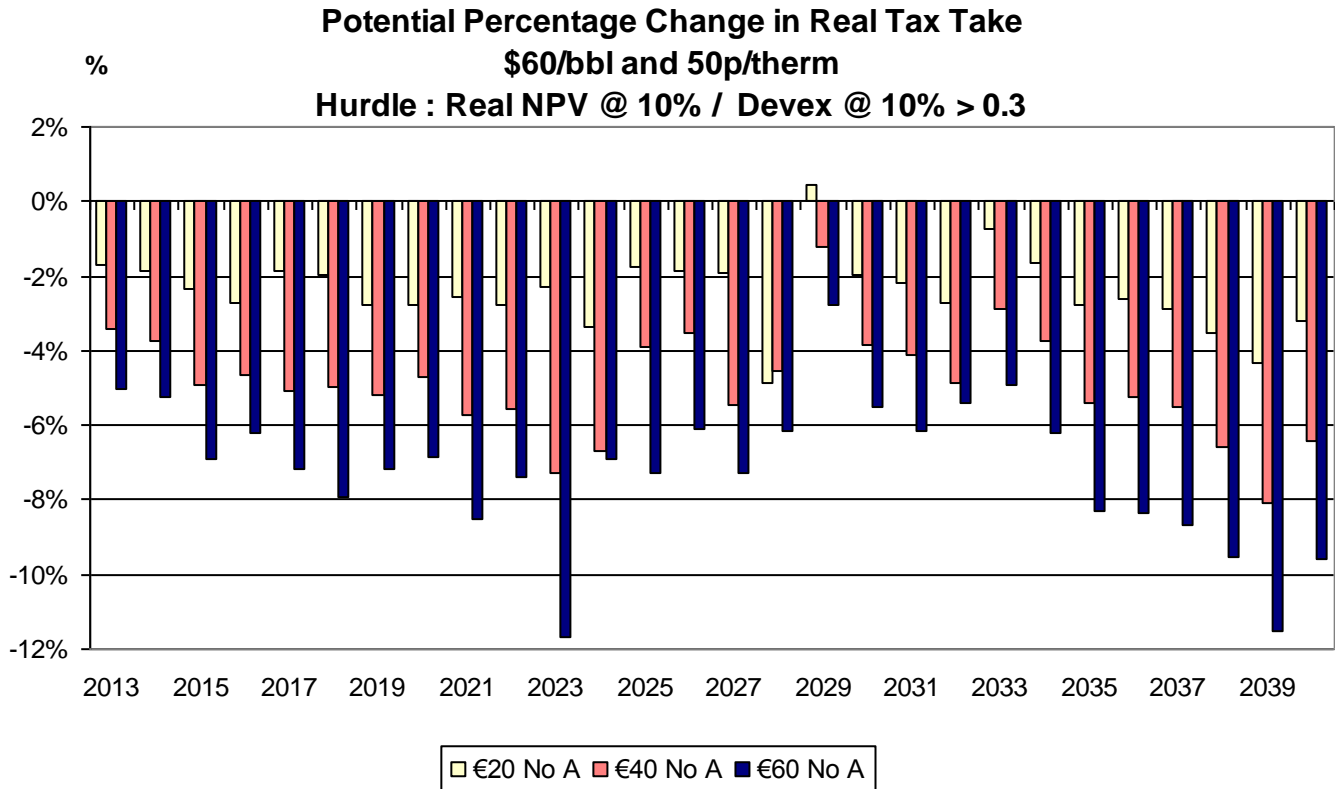
Chart 108



From Chart 108 it is seen that at the high price with no free allowances and EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the real total government take could be increased by £393m in 2016, £464m in 2019, £407m in 2022 and £533m in 2031. The cumulative change in total government take could be £2739m by 2020, £4808m by 2030 and £6221m by 2040. With a CO<sub>2</sub> price of €40/t, the real total government take could be increased by £821m in 2014, £768m in 2022, £673m in 2031 and £306m in 2035. The cumulative change in total government take could be £5173m by 2020, £9789m by 2030 and £11430m by 2040. With a CO<sub>2</sub> price of €60/t, the real total government take could be increased by £1198m in 2014, £1113m in 2022, £938m in 2024 and £778m in 2031. The cumulative change in total government take could be £7785m by 2020, £14421m by 2030 and £16789m by 2040.

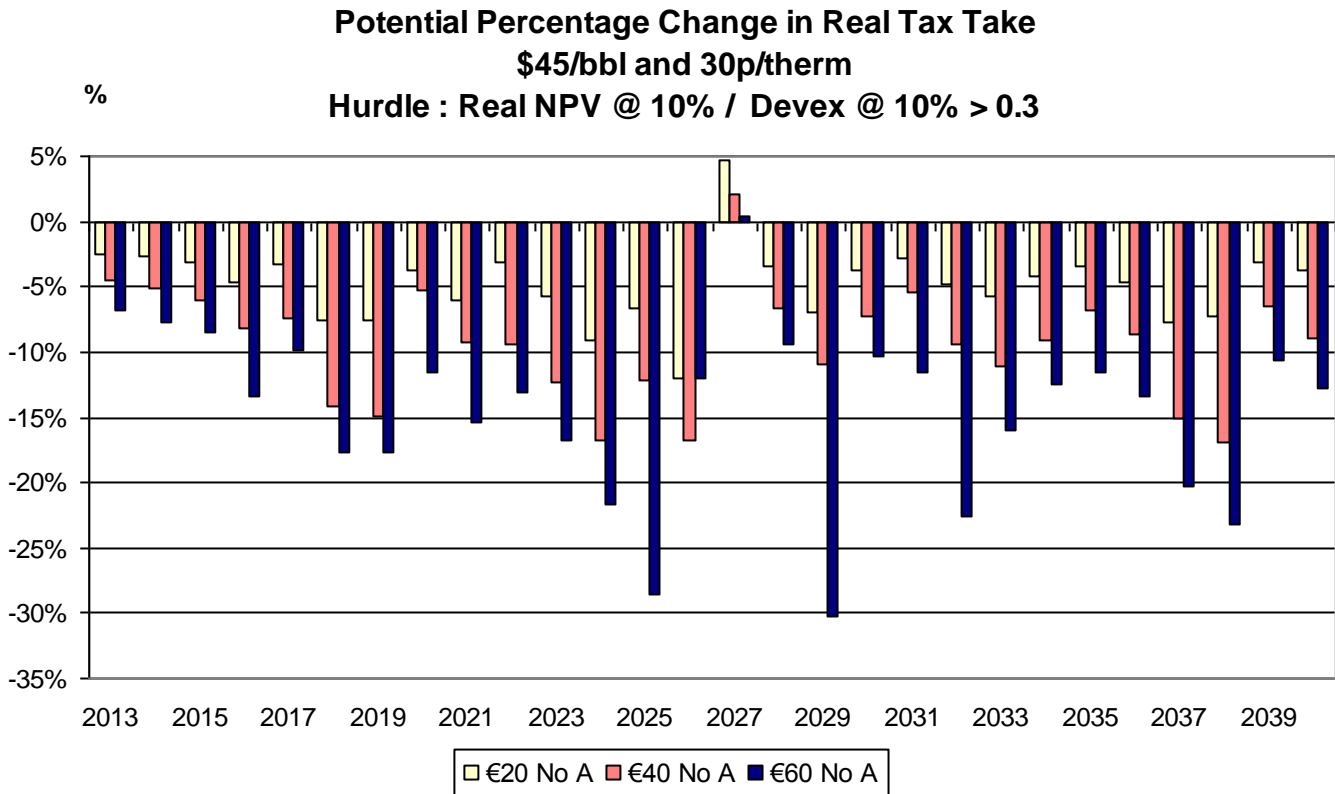
iii) Percentage Change in Tax Revenue

Chart 109



In Chart 109 it is seen that at the medium price with no free allowances and EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real tax take could be reduced by 2.73% in 2016, 2.78% in 2022, 3.37% in 2024, 4.85% in 2028 and 4.33% higher in 2039. Over the period to 2040, the average change is a decrease of 2.41%. With a CO<sub>2</sub> price of €40/t, the percentage real tax take could be reduced by 5.06% in 2017, 7.27% in 2023, 5.47% in 2027, 4.85% in 2032 and 8.09% higher in 2039. Over the period to 2040, the average change is a decrease of 4.9%. With a CO<sub>2</sub> price of €60/t, the percentage real tax take could be reduced by 7.97% in 2018, 11.69% in 2023, 7.3% in 2027, 6.18% in 2031 and 11.54% in 2039. Over the period to 2040, the average change is a decrease of 7.17%.

Chart 110

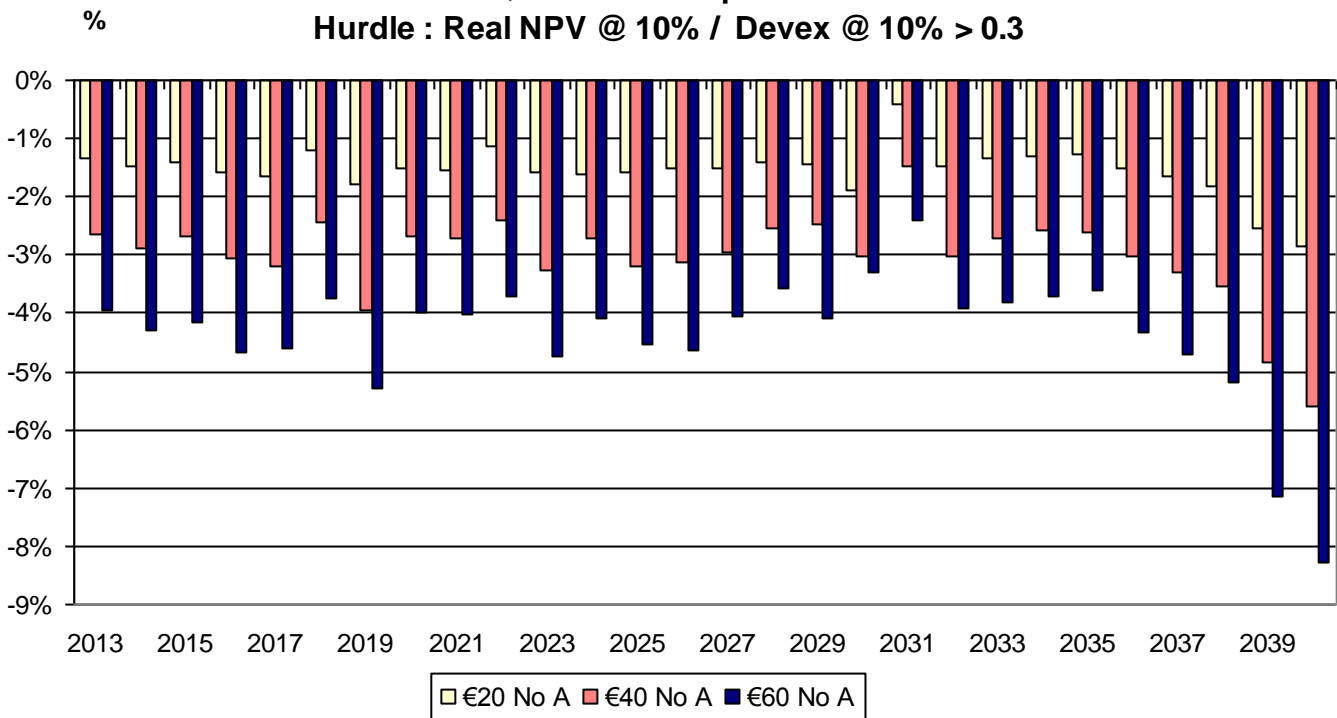


In Chart 110 it is seen that at the low price with no free allowances and EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real tax take could be reduced by 7.6% in 2018, 6.01% in 2021, 9.04% in 2024, 11.95% in 2026 and 7.67% in 2037. Over the period to 2040, the average change is a decrease of 4.8%. With a CO<sub>2</sub> price of €40/t, the percentage real tax take could be reduced by 14.86% in 2019, 16.83% in 2024, 16.79% in 2026, 11.12% in 2033 and 8.92% in 2040. Over the period to 2040, the average change is a decrease of 9.4%. With a CO<sub>2</sub> price of €60/t, the percentage real tax take could be reduced by 17.7% in 2018, 28.53% in 2025, 30.31% in 2029, 22.57% in 2032 and 23.18% in 2038. Over the period to 2040, the average change is a decrease of 14.46%.

Chart 111

**Potential Percentage Change in Real Tax Take  
\$80/bbl and 70p/therm**

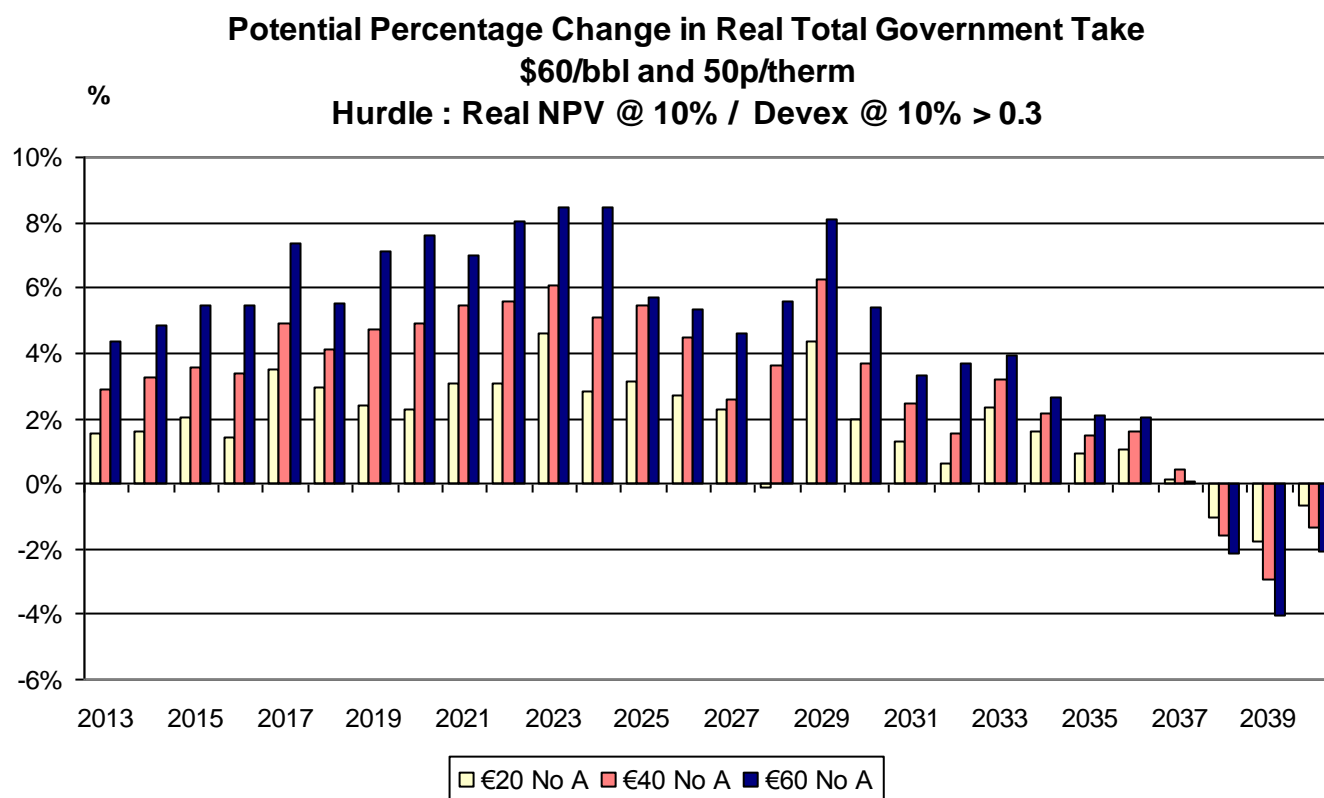
**Hurdle : Real NPV @ 10% / Devex @ 10% > 0.3**



In Chart 111 it is seen that at the high price with no free allowances and EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real tax take could be reduced by 1.64% in 2017, 1.79% in 2019, 1.6% in 2024 and 2.53% in 2039. Over the period to 2040, the average change is a decrease of 1.55%. With a CO<sub>2</sub> price of €40/t, the percentage real tax take could be reduced by 3.2% in 2017, 3.94% in 2019, 3.26% in 2023, 3.04% in 2032 and 5.61% in 2040. Over the period to 2040, the average change is a decrease of 3.02%. With a CO<sub>2</sub> price of €60/t, the percentage real tax take could be reduced by 4.66% in 2016, 4.02% in 2021, 4.74% in 2023, 4.63% in 2026 and 8.26% in 2040. Over the period to 2040, the average change is a decrease of 4.37%.

