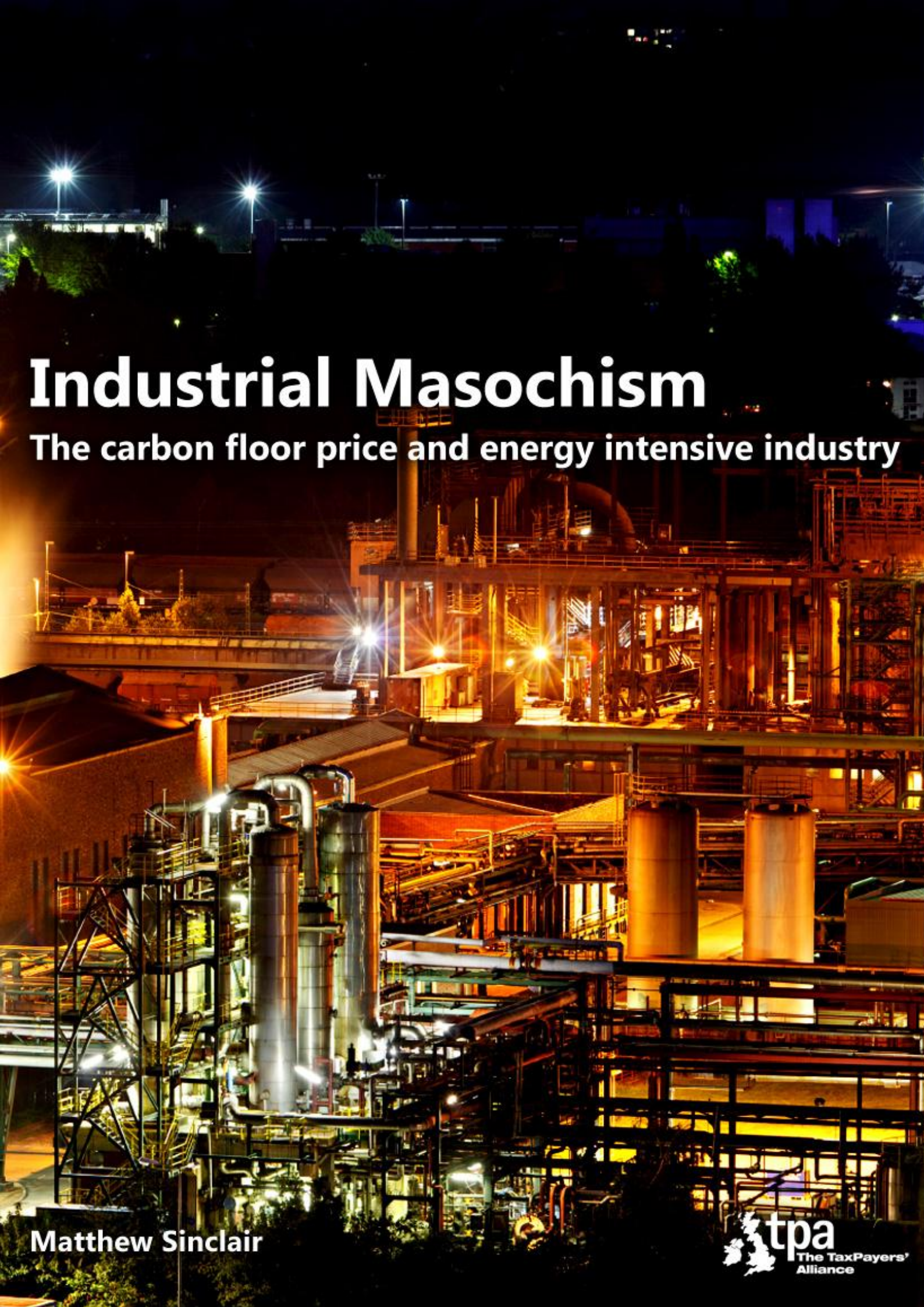

Industrial Masochism

The carbon floor price and energy intensive industry

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tpa
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Executive Summary

The carbon floor price introduced in Budget 2011 threatens to increase energy prices in Britain while reducing them elsewhere in Europe. Combined with other measures that increase prices such as renewable energy subsidies it will increase bills for domestic customers. But it will also create particular problems for energy intensive industries.