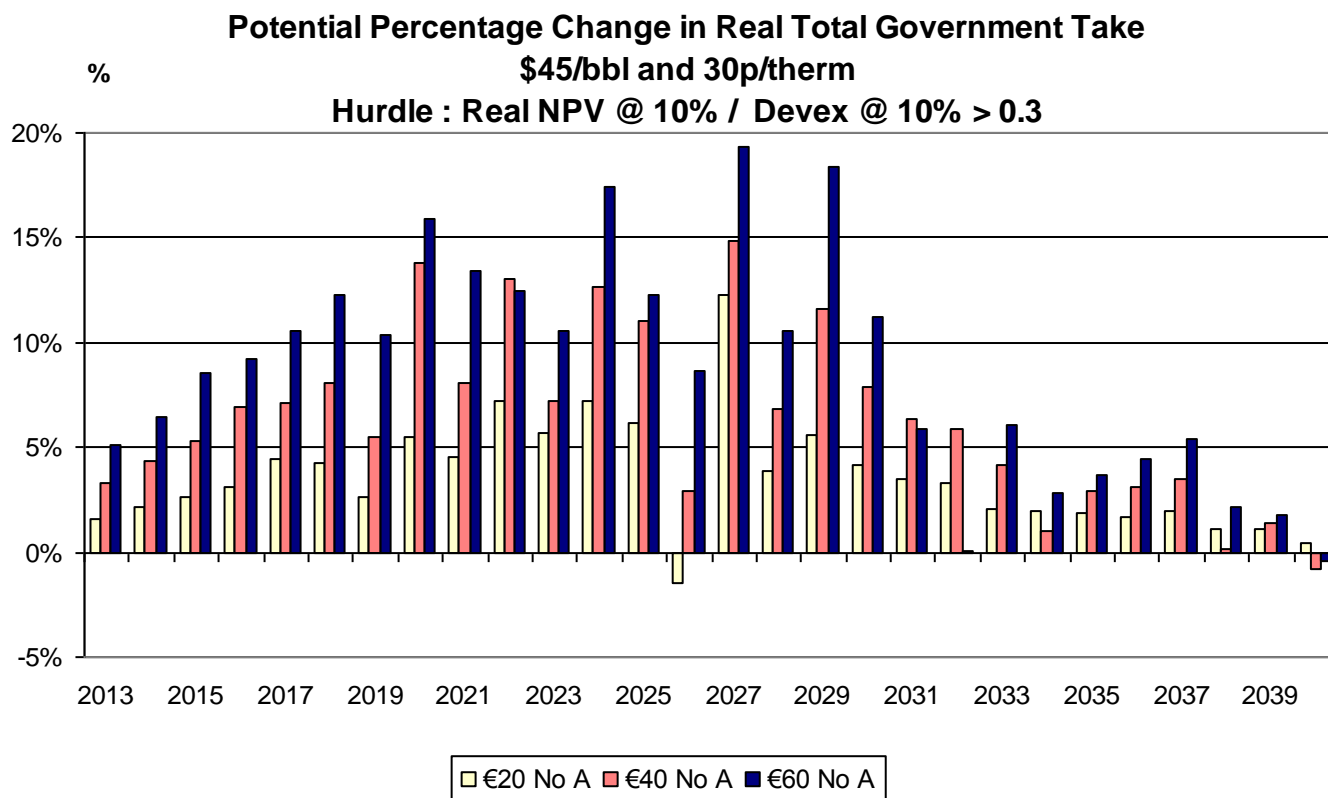
iv) Percentage Change in Total Government Take

Chart 112



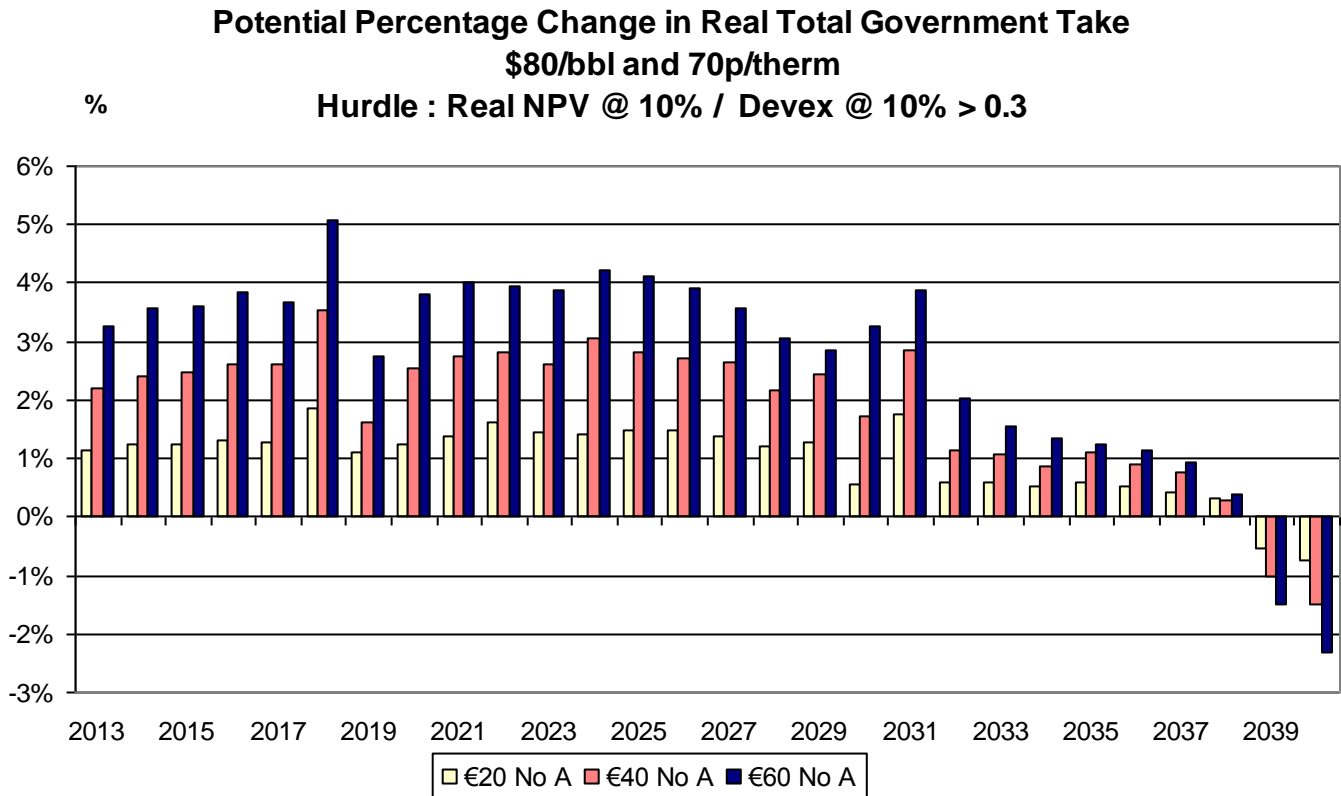
In Chart 112 it is seen that at the medium price with no free allowances and EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real government take could be 3.51% higher in 2017, 4.58% higher in 2023, 4.35% higher in 2029 and 2.33% higher in 2033. Over the period to 2040, the average change is an increase of 1.79%. With a CO<sub>2</sub> price of €40/t, the percentage real government take could be 4.93% higher in 2017, 6.05% higher in 2023, 6.27% higher in 2029 and 3.18% higher in 2033. Over the period to 2040, the average change is an increase of 3.11%. With a CO<sub>2</sub> price of €60/t, the percentage real government take could be 7.36% higher in 2017, 8.46% higher in 2023, 8.09% higher in 2029 and 3.95% higher in 2033. Over the period to 2040, the average change is an increase of 4.43%.

Chart 113



In Chart 113 it is seen that at the low price with no free allowances and EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real government take could be 4.46% higher in 2017, 5.51% higher in 2020, 7.2% higher in 2022 and 12.26% higher in 2027. Over the period to 2040, the average change is an increase of 3.6%. With a CO<sub>2</sub> price of €40/t, the percentage real government take could be 8.07% higher in 2018, 13.78% higher in 2020, 12.68% higher in 2024 and 14.87% higher in 2027. Over the period to 2040, the average change is an increase of 6.37%. With a CO<sub>2</sub> price of €60/t, the percentage real government take could be 12.25% higher in 2018, 15.91% higher in 2020, 17.41% higher in 2024, 19.35% higher in 2027 and 18.37% higher in 2029. Over the period to 2040, the average change is an increase of 8.73%.

Chart 114



In Chart 114 it is seen that at the high price with no free allowances and EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t, the percentage real government take could be 1.85% higher in 2018, 1.61% higher in 2022, 1.49% higher in 2026 and 1.76% higher in 2031. Over the period to 2040, the average change is an increase of 0.99%. With a CO<sub>2</sub> price of €40/t, the percentage real government take could be 3.55% higher in 2018, 3.05% higher in 2024, 2.44% higher in 2029 and 1.11% higher in 2035. Over the period to 2040, the average change is an increase of 1.87%. With a CO<sub>2</sub> price of €60/t, the percentage real government take could be 5.08% higher in 2018, 4.03% higher in 2021, 4.23% higher in 2024 and 3.88% higher in 2031. Over the period to 2040, the average change is an increase of 2.68%.



v) Remaining Percentage Tax Takes (Sanctioned Fields and Incremental Projects)

Chart 115

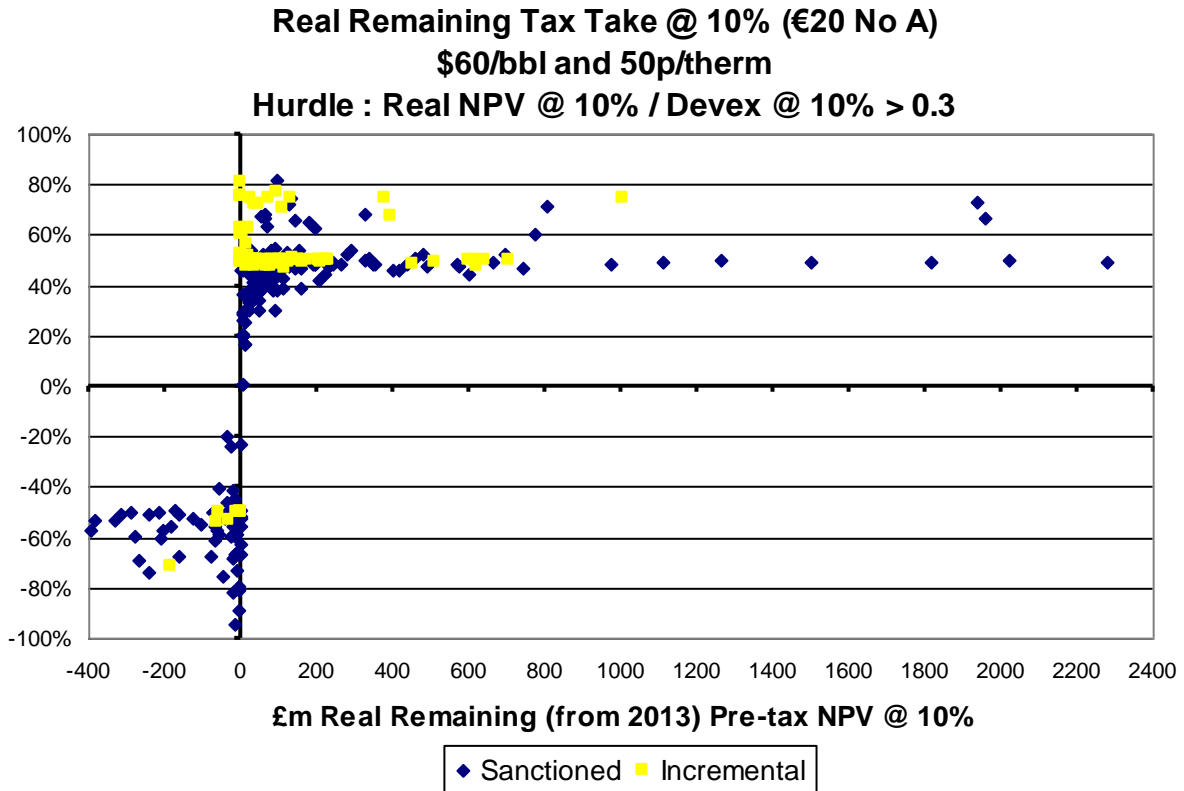


Chart 115 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where there are no free allowances. There are 80 sanctioned fields and 15 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 24 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 68 of the sanctioned fields and 12 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 29 sanctioned fields and 35 incremental projects which have a real remaining tax take at 10% of 60% or more and 130 of the sanctioned fields and 98 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 116

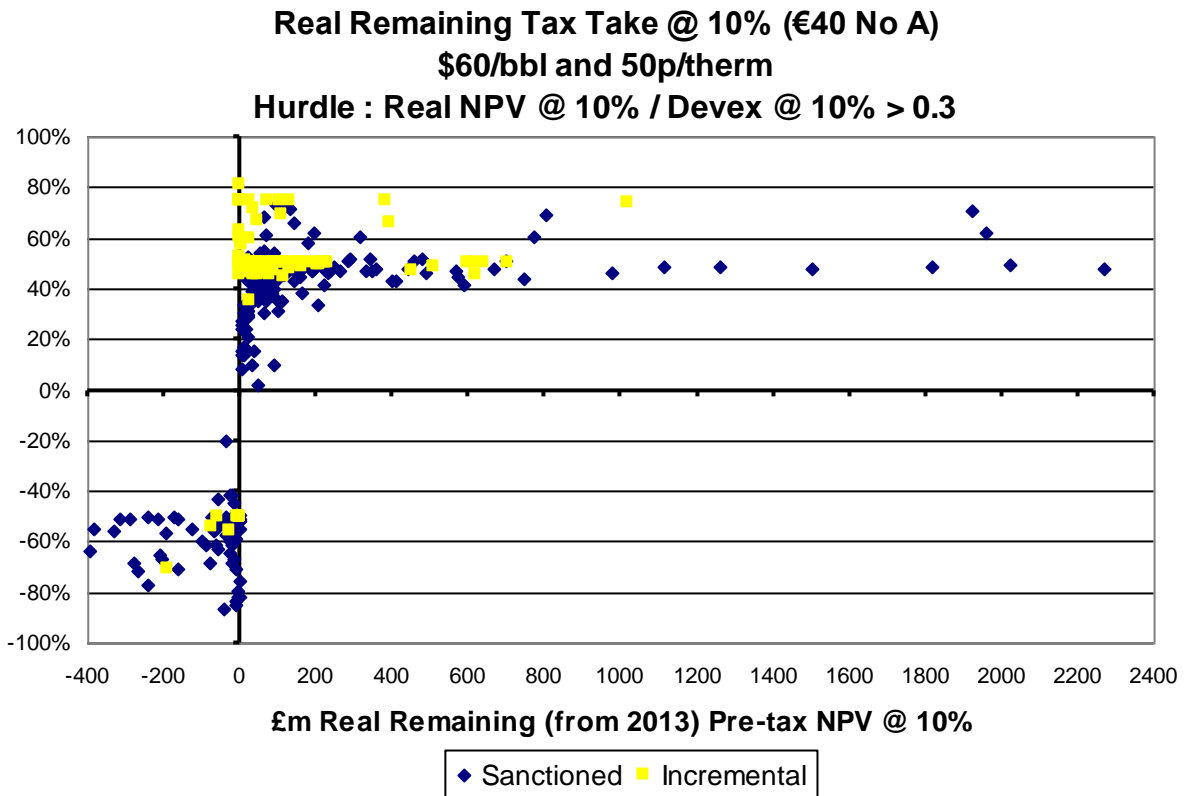


Chart 116 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where there are no free allowances. There are 81 sanctioned fields and 15 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 32 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 72 of the sanctioned fields and 12 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 25 sanctioned fields and 32 incremental projects which have a real remaining tax take at 10% of 60% or more and 119 of the sanctioned fields and 97 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 117

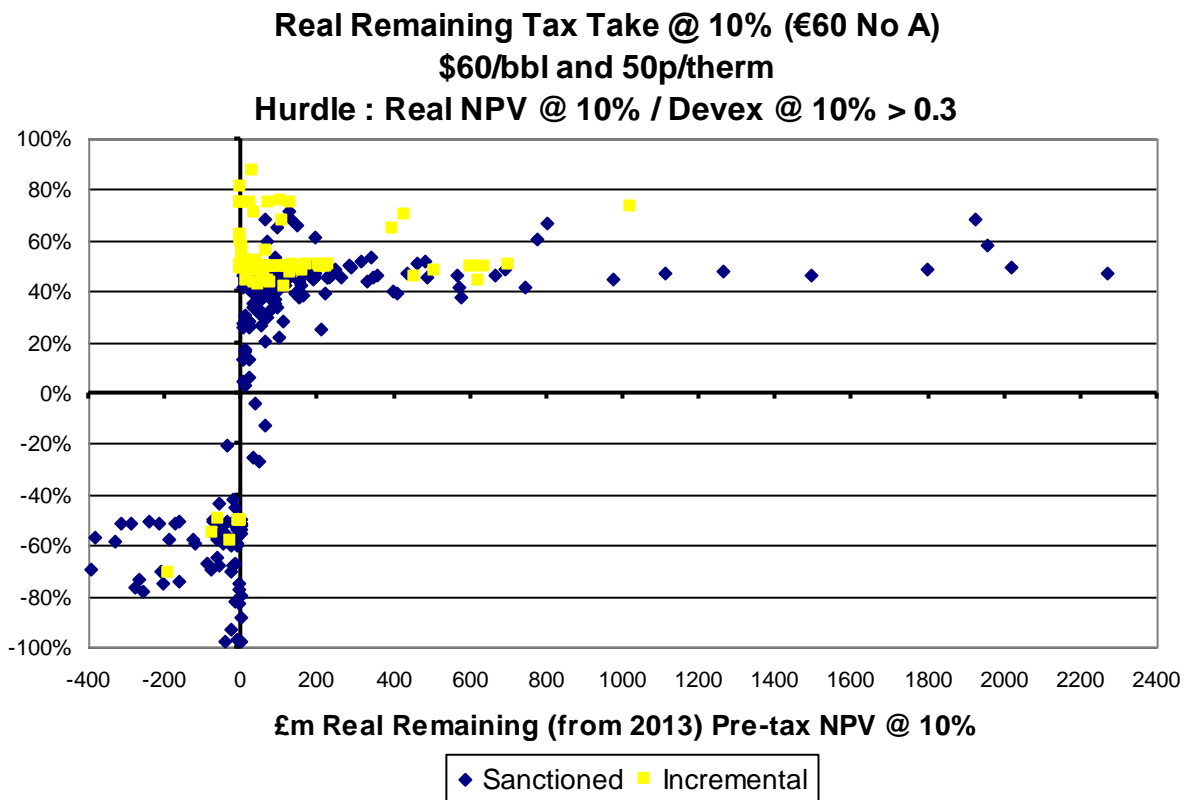


Chart 117 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where there are no free allowances. There are 85 sanctioned fields and 15 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 33 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 74 of the sanctioned fields and 12 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 19 sanctioned fields and 33 incremental projects which have a real remaining tax take at 10% of 60% or more and 108 of the sanctioned fields and 98 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 118

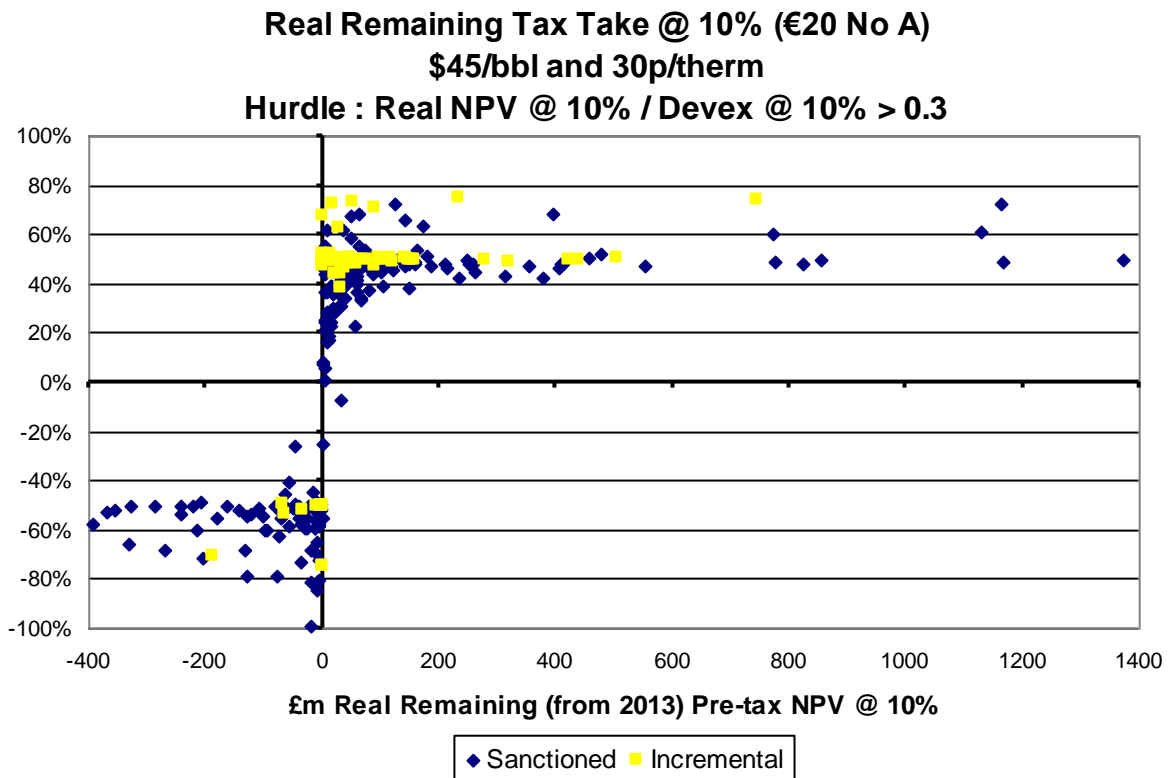


Chart 118 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where there are no free allowances. There are 95 sanctioned fields and 18 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 26 of the sanctioned fields and 3 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 84 of the sanctioned fields and 16 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 23 sanctioned fields and 19 incremental projects which have a real remaining tax take at 10% of 60% or more and 105 of the sanctioned fields and 70 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 119

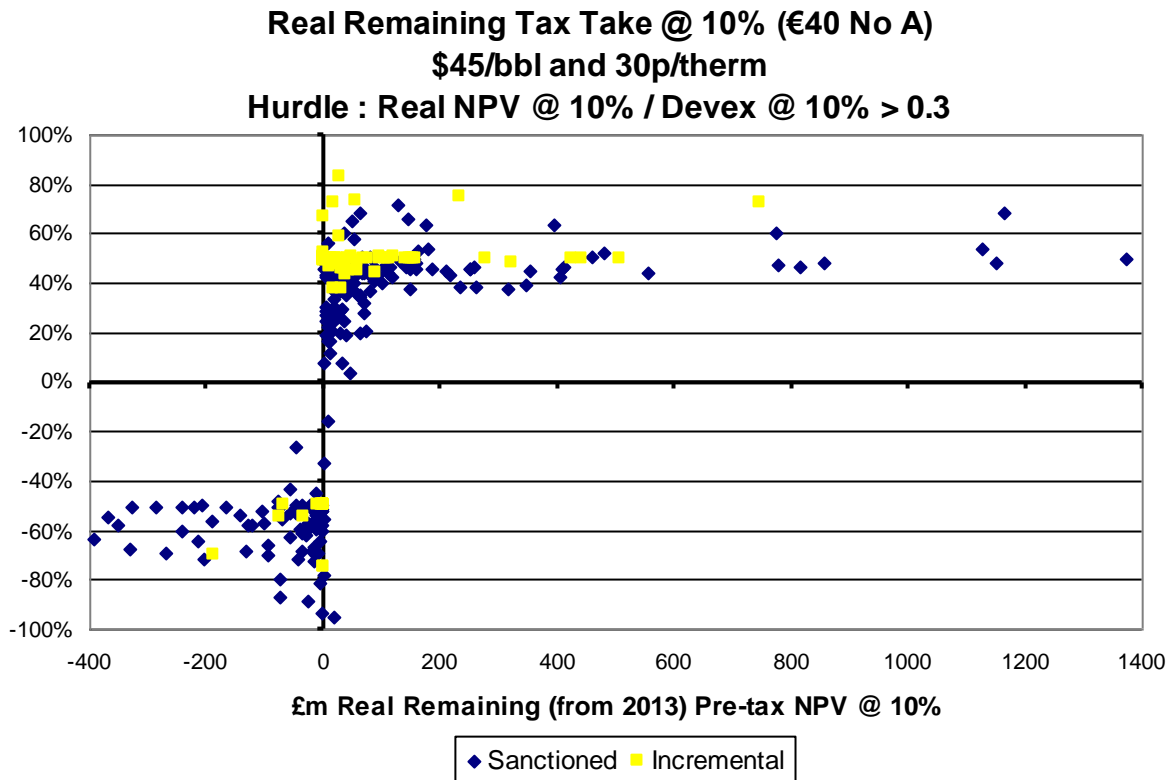


Chart 119 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where there are no free allowances. There are 98 sanctioned fields and 19 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 39 of the sanctioned fields and 4 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 89 of the sanctioned fields and 17 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 18 sanctioned fields and 19 incremental projects which have a real remaining tax take at 10% of 60% or more and 89 of the sanctioned fields and 66 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 120

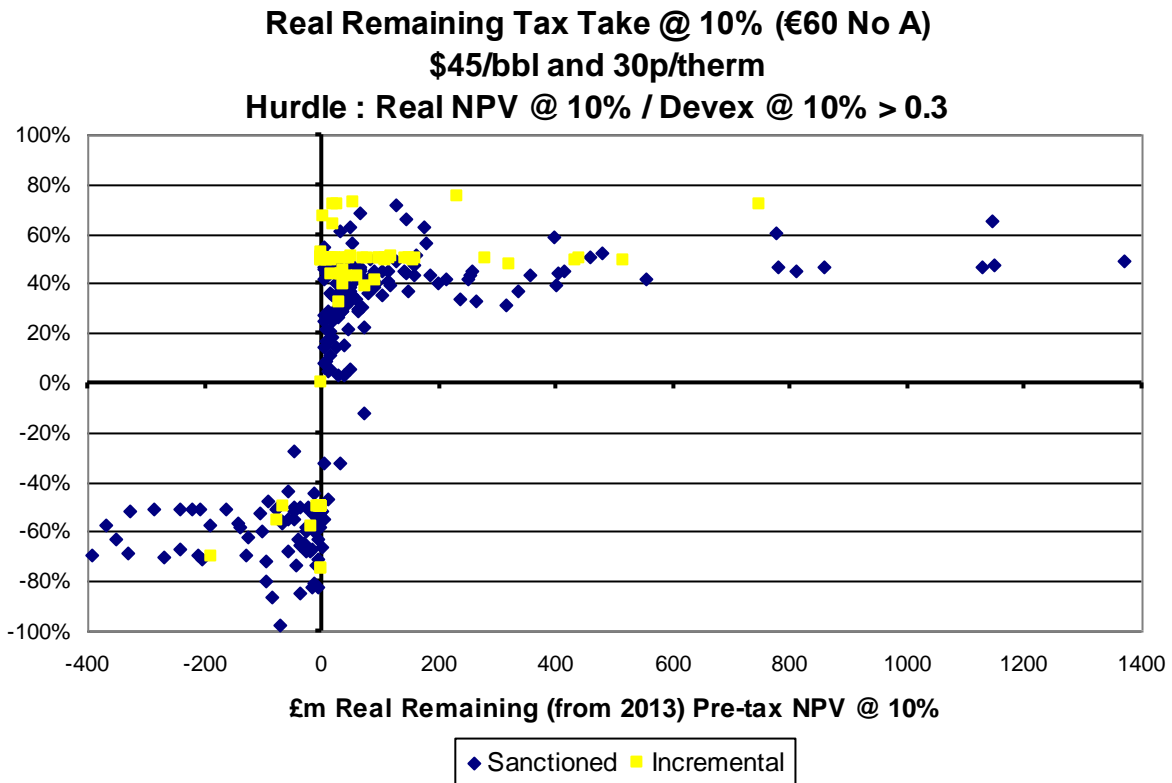


Chart 120 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where there are no free allowances. There are 102 sanctioned fields and 18 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 46 of the sanctioned fields and 3 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 91 of the sanctioned fields and 16 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 17 sanctioned fields and 18 incremental projects which have a real remaining tax take at 10% of 60% or more and 79 of the sanctioned fields and 66 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 121

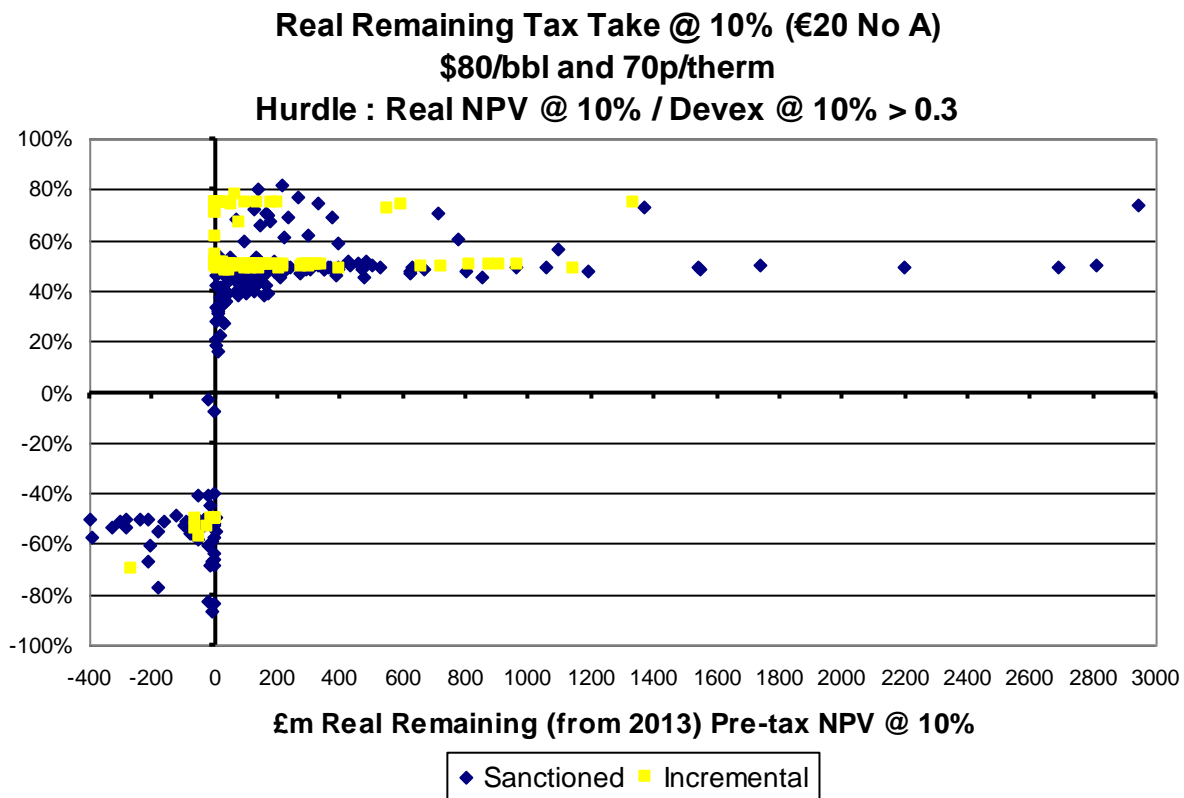


Chart 121 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where there are no free allowances. There are 68 sanctioned fields and 16 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 19 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 58 of the sanctioned fields and 13 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 36 sanctioned fields and 40 incremental projects which have a real remaining tax take at 10% of 60% or more and 153 of the sanctioned fields and 110 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

Chart 122

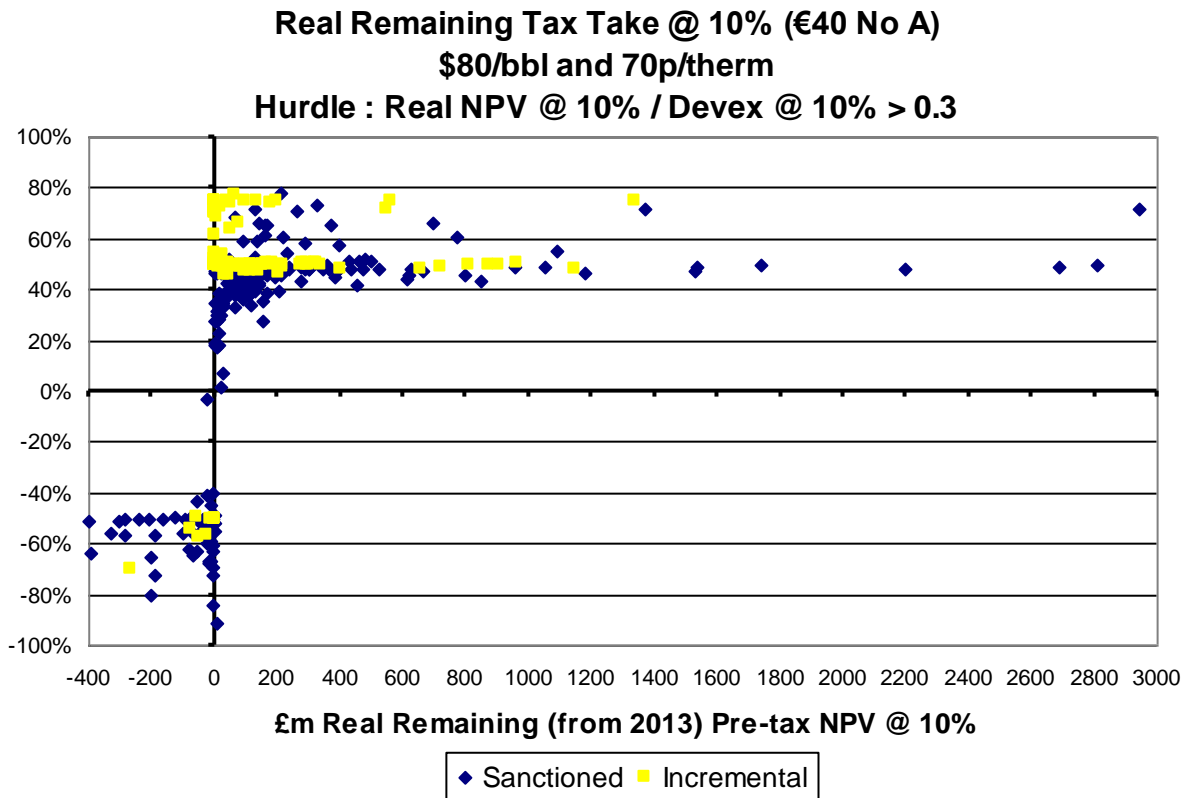


Chart 122 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where there are no free allowances. There are 70 sanctioned fields and 16 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 26 of the sanctioned fields and 1 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 61 of the sanctioned fields and 13 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 30 sanctioned fields and 40 incremental projects which have a real remaining tax take at 10% of 60% or more and 137 of the sanctioned fields and 110 of the incremental projects which have a real remaining tax take at 10% of 50% or more.



Chart 123

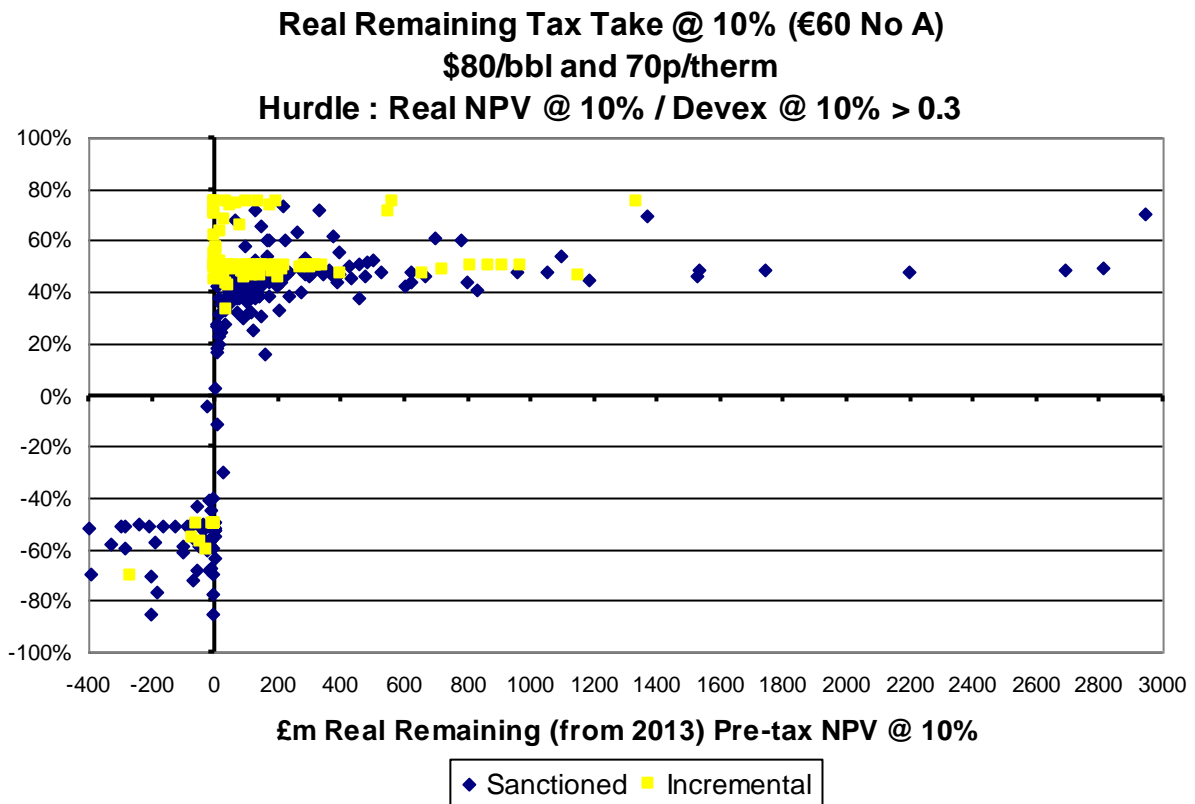


Chart 123 shows the real remaining pre-tax NPV at 10% against real remaining tax at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where there are no free allowances. There are 73 sanctioned fields and 16 incremental projects with a real remaining tax take at 10% of less than zero. Of these, 26 of the sanctioned fields and 2 of the incremental projects have a real remaining tax take at 10% of less than negative 60% whilst 63 of the sanctioned fields and 13 of the incremental projects have a real remaining tax take at 10% of less than negative 50%. There are 27 sanctioned fields and 37 incremental projects which have a real remaining tax take at 10% of 60% or more and 126 of the sanctioned fields and 109 of the incremental projects which have a real remaining tax take at 10% of 50% or more.