Those industries are going to see their energy costs rise while those costs fall for their competitors. Some companies have made it clear that threatens billions in new investment, or even the ability to keep major plants open. This study attempts to gauge the effectiveness of the carbon floor price, and assess its economic consequences.

The policy will seriously undermine the competitiveness of British industry:

- For some major industries – such as steel or chlor-alkali – **energy represents between a quarter and well over half of total costs**. Any substantial increase in those costs, particularly compared to our key industrial competitors, will seriously affect their ability to compete in the UK.
- The largest energy consumers already pay up to **10 to 25 per cent more than in Germany**, and **60 to 75 per cent more than in France**, where industry often gets rebates or more substantial discounts on its energy costs. The carbon floor price alone will add another **10 per cent to their energy costs by 2020**, while **reducing costs for competitors**. The burden is exacerbated as the carbon price floor has not been accompanied by a ceiling, which means industry still faces the possibility of damaging price spikes.

That will have a number of consequences:

- The carbon floor price will **increase total global emissions** as it does not cut the overall cap on European emissions, and some emissions will be exported to other countries where production is less efficient.
- Jobs will be threatened. For example, Tata Steel employs **around 20,000 people** and three to four times as many jobs may be at stake with suppliers and contractors. If that activity contracted, there would also be job losses in the wider economy. **Overall employment** in energy intensive industries has been estimated at **225,000**.
- Revenue from the new tax could be offset by reductions in revenue if major firms in energy intensive industries contract their activities in the UK. For example, INEOS report that they pay **£600 million a year in VAT** and **£70 million a year in PAYE and NICs**. Tata Steel report they pay **£280 million a year in PAYE and NICs**.

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The carbon floor price was introduced to address a genuine weakness in the European Union's Emissions Trading System. The carbon price it has produced has been volatile since its inception for two reasons:

1. Specific failings in the way it has been implemented.
2. Inherent volatility in any cap and trade scheme, created by combining variable and unpredictable demand with a fixed supply of allowances.

That volatility undermines the effectiveness of the EU ETS in encouraging investment to lower emissions.

However, a carbon price is likely to be ineffective for four key reasons:

1. It does not reduce the overall cap on emissions and will merely redistribute emissions cuts from other European countries to Britain.
2. It is not sufficiently credible that the policy will be stable.
3. There are other challenges to the investment it is designed to encourage, such as severe construction risk in constructing new nuclear capacity.
4. It will lead to carbon leakage, driving emissions out of the UK and possibly to countries where emissions intensity is higher.

The Government should abandon this policy.

If that is not possible they will need to introduce measures to mitigate the impact on energy intensive industries. In France that mitigation takes the form of an industrial consortium buying heavily discounted energy from the largely state-owned EDF. In Germany there are extensive rebates for energy intensive firms which exempt them from **98.5 per cent of the renewables fee**, for example, and substantial parts of the cost of other policies.

Reports suggest the Government understand that the mitigation announced in the Budget 2011 report was inadequate and are looking at the kind of rebates provided in Germany. But any mitigation will need to support new investment and new industries, not just existing plants.

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About the author

Matthew Sinclair is the Director of the TaxPayers' Alliance (TPA) in London. He has produced a range of pioneering and influential economic policy research, particularly on climate change policy. That work has had a global impact. It has received prominent coverage on the front pages of newspapers from the Daily Express and Metro in the United Kingdom to The Australian. It has also been widely cited in leader columns from the The Sun and the Daily Mail to the Wall Street Journal the day before the vote on Waxman-Markey. It has been cited from evidence to the United States Senate Committee on Environment and Public Works to the debate in the House of Commons over the Climate Change Act. His book on the subject, *Let them eat carbon*, was published by Biteback Publishing in August 2011.