vi) New Field Percentage Lifetime Tax Take

Chart 124

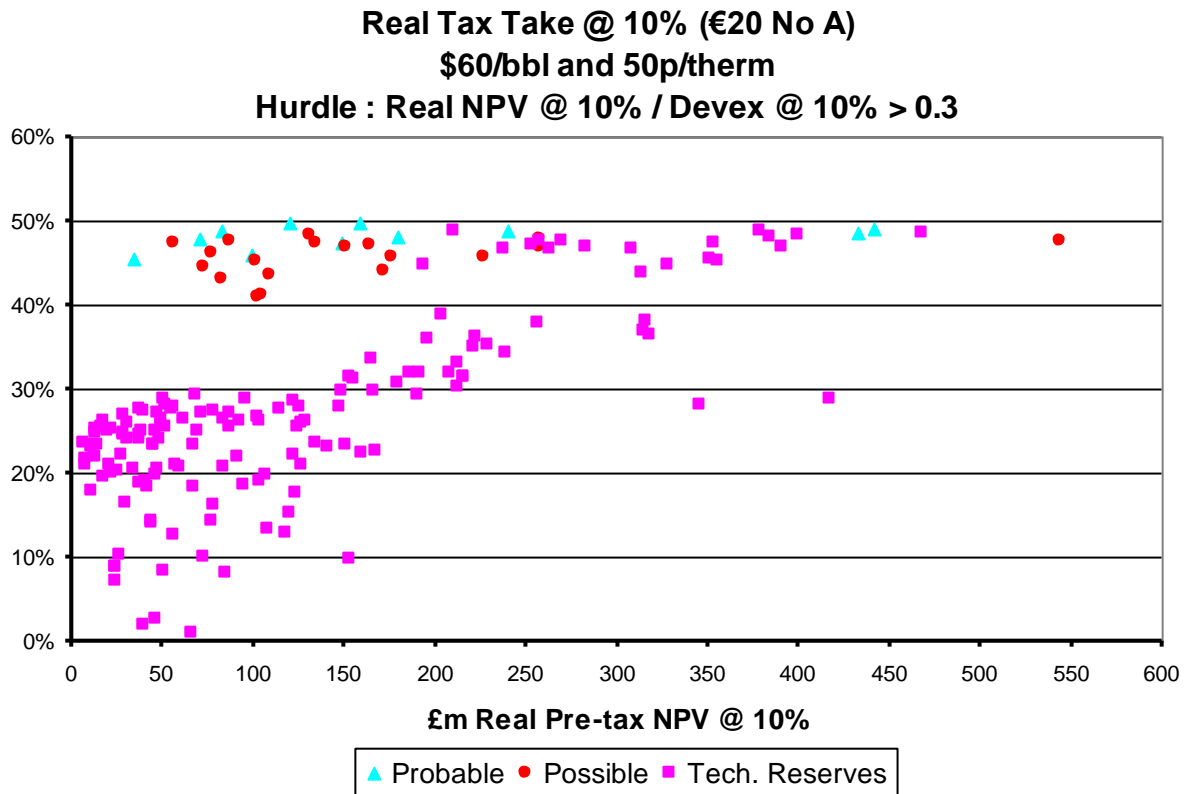


Chart 124 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t at the medium price for the scenario where there are no free allowances. There are 13 probable fields, 19 possible fields and 22 technical reserve fields which have a real tax take at 10% of 50% or more. There are 13 probable fields, 19 possible fields and 152 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 125

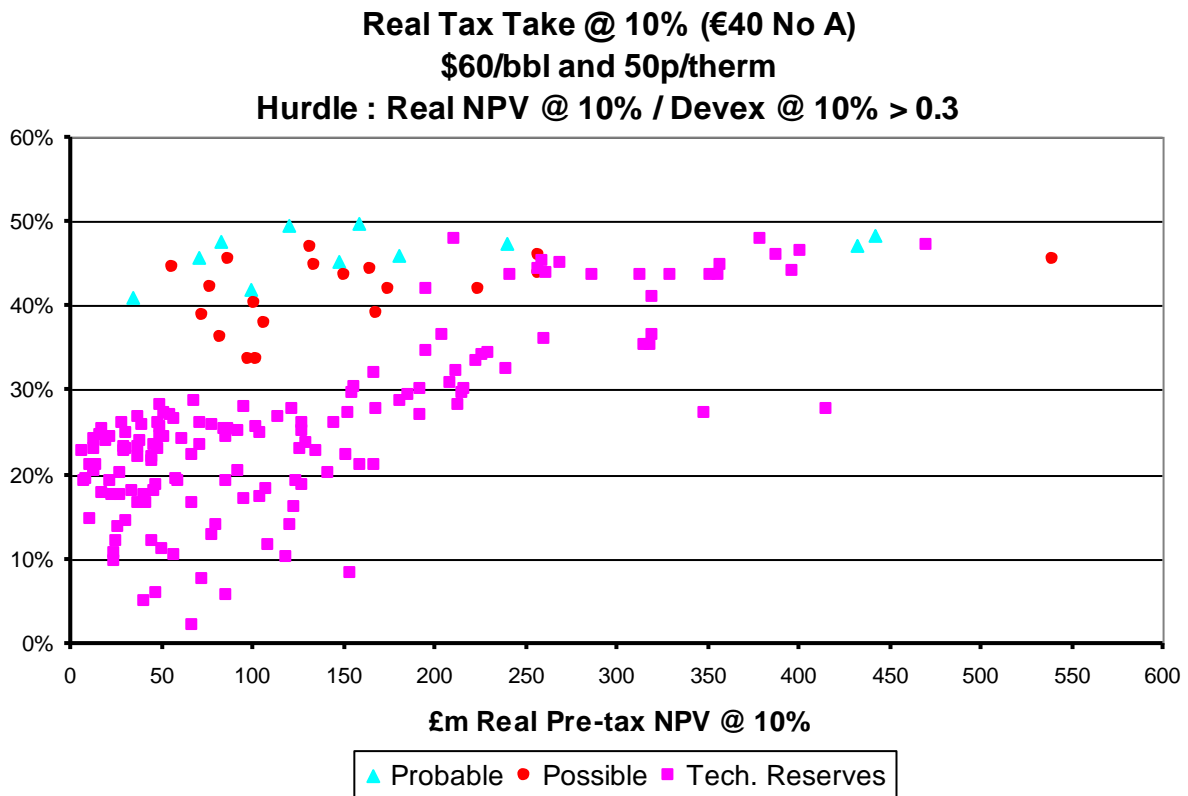


Chart 125 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t at the medium price for the scenario where there are no free allowances. There are 13 probable fields, 13 possible fields and 22 technical reserve fields which have a real tax take at 10% of 50% or more. There are 13 probable fields, 19 possible fields and 151 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 126

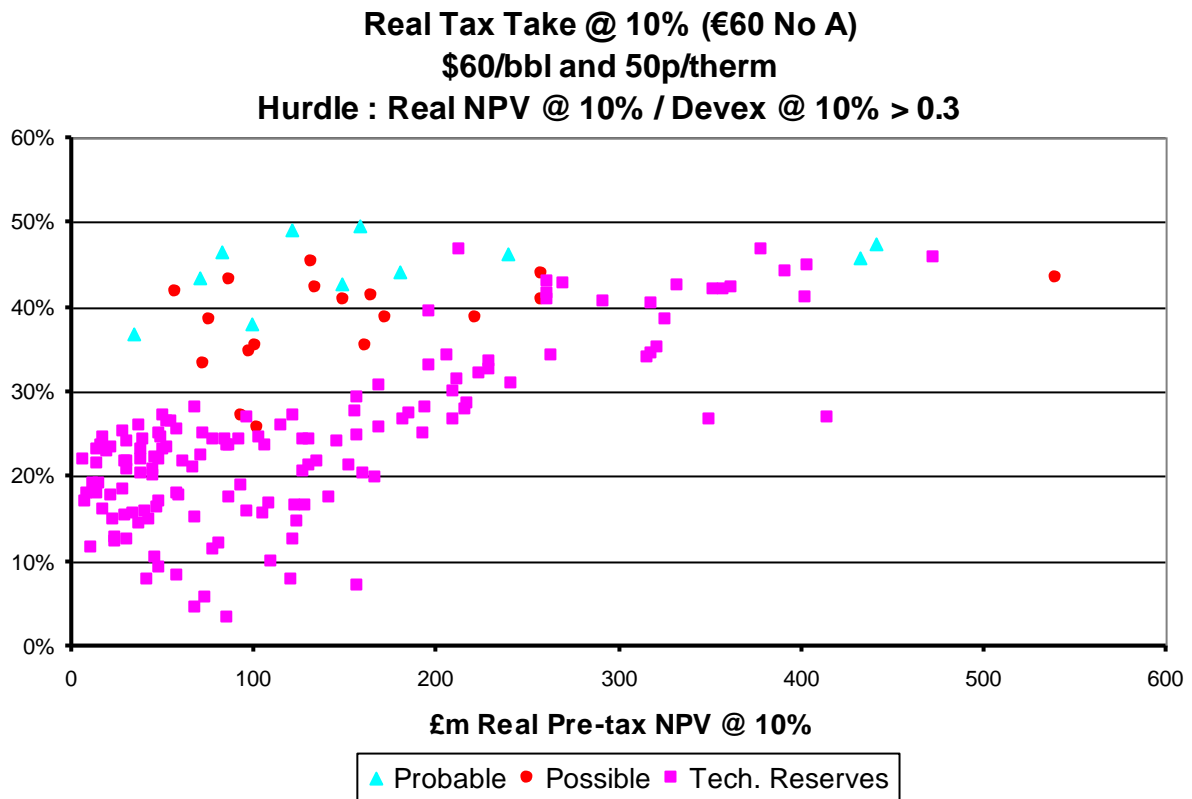


Chart 126 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t at the medium price for the scenario where there are no free allowances. There are 11 probable fields, 9 possible fields and 19 technical reserve fields which have a real tax take at 10% of 50% or more. There are 13 probable fields, 18 possible fields and 147 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 127

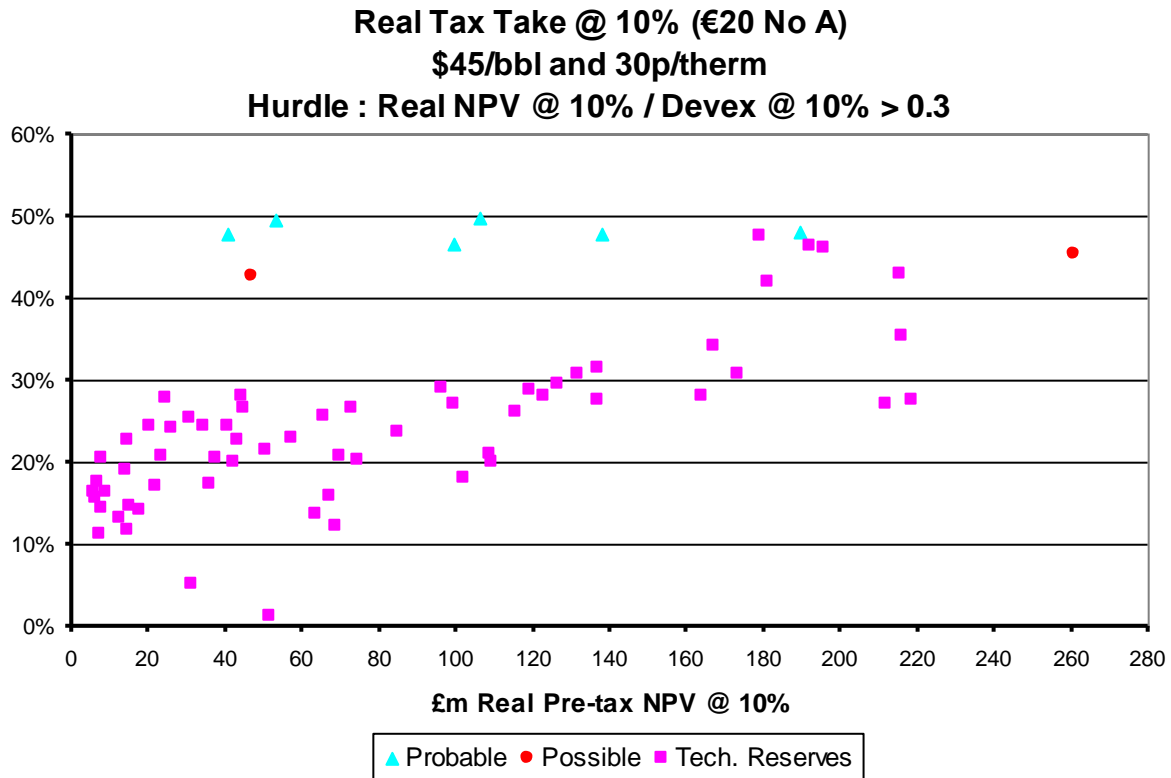


Chart 127 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t at the low price for the scenario where there are no free allowances. There are 6 probable fields, 2 possible fields and 7 technical reserve fields which have a real tax take at 10% of 50% or more. There are 6 probable fields, 2 possible fields and 64 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 128

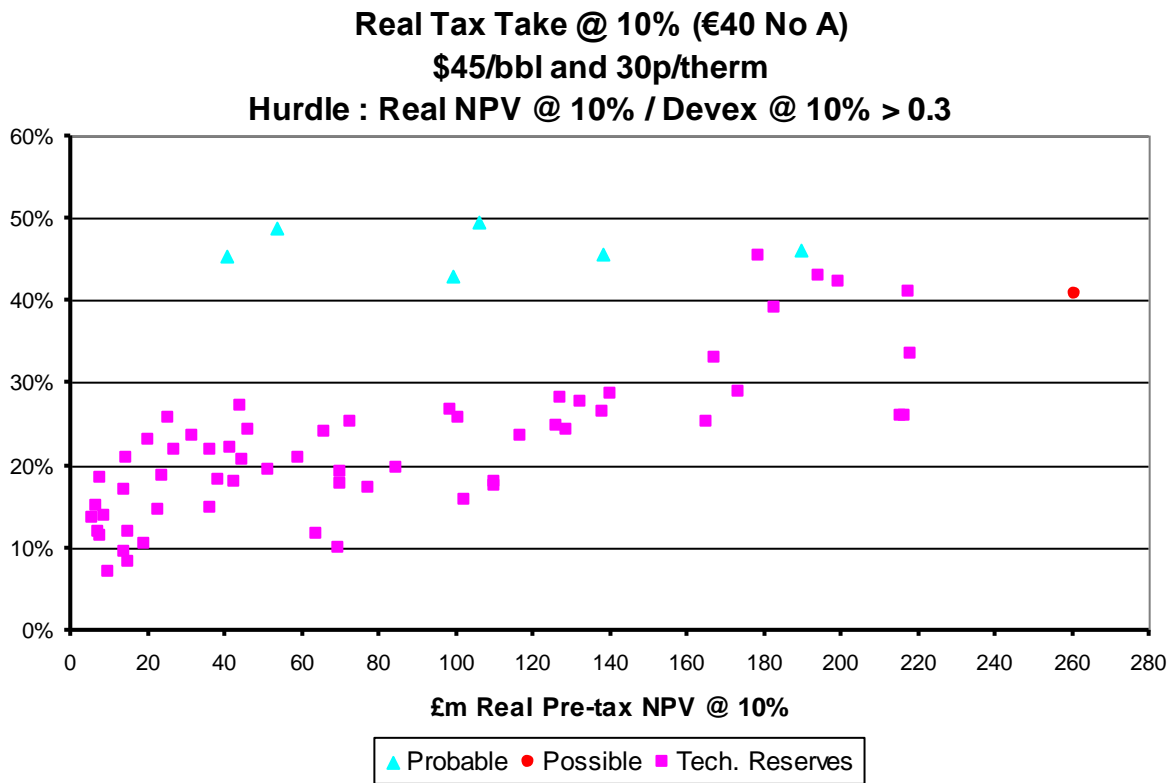


Chart 128 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t at the low price for the scenario where there are no free allowances. There are 6 probable fields, 1 possible field and 6 technical reserve fields which have a real tax take at 10% of 50% or more. There are 6 probable fields, 1 possible field and 62 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 129

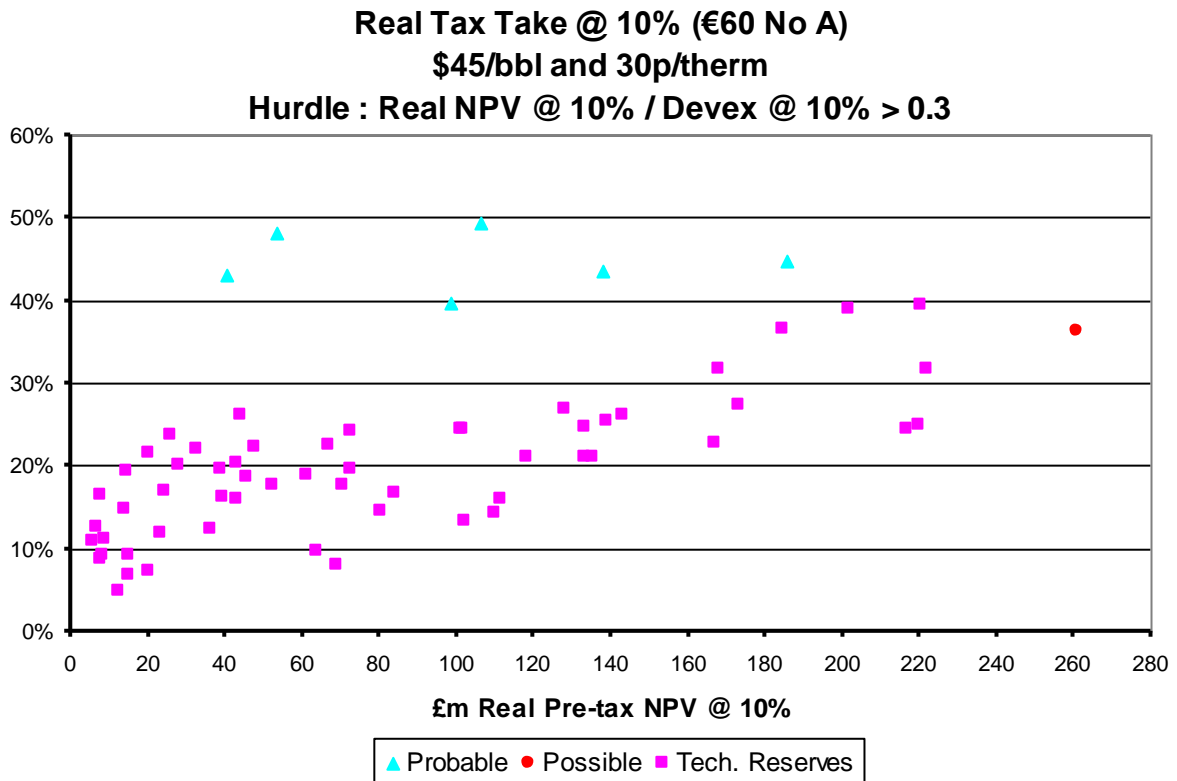


Chart 129 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t at the low price for the scenario where there are no free allowances. There are 5 probable fields and 2 technical reserve fields which have a real tax take at 10% of 50% or more. There are 6 probable fields, 1 possible field and 59 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 130

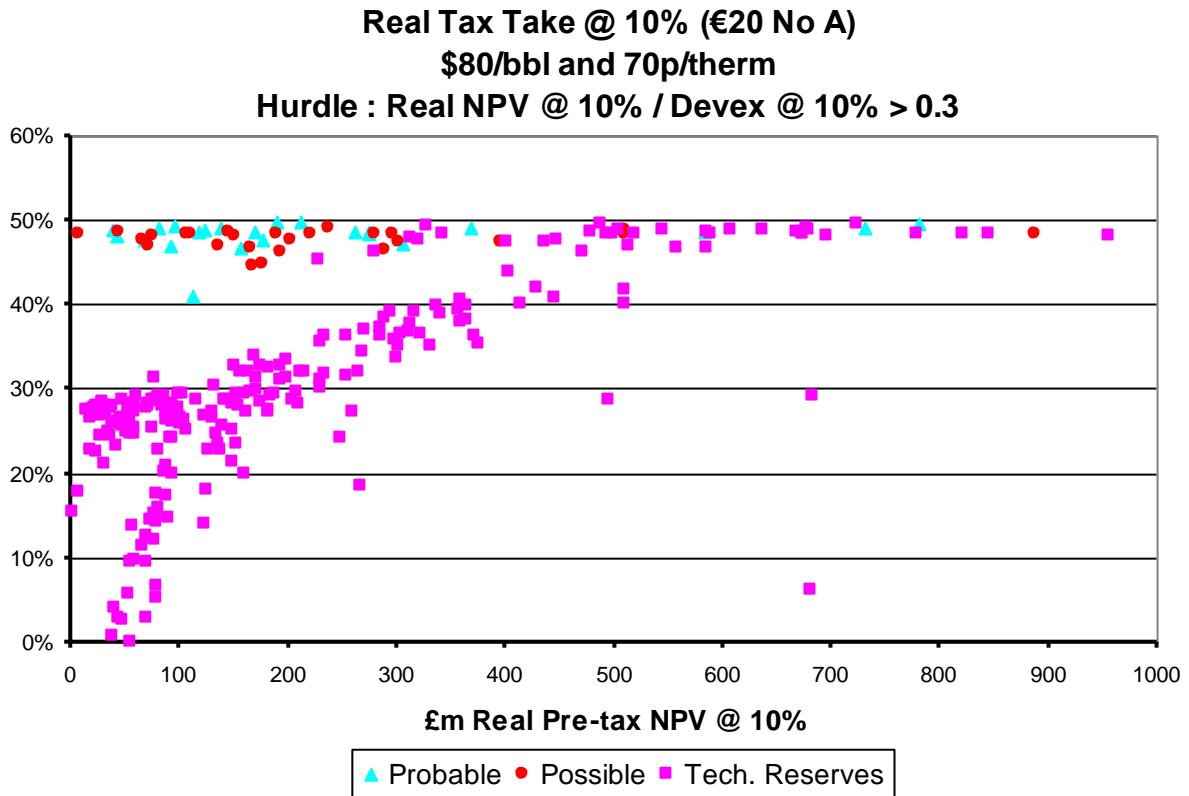


Chart 130 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t at the high price for the scenario where there are no free allowances. There are 27 probable fields, 26 possible fields and 46 technical reserve fields which have a real tax take at 10% of 50% or more. There are 27 probable fields, 26 possible fields and 229 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.