He has also represented the TPA frequently on radio, television – with appearances on the BBC News Channel, Sky News, Bloomberg, Fox News, CNBC, the Daily Politics and Newsnight – and in person at a range of events both in the UK and abroad – in Rome, Washington DC, Brussels, Strasbourg and New York.

Introduction

The impact of climate policies on domestic energy bills has become a pressing political issue. Nearly twice as many people ranked electricity and gas prices as a very important issue in a Populus poll as government cuts or unemployment.

If the Government is seen to be adding to bills, rather than helping consumers, that will be politically toxic. But the impact on energy intensive industries can be just as contentious. Facilities like the steel plant at Redcar or the chemicals factory at Runcorn are extremely important to their communities and to the British economy.

This study is an attempt to complement the extensive work the TaxPayers' Alliance has produced on the cost of climate policy for domestic consumers with an investigation of the impact on energy intensive industries, and the consequences of any contraction in their activity. We are very grateful for help from a number of businesses and other organisations in obtaining the statistics we needed.

Economic growth is vital to a wide range of objectives: from successfully rescuing the public finances to bringing down unemployment across the country. And an overreliance on financial services means the economy is too vulnerable to a downturn in that sector of the sort experienced since 2008. The Government needs to ensure it does nothing to unnecessarily imperil manufacturing industry. Energy intensive industries are important both in themselves and as part of critical supply chains.

The carbon floor price is an attempt to make the EU Emissions Trading Scheme work. Added to other measures that are increasing the price of energy to industry, it threatens a large number of jobs. The Government needs to reconsider its plans and be very careful before implementing a measure that could threaten the economic recovery, by making British industry less competitive, while increasing global greenhouse gas emissions.

The EU ETS

The objective with any emissions trading scheme is to avoid the Government having to set a carbon price; instead it can simply set a target for the amount that should be emitted. The carbon market – made up of firms buying and selling a restricted supply of emissions allowances – will determine the price needed to meet that target.

The European Union Emissions Trading System (EU ETS) is the world's largest carbon market; the largest example of an emissions trading or "cap and trade" scheme:

- It covers all 27 European Union Member States plus Iceland, Liechtenstein and Norway.[1]
- Around 11,000 installations are regulated. By comparison, the US SO_2 trading system – which was a key inspiration for the use of this mechanism to regulate CO_2 emissions – covers around 450 plants.
- Those installations were responsible for emitting a total of 1.9 Gt CO_2 in 2010. For context, global emissions were around 30 Gt CO_2 in 2008.

It is the centrepiece of the mix of policies that are intended to deliver on the European Union's emissions targets. Those running it have hoped that it would be the start of an international carbon market as other countries implemented similar legislation. Jos Delbeke – the European Commission's Deputy Director General DG ENVIRONMENT – told an audience in Berlin that:[2]

> *The EU ETS also has clear provisions in the legislation for linking the EU ETS with other mandatory and compatible cap-and-trade systems.*
>
> *The EU ETS and the future US cap-and-trade system – integrated into a transatlantic carbon market – can be the twin engines driving the OECD-wide carbon market. The progress on domestic legislation in the US is an essential step in this regard and we are encouraged by Congressional timetables for getting draft legislation to a floor vote in the coming months.*

Those hopes have appeared less realistic since the collapse of attempts to pass such legislation in the United States Senate. New Zealand does operate an emissions trading system along with Tokyo (but not the rest of Japan); some states within the United States are planning regional cap and trade systems; and proposals that would see an emissions trading system created have recently passed the Senate in

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[1] European Commission *Emissions Trading System (EU ETS)*, http://ec.europa.eu/clima/policies/ets/index_en.htm

[2] Delbeke, J. *Environmental policy in times of economic crisis – the example of the EU ETS*, 29 May 2009

Australia, though the measure is unpopular and the opposition have pledged to repeal it.[3] But other major economic areas have not followed the European Union's example as the authorities hoped and expected.

The carbon floor price is the British Government's response to a sense that this unique policy is not delivering, primarily thanks to volatility in the carbon price.

[3] BBC News *Australia Senate backs carbon tax*, 8 November 2011

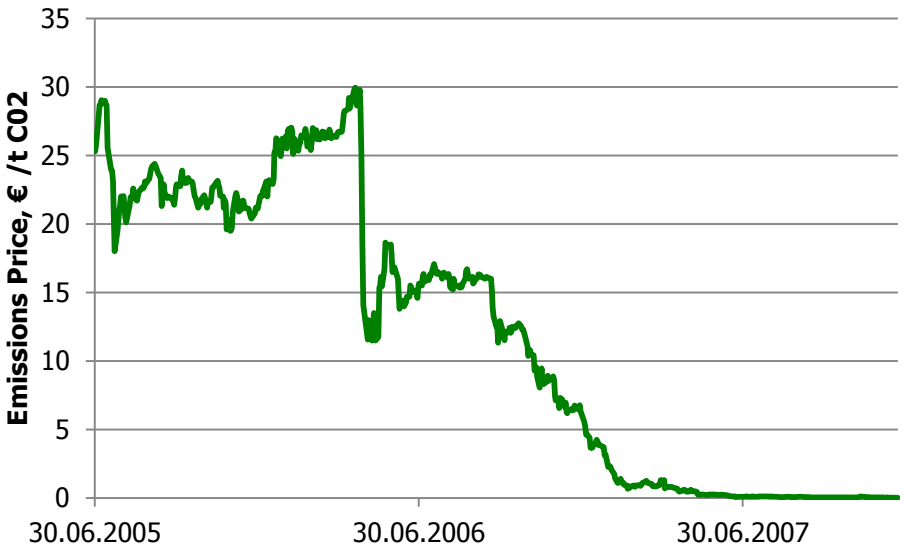
Sources of carbon price volatility

The carbon price produced by the EU ETS has been highly volatile since it was instituted. High volatility has resulted from two sets of problems: First, specific failings in the design and operation of the EU ETS; second, the fixed supply of emissions allowances inherent in any carbon market created by cap and trade regulation.

Specific failings in the EU ETS

In 2005, the carbon price fell from €29 per tonne on 11 July to €18 per tonne on 22 July. It then slowly recovered to just under €30 again by 24 April 2006 before collapsing again to just over €14 by 28 April. It then slowly declined effectively to zero for the rest of Phase I (2005 to 2007), falling below €1 per tonne in February 2007 and then continuing to decline.[4]

Emissions price, € /t CO_2, June 2006 to November 2007



That complete collapse in the price during the first phase has been attributed to many of the participating countries allocating an excessive number of allowances. The think tank Open Europe has set out the scale of those allocations:[5]

> *According to figures released in June 2006, member states handed out permits for 1,829 million tonnes of CO_2 in 2005, while emissions were only 1,785 million tonnes. Emissions would have to be 44 million tonnes higher for the system to actually "bite" – in other words, at present the system is simply*

[4] EEX Market Data
[5] Open Europe *The high price of hot air*, 2 July 2006

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not limiting emissions. Only four out of the twenty five member states had targets which were lower than their actual emissions.

They argue that led to firms in Britain, which set relatively robust targets, having to transfer £1.5 billion to competitors in other Member States.

In Phase II (2008-2012), the European Commission attempted to restrict the number of allowances that Member States could allocate. The Commission announced they would only accept those countries' National Allocation Plans if the amount of allowances were cut substantially. The Czech Republic was allowed 14.8 per cent less than it had proposed, Poland was allowed 26.7 per cent less and Estonia was allowed 47.8 per cent less. Between them, Estonia, Poland and the Czech Republic were allowed 102.9 Mt CO_2 less by the Commission than they had provided for in their own National Allocation Plans.[6]

However Estonia and Poland took legal action to dispute that decision and won their cases at the European Court of First Instance, annulling the European Commission's decision. The Commission then issued a new statement rejecting the Polish National Allocation Plan but not suggesting a particular target. Since then Poland has settled the issue by producing a new plan with an emissions target that fits with the Commission's recommendation. They did that after emissions had fallen sharply in the recession though, and the new target will now not be as onerous. The extent to which the Commission can dictate the number of allowances permissible in National Allocation Plans is still unclear.