Chart 131

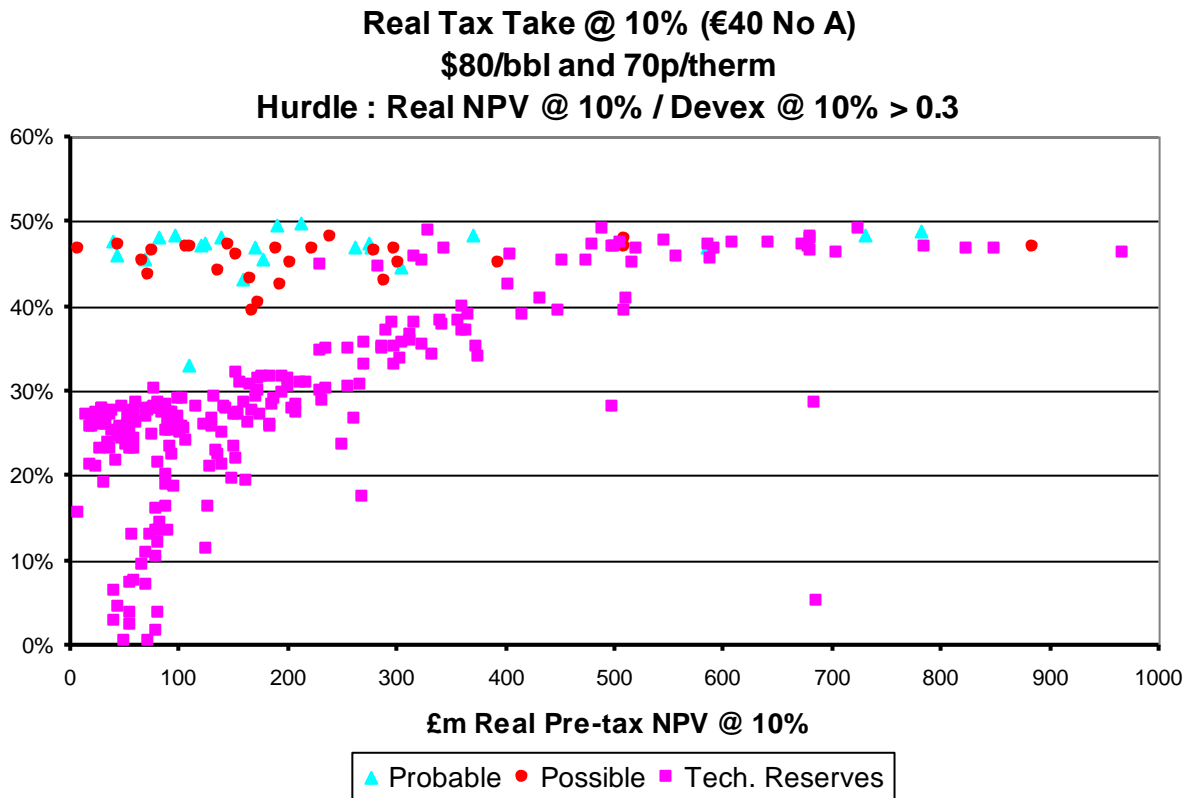


Chart 131 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t at the high price for the scenario where there are no free allowances. There are 25 probable fields, 25 possible fields and 42 technical reserve fields which have a real tax take at 10% of 50% or more. There are 26 probable fields, 26 possible fields and 227 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 132

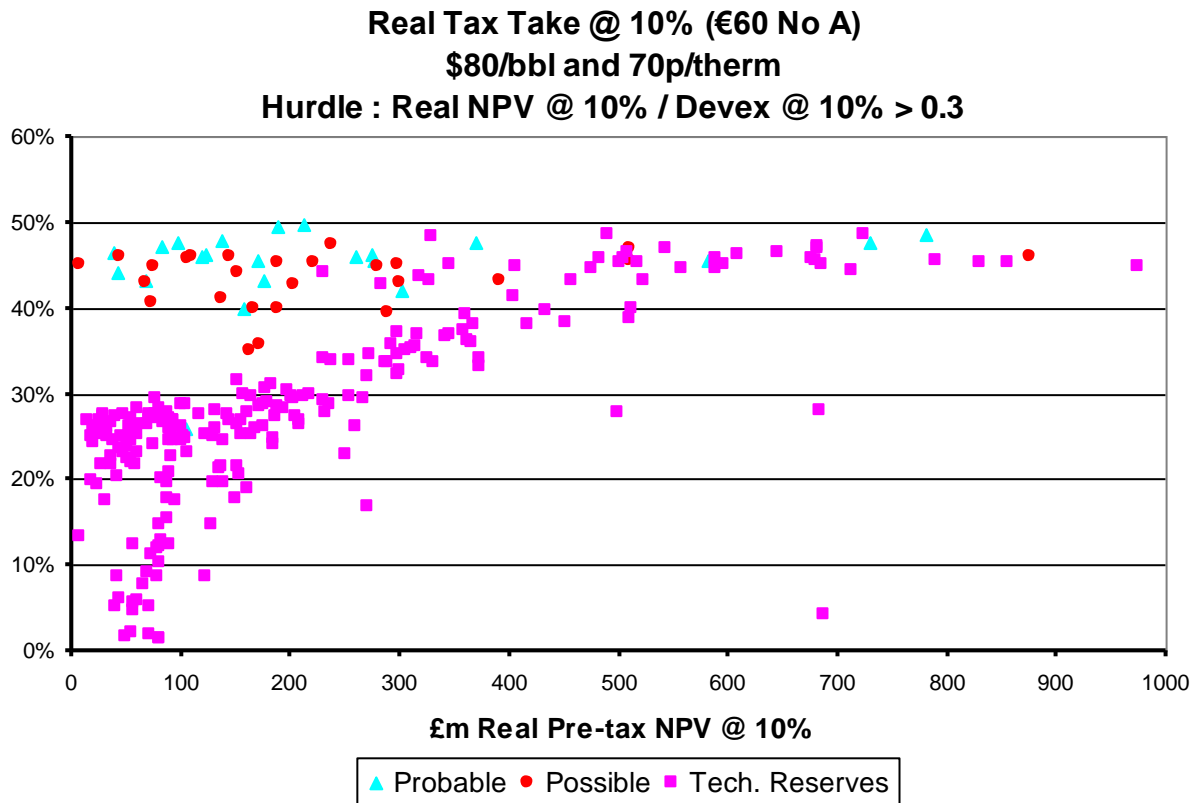


Chart 132 shows the real pre-tax NPV at 10% against real tax take at 10% for the scenario with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t at the high price for the scenario where there are no free allowances. There are 24 probable fields, 21 possible fields and 41 technical reserve fields which have a real tax take at 10% of 50% or more. There are 26 probable fields, 26 possible fields and 227 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

vii) Remaining Percentage Government Take (Sanctioned Fields and Incremental Projects)

Chart 133

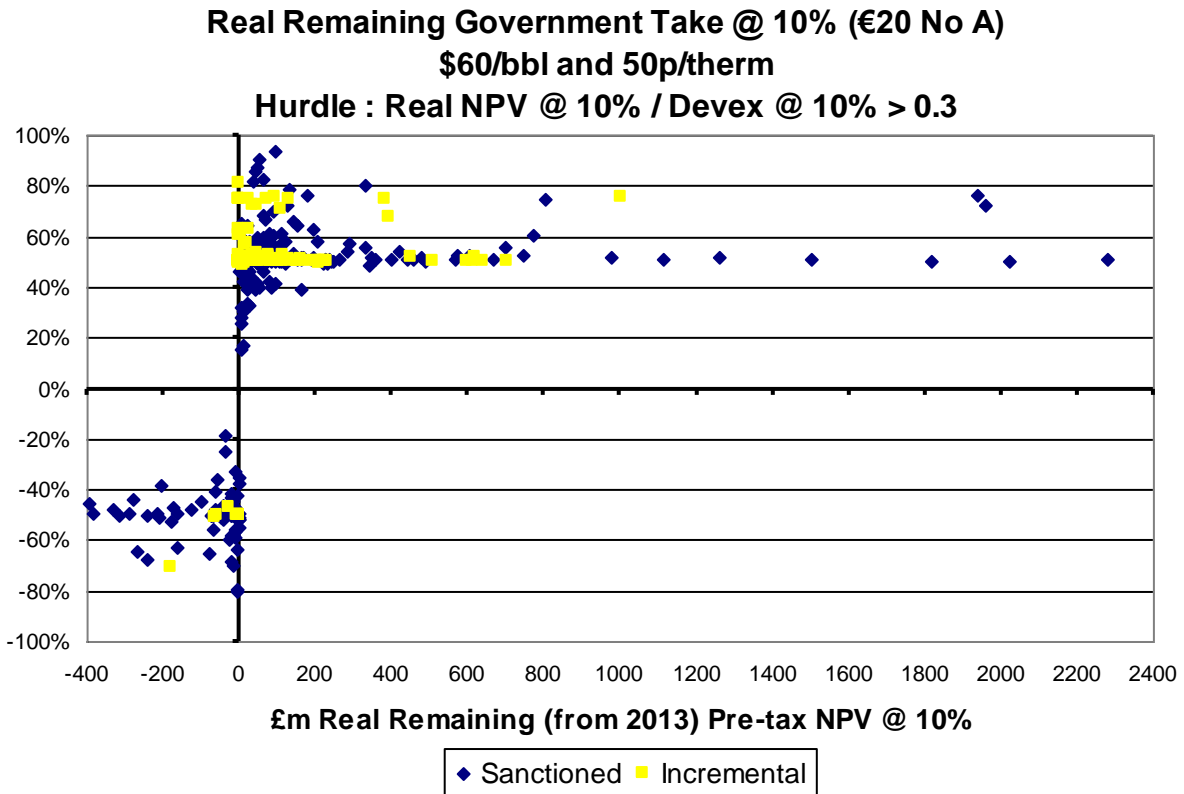


Chart 133 shows the real remaining pre-tax NPV at 10% against the real remaining government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where there are no free allowances. There are 79 sanctioned fields and 15 incremental projects with a real remaining government take at 10% of less than zero. Of these, 16 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 43 of the sanctioned fields and 11 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 125 sanctioned fields and 58 incremental projects which have a real remaining government take at 10% of 60% or more and 148 of the sanctioned fields and 98 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 134

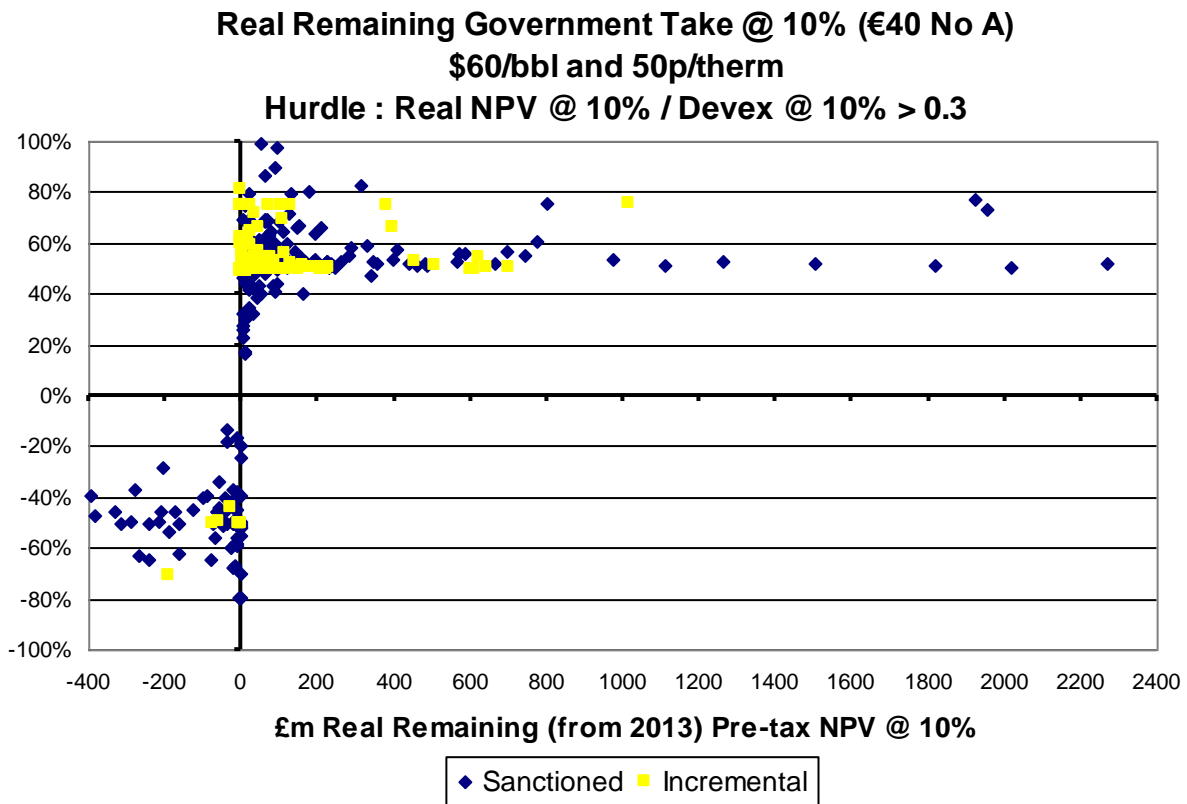


Chart 134 shows the real remaining pre-tax NPV at 10% against the real remaining government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where there are no free allowances. There are 80 sanctioned fields and 15 incremental projects with a real remaining government take at 10% of less than zero. Of these, 15 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 41 of the sanctioned fields and 11 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 130 sanctioned fields and 58 incremental projects which have a real remaining government take at 10% of 60% or more and 149 of the sanctioned fields and 98 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 135

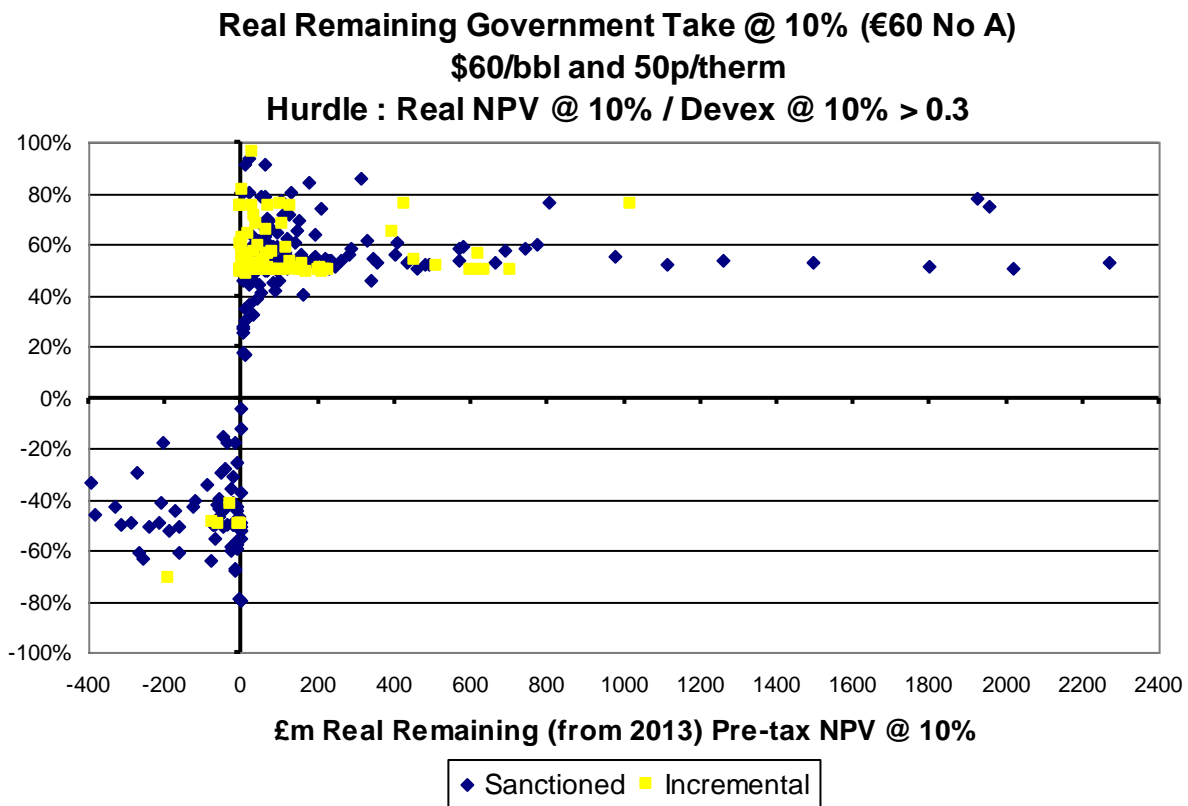


Chart 135 shows the real remaining pre-tax NPV at 10% against the real remaining government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where there are no free allowances. There are 80 sanctioned fields and 15 incremental projects with a real remaining government take at 10% of less than zero. Of these, 15 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 37 of the sanctioned fields and 10 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 130 sanctioned fields and 55 incremental projects which have a real remaining government take at 10% of 60% or more and 149 of the sanctioned fields and 98 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 136

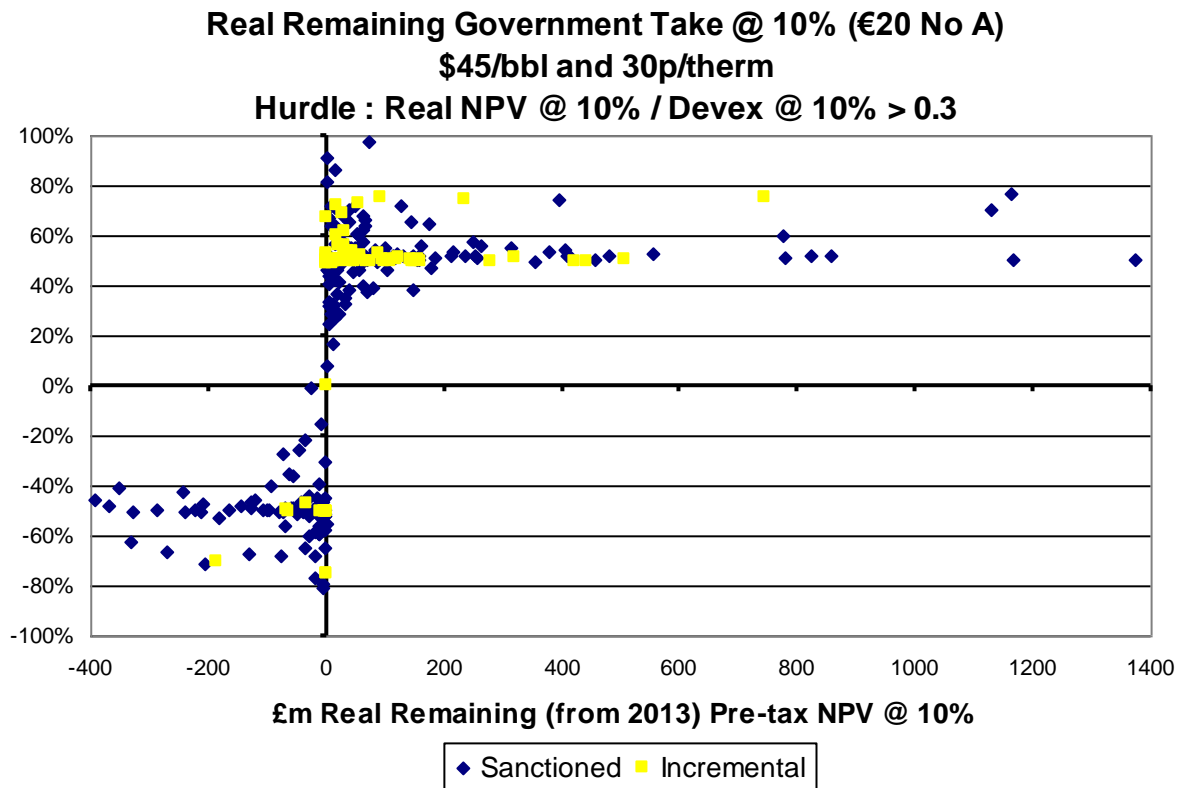


Chart 136 shows the real remaining pre-tax NPV at 10% against the real remaining government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where there are no free allowances. There are 93 sanctioned fields and 18 incremental projects with a real remaining government take at 10% of less than zero. Of these, 17 of the sanctioned fields and 3 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 46 of the sanctioned fields and 15 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 107 sanctioned fields and 38 incremental projects which have a real remaining government take at 10% of 60% or more and 126 of the sanctioned fields and 71 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 137

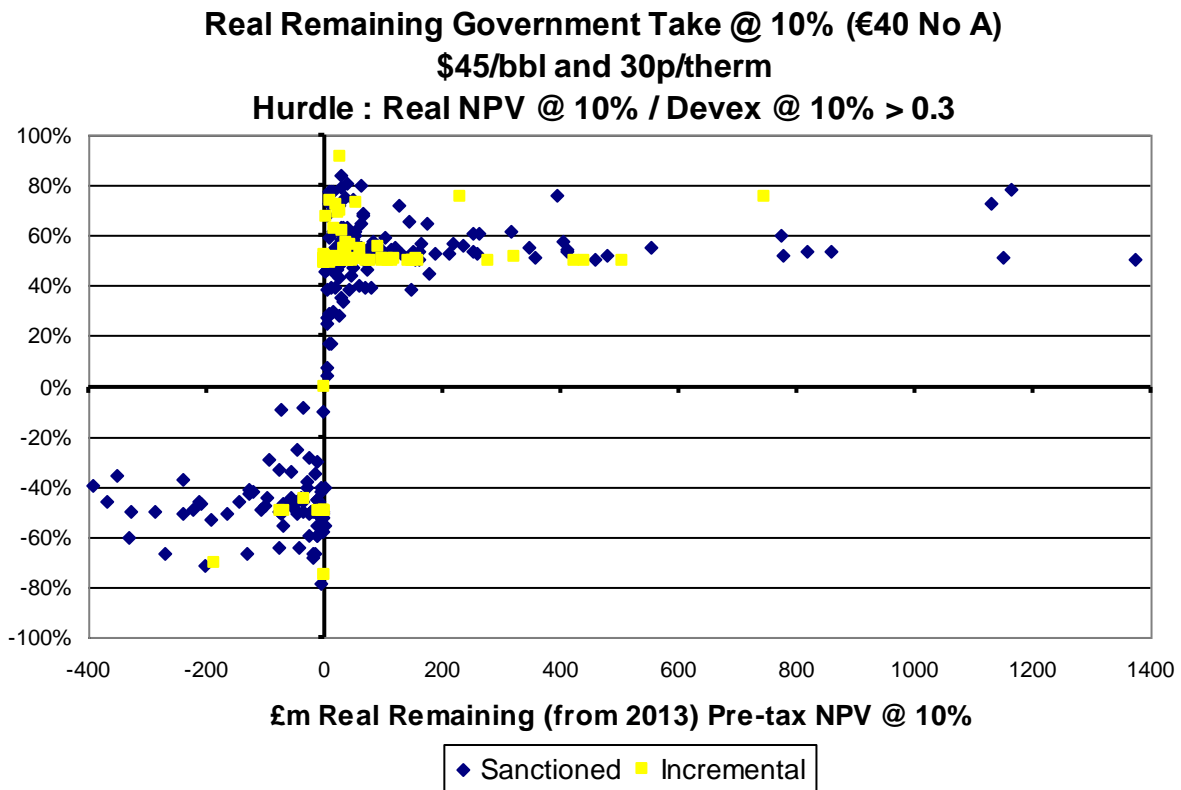


Chart 137 shows the real remaining pre-tax NPV at 10% against the real remaining government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where there are no free allowances. There are 93 sanctioned fields and 18 incremental projects with a real remaining government take at 10% of less than zero. Of these, 18 of the sanctioned fields and 3 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 45 of the sanctioned fields and 15 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 113 sanctioned fields and 39 incremental projects which have a real remaining government take at 10% of 60% or more and 126 of the sanctioned fields and 69 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 138

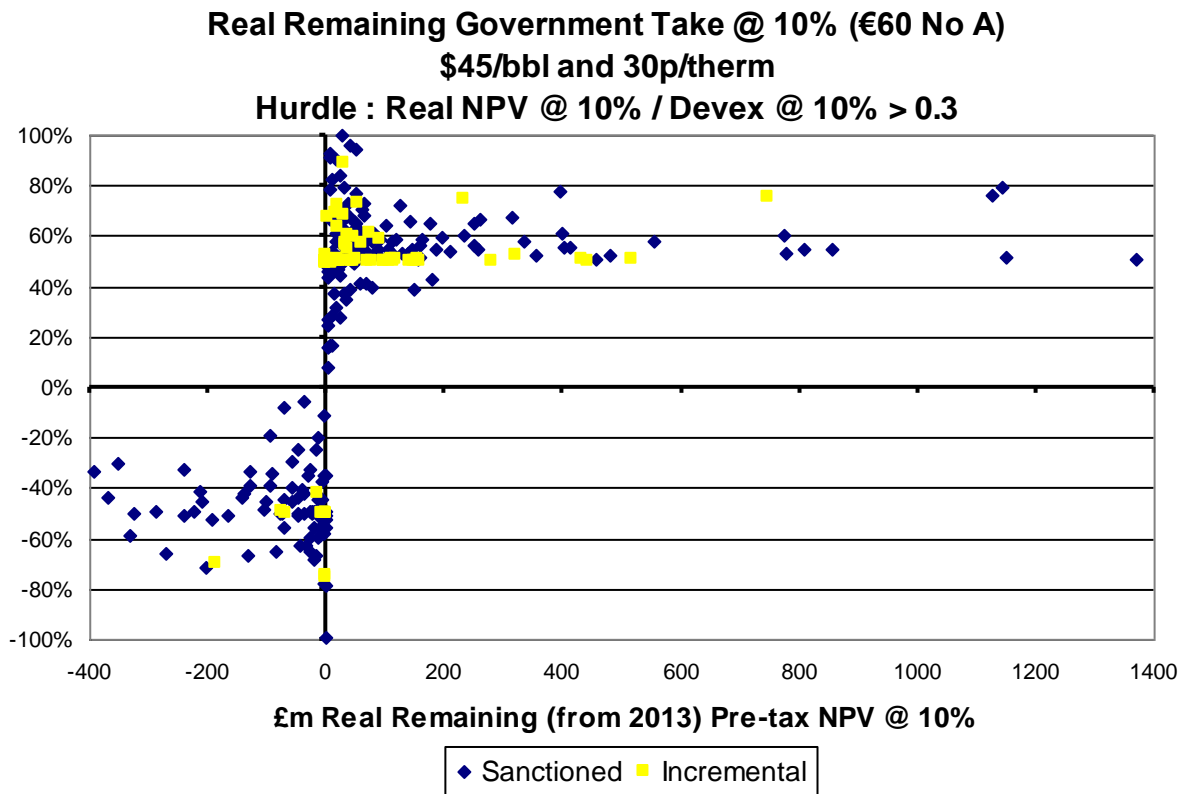


Chart 138 shows the real remaining pre-tax NPV at 10% against the real remaining government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where there are no free allowances. There are 94 sanctioned fields and 18 incremental projects with a real remaining government take at 10% of less than zero. Of these, 18 of the sanctioned fields and 3 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 43 of the sanctioned fields and 14 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 114 sanctioned fields and 37 incremental projects which have a real remaining government take at 10% of 60% or more and 128 of the sanctioned fields and 70 of the incremental projects which have a real remaining government take at 10% of 50% or more.



Chart 139

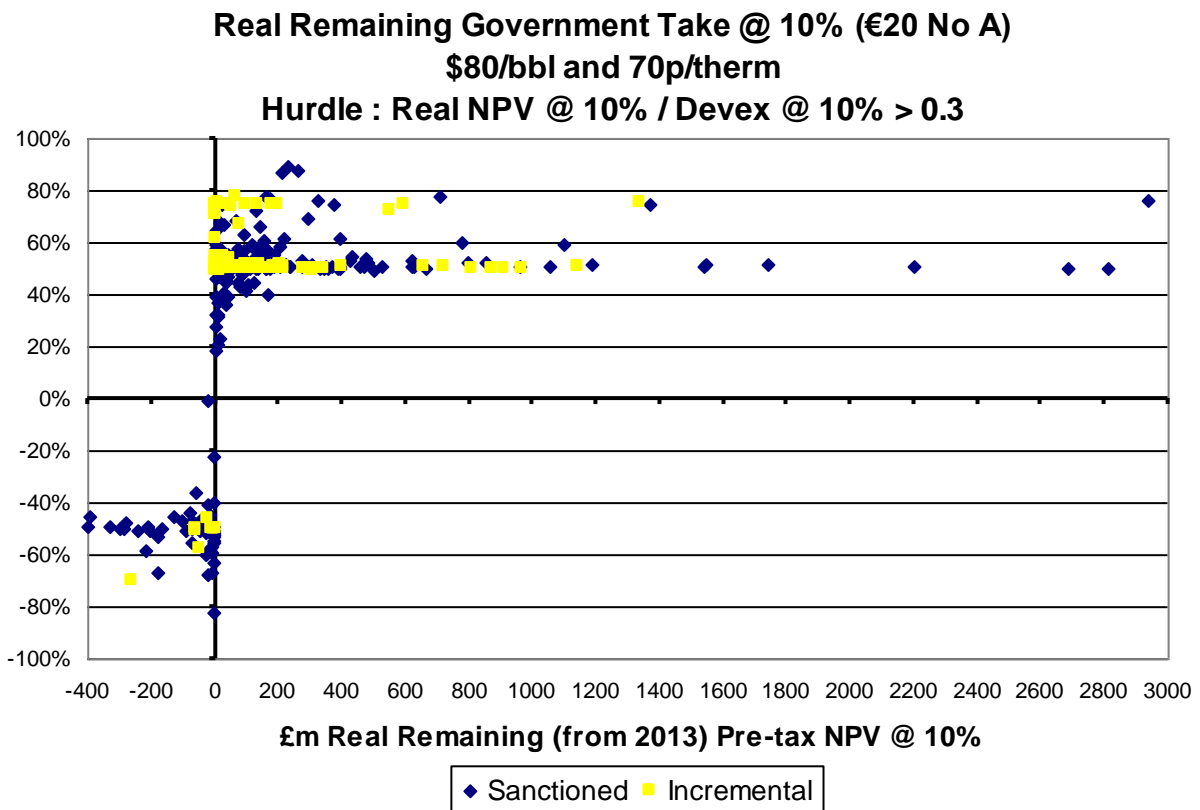


Chart 139 shows the real remaining pre-tax NPV at 10% against the real remaining government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where there are no free allowances. There are 68 sanctioned fields and 16 incremental projects with a real remaining government take at 10% of less than zero. Of these, 12 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 28 of the sanctioned fields and 11 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 139 sanctioned fields and 62 incremental projects which have a real remaining government take at 10% of 60% or more and 165 of the sanctioned fields and 110 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 140

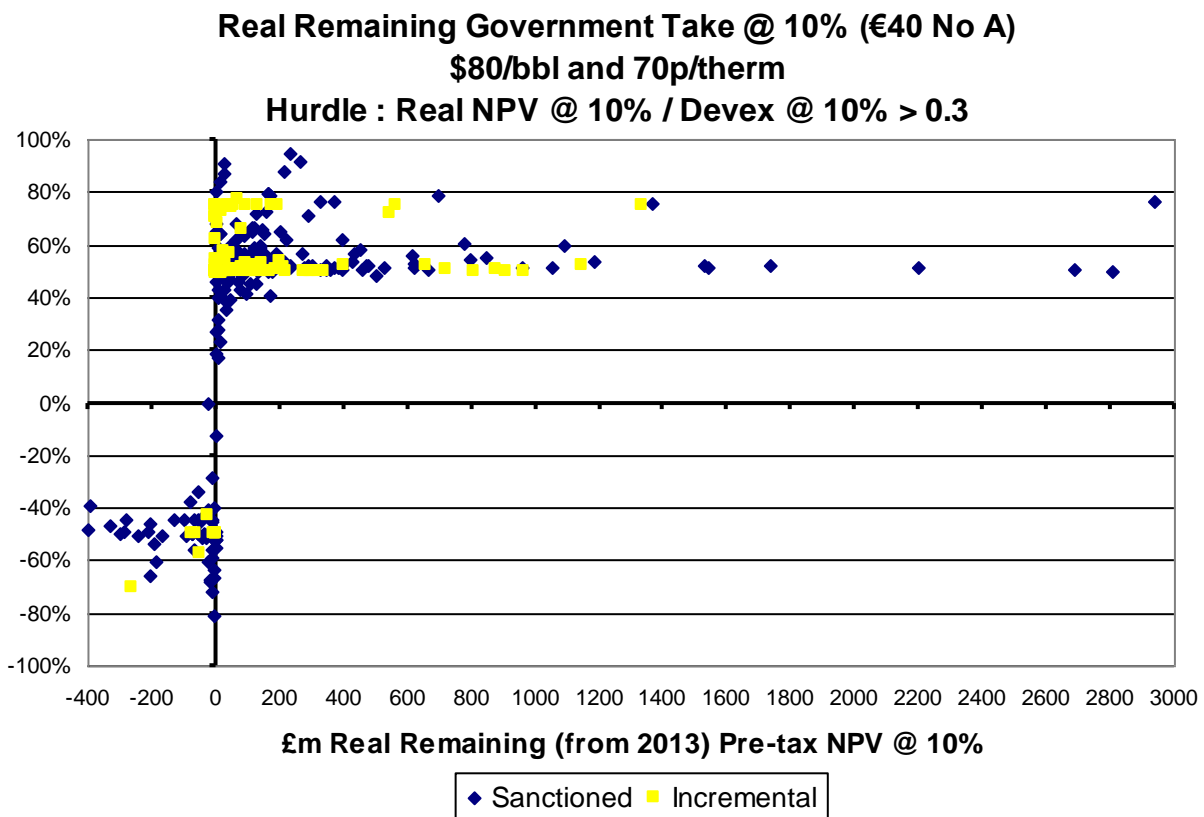


Chart 140 shows the real remaining pre-tax NPV at 10% against the real remaining government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where there are no free allowances. There are 69 sanctioned fields and 16 incremental projects with a real remaining government take at 10% of less than zero. Of these, 16 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 38 of the sanctioned fields and 12 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 145 sanctioned fields and 64 incremental projects which have a real remaining government take at 10% of 60% or more and 166 of the sanctioned fields and 110 of the incremental projects which have a real remaining government take at 10% of 50% or more.