Inherent volatility in carbon markets

While there have been specific factors causing high volatility in the EU ETS carbon price, volatility is inherent to any emissions trading system. For example, the US SO_2 trading scheme has also seen dramatic rises and falls in the price of its allowances.

The Kaya Identity – named after Japanese economist Yoichi Kaya and giving a simple picture of the key factors driving overall emissions – helps to explain why:

Emissions = Population x GDP per capita x Energy intensity of GDP x Carbon intensity of energy

In other words, in order to reduce emissions there either needs to be fewer of us – a lower population; we need to be poorer – a lower GDP per capita; we need to use energy more efficiently – a lower energy intensity of GDP; or we need to reduce the amount of greenhouse gas we emit producing a given amount of energy – a lower

[6] European Commission *Emissions trading: Commission adopts decision on Estonia's national allocation plan for 2008-2012*, 4 May 2007

carbon intensity of energy. Exactly the same factors will drive demand for emissions allowances.

It can be possible for governments, companies and individuals to plan steady reductions in the energy intensity of GDP, or the carbon intensity of energy. And dramatic, unexpected changes in population are rare. But demand for emissions allowances will also be driven by economic growth or recession.

The potential for prices to respond sharply to broader economic circumstances can be seen in the steep fall in the price that has followed the global economic downturn.

In 2008 the price fell from around €28 per tonne in July to around €15 in December. It declined further to just over €8 per tonne in February 2009. It has since recovered somewhat to a range between €10 and €15 per tonne.[7]

Emissions price, € /t CO_2, June 2008 to October 2009

That two thirds fall in the price, and stabilisation at half the original price, is generally attributed to the fall in economic activity in the recent recession reducing demand for emissions allowances.

William Nordhaus has found that allowance prices in the US SO_2 trading scheme have been substantially more volatile than even oil – and that allowance prices in

[7] EEX Market Data

the EU Emissions Trading System were similar – another market where supply is also politically dictated and responds poorly to short term fluctuations in demand.[8]

It is likely that oil and gas prices and the carbon price will often rise and fall together. An example of that happening can be seen in the recent recession, which led to declines in both prices, though fossil fuels prices then rose with the nuclear disaster in Japan and instability in the Middle East. As gas prices and carbon prices both contribute to energy prices, the combined effect of the volatility in both markets will mean more pronounced swings, creating both economic disruption and an unpredictable environment for business.

Unpredictable changes in demand for emissions allowances can have dramatic effects on the emissions price as supply is fixed. This is similar to the situation in the British housing market where planning regulations limit supply, meaning that demand is reflected almost entirely in the price.

With a fixed supply of allowances, increases or decreases in demand are entirely reflected in the price. That is why the effectiveness of any cap and trade scheme is likely to be undermined by a failure to produce a stable price. While volatility in the price has so far taken the form of collapses, there is no reason to think that similar volatility cannot take the form of a sharp rise in prices just as easily.

[8] Nordhaus, W. *Economic Issues in Designing a Global Agreement on Global Warming*, March 2009

Consequences of carbon price volatility

Jos Delbeke – the European Commission's Deputy Director General DG ENVIRONMENT – has argued that the volatile emissions price is not a significant problem:[9]

> *Some people are worried that at times the carbon price signal will not be strong enough to create incentives for investments in clean technology. They see a floor price as a tool to ensure a predictable and sufficiently strong carbon price signal. However, I question that investors in power plants would base their decisions on the short-term price during a severe recession, rather than on medium-term expectations.*

That optimism is not shared by most commentators. Even in Phase II where there was not the same problem with overallocation that led to a complete collapse in the price in Phase I, the carbon price has at times been depressed for a sustained period. That "short-term price" is sufficient to pose a substantial risk and deter investors.