Chart 141

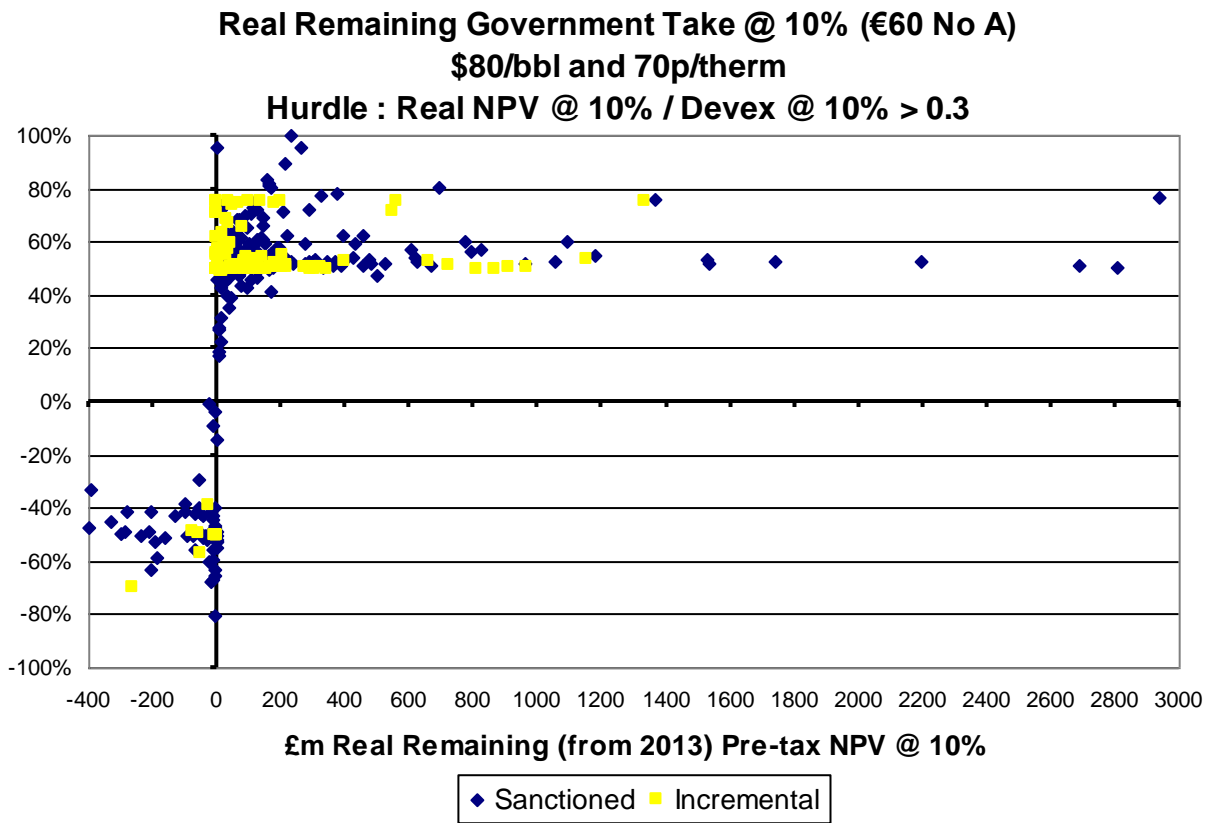


Chart 141 shows the real remaining pre-tax NPV at 10% against the real remaining government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where there are no free allowances. There are 71 sanctioned fields and 16 incremental projects with a real remaining government take at 10% of less than zero. Of these, 15 of the sanctioned fields and 1 of the incremental projects have a real remaining government take at 10% of less than negative 60% whilst 37 of the sanctioned fields and 11 of the incremental projects have a real remaining government take at 10% of less than negative 50%. There are 144 sanctioned fields and 66 incremental projects which have a real remaining government take at 10% of 60% or more and 166 of the sanctioned fields and 110 of the incremental projects which have a real remaining government take at 10% of 50% or more.

viii) New Field Lifetime Government Take

Chart 142

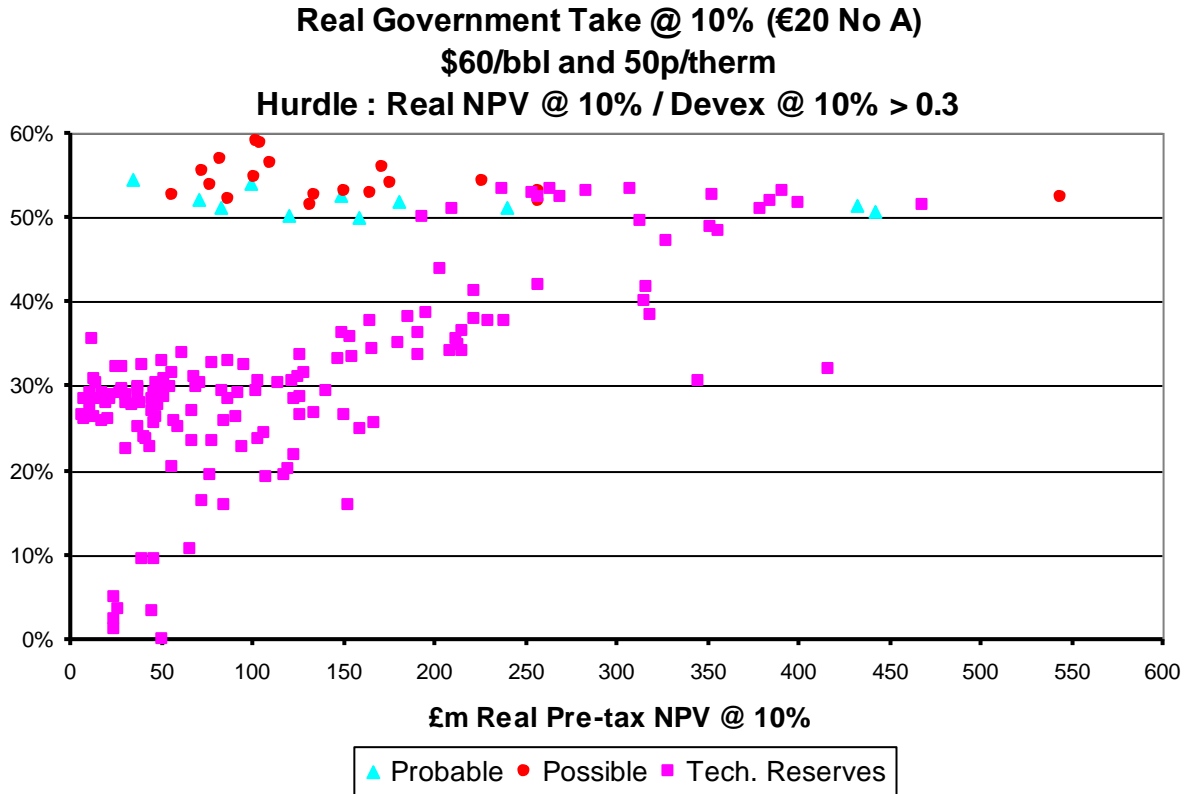


Chart 142 shows the real pre-tax NPV at 10% against the real government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where there are no free allowances. There are 13 probable fields, 19 possible fields and 18 technical reserve fields which have a real government take at 10% of 60% or more. There are 13 probable fields, 19 possible fields and 27 technical reserve fields which have a real government take at 10% of 50% or more. There are 13 probable fields, 19 possible fields and 152 technical reserve fields which pass the (real NPV at 10% / real devex at 10%) hurdle rate.

Chart 143

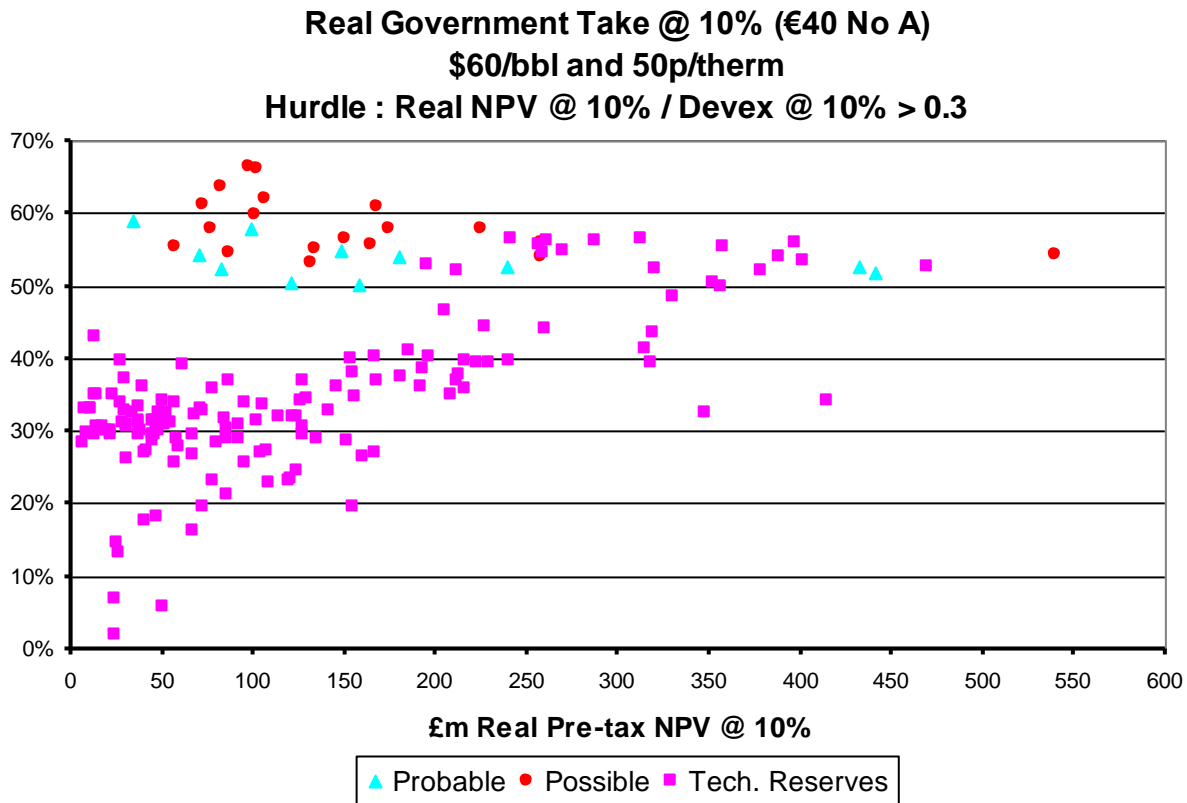


Chart 143 shows the real pre-tax NPV at 10% against the real government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where there are no free allowances. There are 13 probable fields, 19 possible fields and 20 technical reserve fields which have a real government take at 10% of 60% or more. There are 13 probable fields, 19 possible fields and 31 technical reserve fields which have a real government take at 10% of 50% or more. There are 13 probable fields, 19 possible fields and 151 technical reserve fields which pass the (real NPV at 10% / real devex at 10%) hurdle rate.

Chart 144

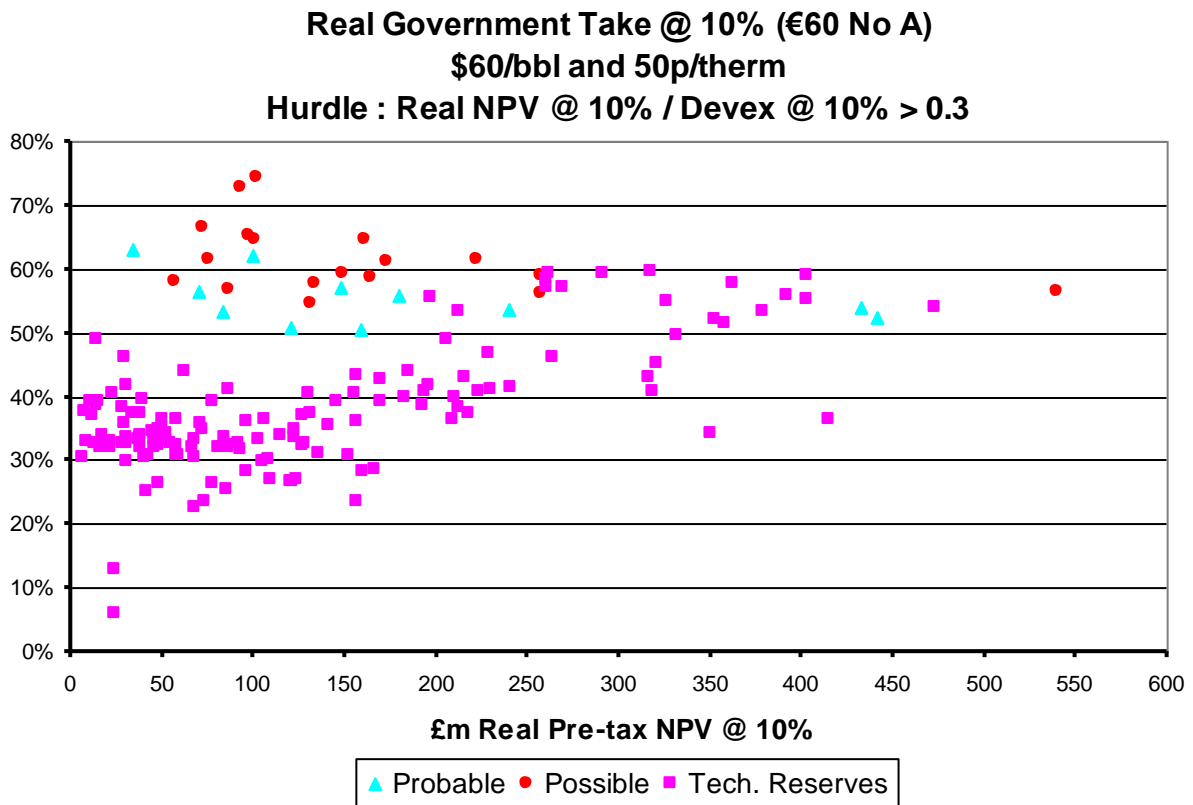


Chart 144 shows the real pre-tax NPV at 10% against the real government take at 10% under the medium price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where there are no free allowances. There are 13 probable fields, 18 possible fields and 20 technical reserve fields which have a real government take at 10% of 60% or more. There are 13 probable fields, 18 possible fields and 44 technical reserve fields which have a real government take at 10% of 50% or more. There are 13 probable fields, 18 possible fields and 147 technical reserve fields which pass the (real NPV at 10% / real devex at 10%) hurdle rate.

Chart 145

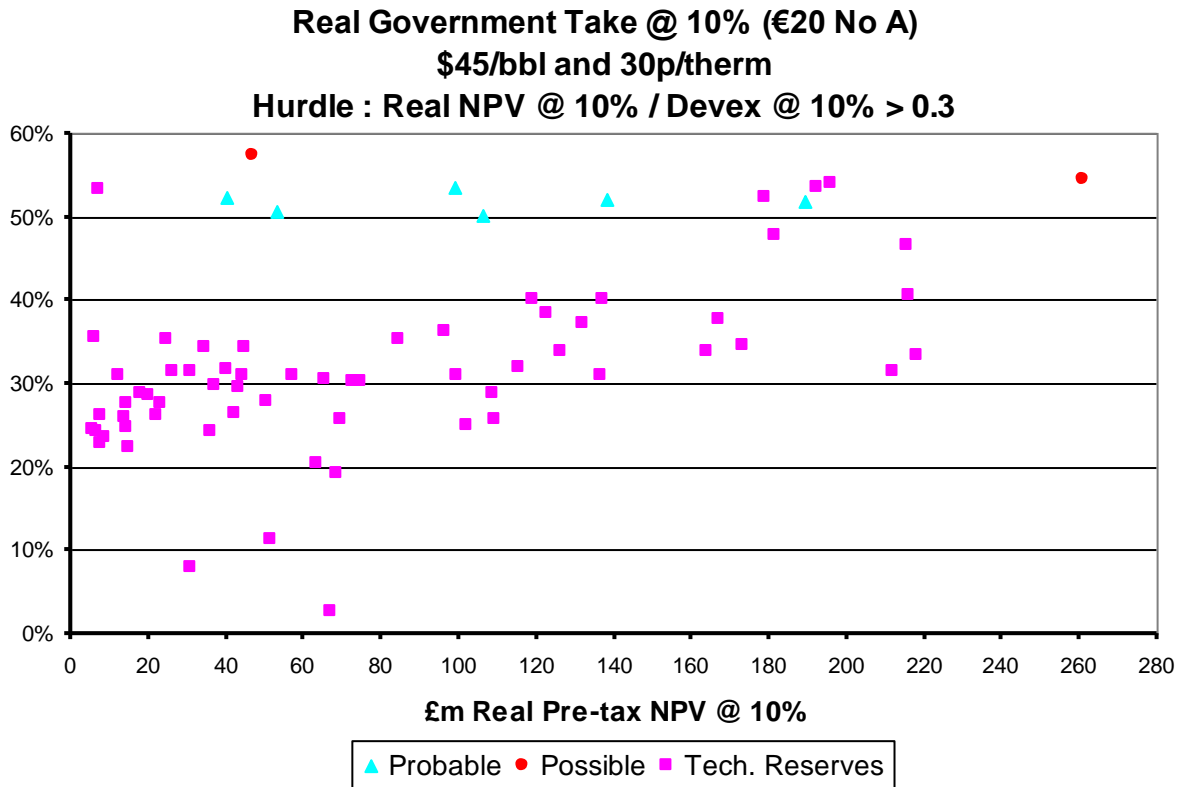


Chart 145 shows the real pre-tax NPV at 10% against the real government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where there are no free allowances. There are 6 probable fields, 2 possible fields and 6 technical reserve fields which have a real government take at 10% of 60% or more. There are 6 probable fields, 2 possible fields and 10 technical reserve fields which have a real government take at 10% of 50% or more. There are 6 probable fields, 2 possible fields and 64 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 146

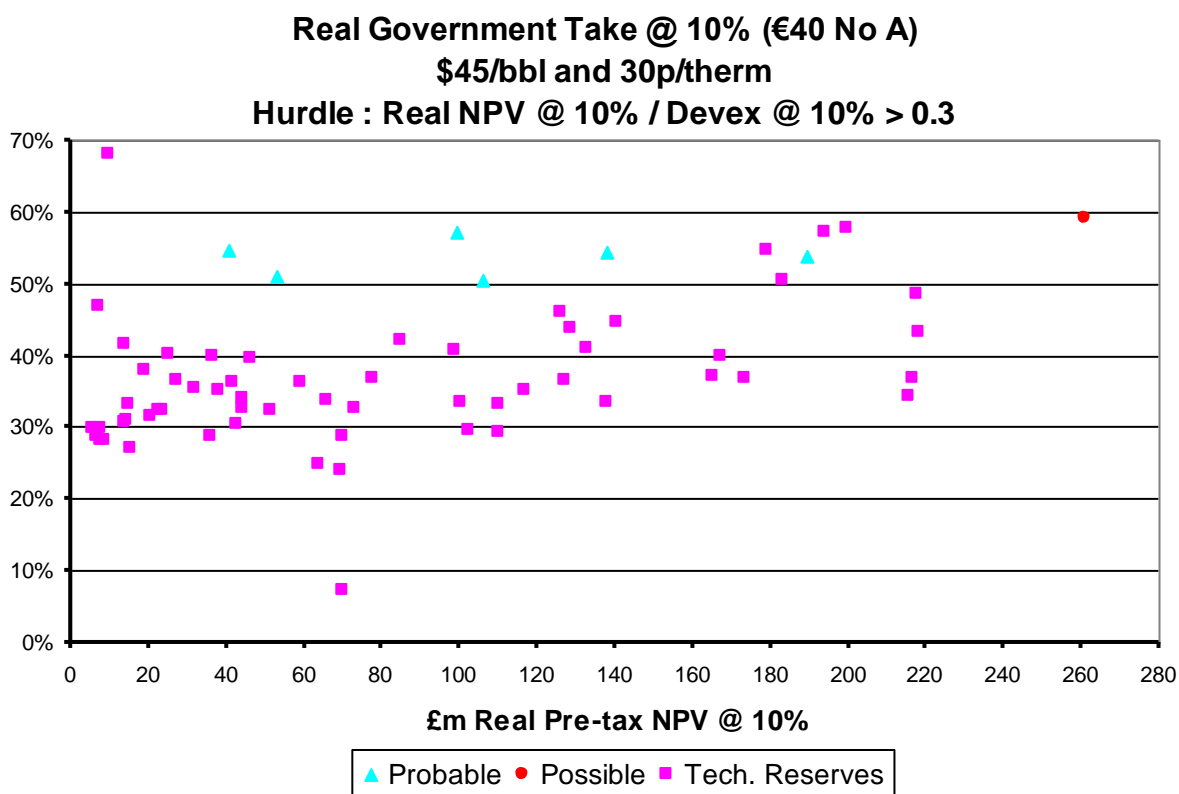


Chart 146 shows the real pre-tax NPV at 10% against the real government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where there are no free allowances. There are 6 probable fields, 1 possible field and 7 technical reserve fields which have a real government take at 10% of 60% or more. There are 6 probable fields, 1 possible field and 18 technical reserve fields which have a real government take at 10% of 50% or more. There are 6 probable fields, 1 possible field and 62 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.



Chart 147

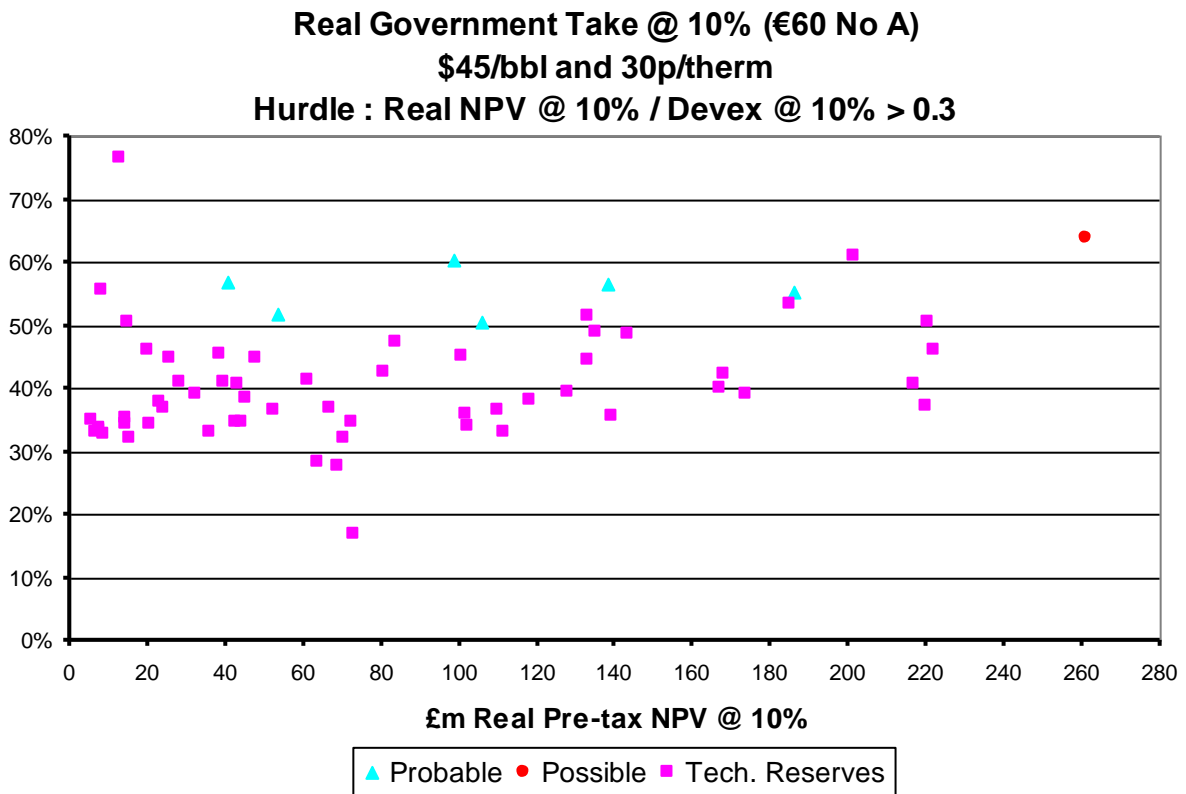


Chart 147 shows the real pre-tax NPV at 10% against the real government take at 10% under the low price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where there are no free allowances. There are 6 probable fields, 1 possible field and 9 technical reserve fields which have a real government take at 10% of 60% or more. There are 6 probable fields, 1 possible field and 27 technical reserve fields which have a real government take at 10% of 50% or more. There are 6 probable fields, 1 possible field and 59 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 148

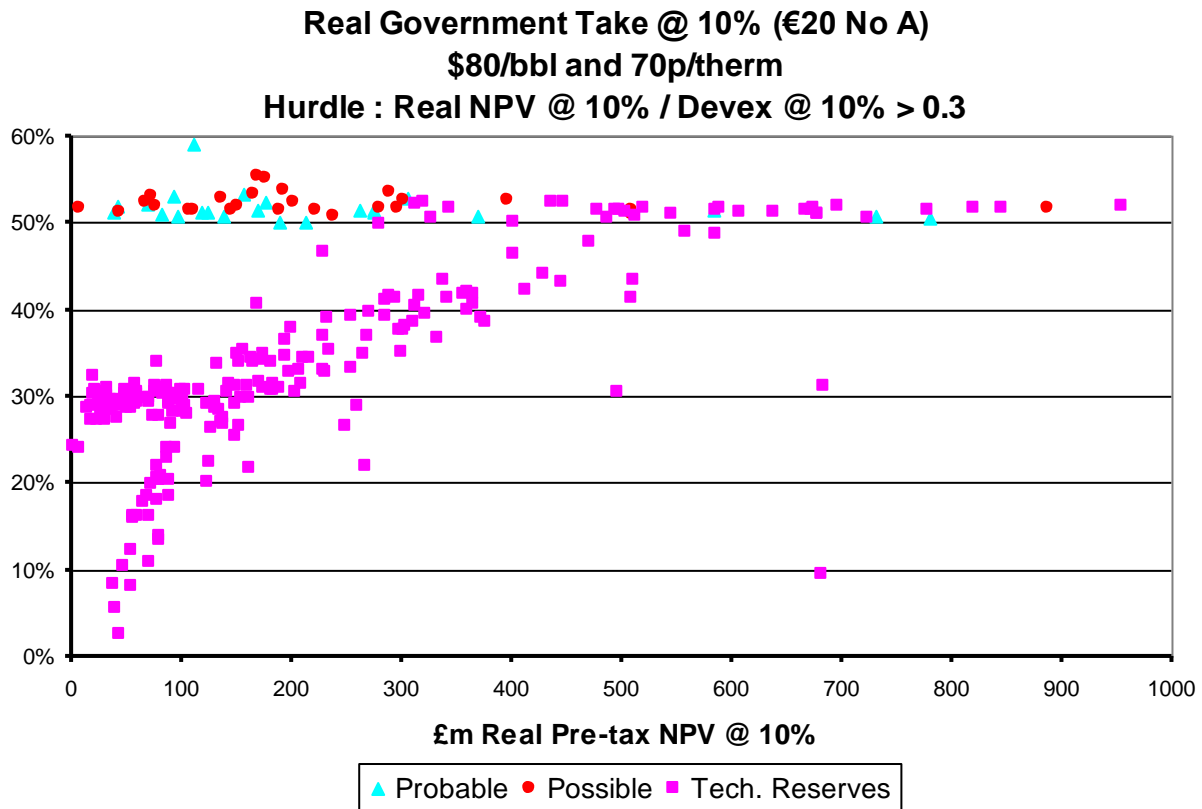


Chart 148 shows the real pre-tax NPV at 10% against the real government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €20/t for the scenario where there are no free allowances. There are 27 probable fields, 26 possible fields and 34 technical reserve fields which have a real government take at 10% of 60% or more. There are 27 probable fields, 26 possible fields and 58 technical reserve fields which have a real government take at 10% of 50% or more. There are 27 probable fields, 26 possible fields and 229 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 149

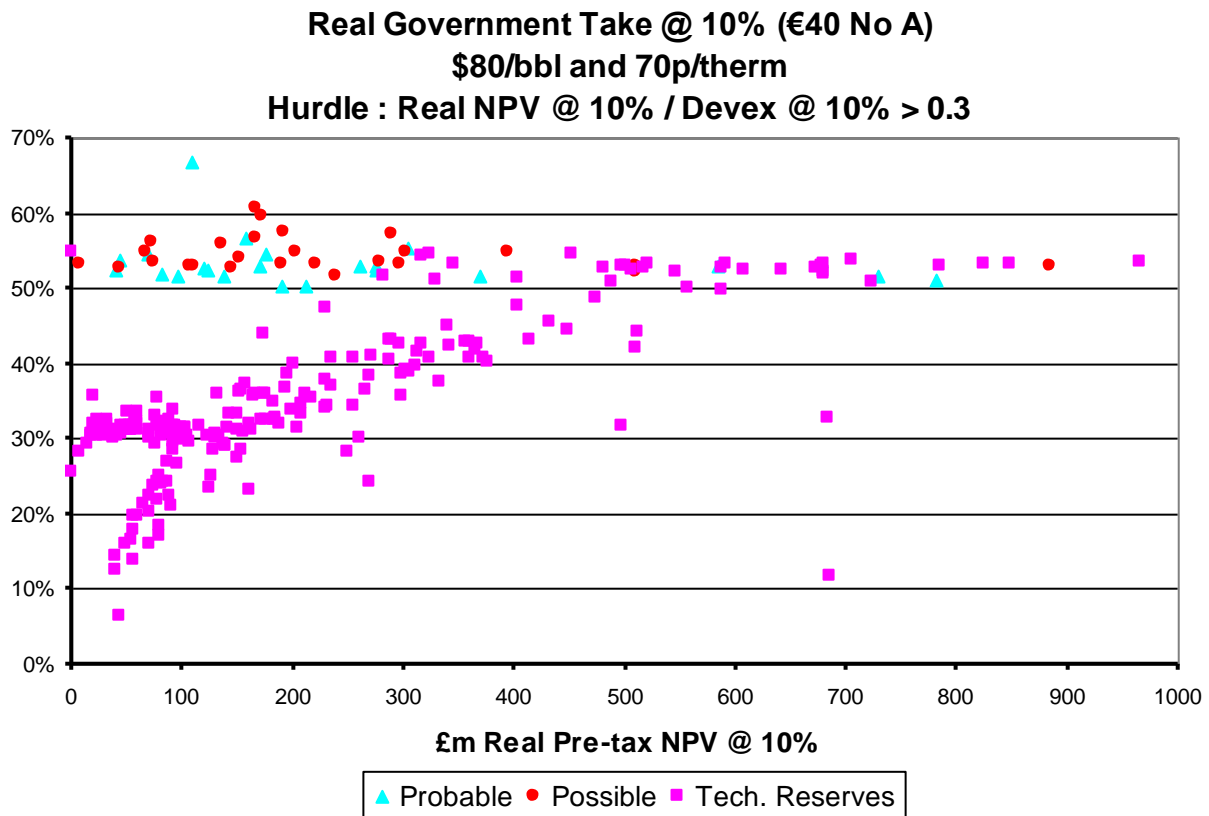


Chart 149 shows the real pre-tax NPV at 10% against the real government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €40/t for the scenario where there are no free allowances. There are 26 probable fields, 26 possible fields and 35 technical reserve fields which have a real government take at 10% of 60% or more. There are 26 probable fields, 26 possible fields and 65 technical reserve fields which have a real government take at 10% of 50% or more. There are 26 probable fields, 26 possible fields and 227 technical reserve fields which pass the (real NPV at 10% /real devex at 10%) hurdle rate.

Chart 150

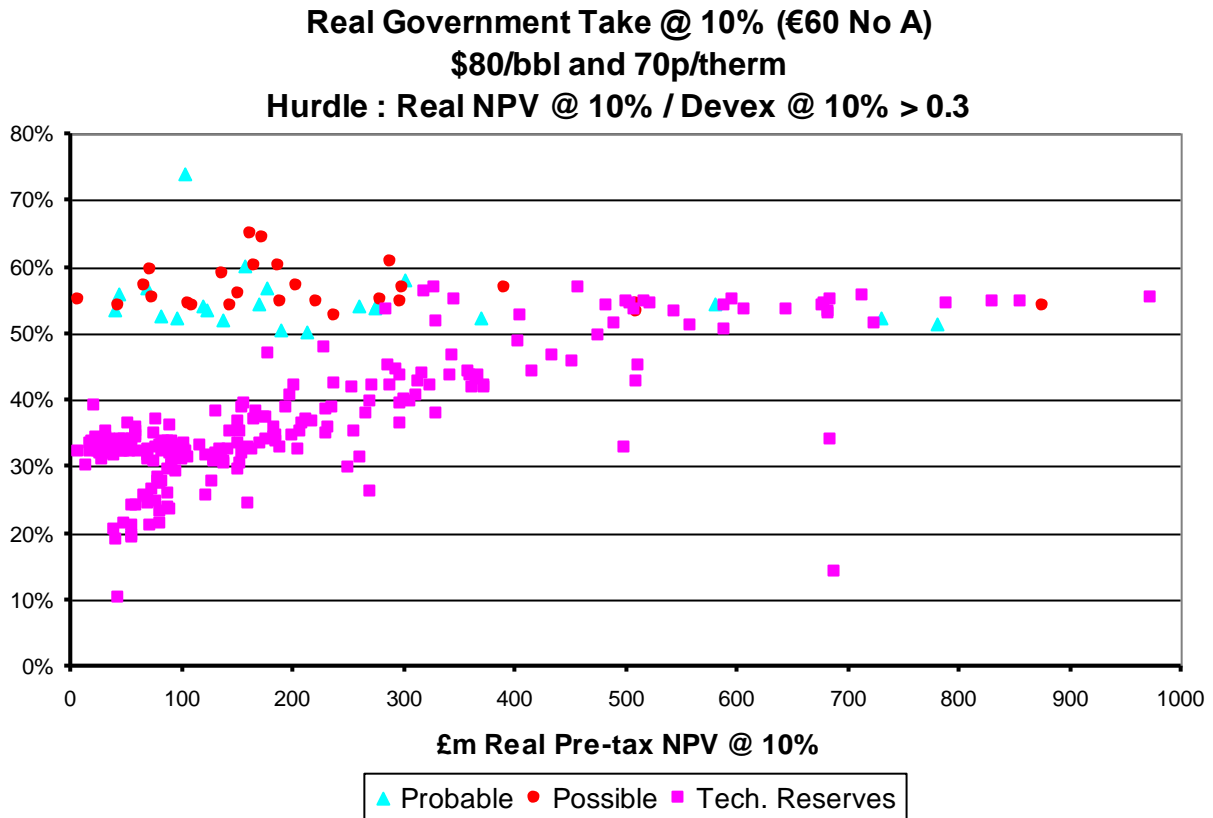


Chart 150 shows the real pre-tax NPV at 10% against the real government take at 10% under the high price with EU ETS auction costs imposed in Phase III and a CO<sub>2</sub> price of €60/t for the scenario where there are no free allowances. There are 26 probable fields, 26 possible fields and 37 technical reserve fields which have a real government take at 10% of 60% or more. There are 26 probable fields, 26 possible fields and 69 technical reserve fields which have a real government take at 10% of 50% or more. There are 26 probable fields, 26 possible fields and 227 technical reserve fields which pass the (real NPV at 10% / real devex at 10%) hurdle rate.

#### 4. Conclusions

This study has examined in detail the repercussions of Phase 3 of the EU ETS on (1) absolute values tax revenues and total Government take, and (2) percentage tax and total Government takes on different categories of fields and projects in the UKCS. The modelling takes into account the deductibility of the costs of purchasing CO<sub>2</sub> allowances for corporation tax, Supplementary Charge and Petroleum Revenue Tax. The effects of the acceleration in the economic limit to a field's life and the non-development of very marginal fields are also fully taken into account. In general the tax revenues are reduced significantly because of the deductibility of the (large) cost of purchasing the CO<sub>2</sub> allowances while total Government revenues increase substantially. The reduction in the industry net cash flows is correspondingly substantial.

In the central case where 50% of CO<sub>2</sub> emissions emanate from electricity generation offshore and with oil price of \$60/barrel and gas price of 50 pence/therm cumulative tax receipts from 2013 to 2040 could be reduced by £2.9 billion (at 2009 prices) with a CO<sub>2</sub> price of €20/tonne, £6.2 billion at €40/tonne and £9.1 billion at €60/tonne. At an oil price of \$80 and gas price of 70 pence the corresponding reductions in cumulative tax receipts are £3.9 billion at €20/tonne, £8.2 billion at €40/tonne, and £11.9 billion at €60/tonne.

The corresponding increase in total Government take at \$60, 50 pence price is £3.9 billion at €20/tonne, £7.0 billion at €40/tonne, and £10.0 billion at €60/tonne. At \$80, 70 pence price the increase in total Government take is £5.4 billion at €20/tonne, £9.6 billion at €40/tonne and £14.0 billion at €60/tonne. These figures indicate the reduction in industry net cash flows over the period.

It should be stressed that all the above figures relate to existing discoveries only, with no account being taken of future exploration successes.

The payments for CO<sub>2</sub> allowances have an effect akin to a production tax. They are thus regressive in their impact, impacting relatively more severely on less profitable fields/projects than on more profitable ones. At \$60, 50 pence prices for fields paying tax at 50% the net effect with CO<sub>2</sub> costs of €20/tonne is to increase the total Government take from 50% to 52%-57%, depending on the profitability of the field. For the many small fields obtaining benefits from the new field allowance, and thus paying little Supplementary Charge, the effect of the need to purchase CO<sub>2</sub> allowances is often to increase the total Government take relatively more than on larger more profitable fields. At higher prices for CO<sub>2</sub> allowances the total Government take increases across all fields but proportionally more on the less profitable ones. On small, less profitable fields the cost of the CO<sub>2</sub> allowances constitutes a higher proportion of the total Government take than is the case with larger and more profitable fields.

Broadly similar effects were found with respect to the remaining tax and total Government takes on sanctioned fields and incremental projects relating to them. For mature fields with negative remaining NPVs and negative remaining tax takes (because of the relief for decommissioning costs), the remaining total (percentage) Government take was sometimes found to be less negative than the remaining (percentage) tax take. Because the purchase cost of CO<sub>2</sub> allowances reduces taxable income for PRT, corporation tax and Supplementary Charge there are lower taxes paid against which the decommissioning losses can be offset. The net result in some cases at least is a reduced rate of relief for the expenditure.