The Brattle Group – considering proposals for a cap and trade scheme in the United States in January 2009 – looked at the mechanisms by which volatility could undermine the effectiveness of an emissions trading system like the EU ETS.[10] They described three key mechanisms:

1. Higher discount rate for avoided carbon costs

When companies evaluate a stream of revenues from an investment a key variable is the discount rate, which will reflect how risky the asset they are investing in is relative to the rest of the economy. In this case the revenues are the avoided carbon costs and the risk is the volatility in the price. The riskier those revenues are the higher the discount rate and the lower the value of that investment. That makes it less likely the investment will be worth the cost.

Looking at historical carbon price volatility in the EU ETS, the Brattle Group concluded that the risk premium was about 3 per cent. They also expected that the risk premium would be higher in a more stringent emissions trading scheme.

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[9] Delbeke, J. *Environmental policy in times of economic crisis – the example of the EU ETS*, 29 May 2009
[10] Brattle Group *CO2 price volatility: consequences and cures*, January 2009

2. Higher required carbon price due to risk aversion against a worst-case investment scenario

An alternative effect of a volatile carbon price could be that investors use deliberately conservative price estimates in their analysis of investments. Lenders in particular might want to ensure that their money is safe in the event of a "worst-case" scenario. The Brattle Group suggest a hypothetical example where they expect an investment to perform at the 10th percentile of the forecasted price distribution (i.e. there is a 90 per cent chance of a higher carbon price). If investors behaved in that manner they would not invest until the expected carbon price was much higher than would be needed if there was not the same volatility.

3. Increasing the option value of waiting

Investors can decide whether to invest sooner or later. If they are unsure about the revenues they will enjoy then they may delay, in order to keep open the option of not investing if the value of those revenues falls too low. With large, irreversible investments like carbon capture and storage and nuclear power, it may be particularly prudent to delay in the face of an uncertain carbon price.

For all those reasons, we should expect that volatility in the carbon price is a significant deterrent to investment. That concern has been reflected in early calls for a carbon floor price and in the Government's explanation of the measures.

Environmentalist Oliver Tickell described the situation in an article for the Guardian in 2009:[11]

> *Wild fluctuations create a risk that deters some investors altogether and makes others demand a significant risk premium, putting up the price of capital.*

The Electricity Market Reform White Paper justifies the carbon floor price by describing the consequences of uncertainty in the carbon price:[12]

> *Having certainty about the price of carbon is particularly important given the long lead times between the decision to invest in low-carbon generation and the plant generating electricity. High levels of uncertainty over future profitability and rates of return could increase the cost of capital for investors and deter investment altogether. If uncertainty is too great, investment will either not go ahead or capital could be diverted to less risky but more polluting forms of generation. If developers have confidence that the*

[11] Tickell, O. *Carbon: a market we can't allow to fail*, Guardian, 29 January 2009
[12] DECC *Planning our electric future: a White Paper for secure, affordable and low-carbon electricity*, July 2011

Government will support the carbon price over the long term, this should make a significant difference to investment decisions for new low-carbon generation.

The carbon floor price therefore does address a genuine problem: as William Nordhaus has put it, the "high level of volatility is economically costly and provides inconsistent signals to private-sector decision makers".[13] That does not mean the policy is an effective response.

[13] Nordhaus, W. *Economic Issues in Designing a Global Agreement on Global Warming*, March 2009

Effectiveness of a carbon floor price

Government electricity market reforms are concentrated on providing electricity and carbon price stability, giving investors greater certainty over the revenues that can be earned in the sector. But uncertainty over prices is only one element of the risk that is discouraging investment in low carbon generation, and the carbon floor price only reduces that element of risk in Britain at the expense of worsening it overseas. Policy risk – the danger that this Government or its successors won't deliver on the promised subsidies – and construction risk – the danger that these plants will not be delivered on time, on budget or to specification – can be just as important in discouraging investment in the sector.

The carbon floor price is therefore an inadequate response to volatility in the carbon price for a number of reasons:

1. It will not reduce emissions as it is only being introduced in Britain.
2. It may not be credible that the Government can maintain this support, policy risk is amplified.
3. It will not address broader challenges for investments in low carbon generation, construction risk is still formidable.

Taking all of these issues into account, it is very unlikely that the carbon floor price will deliver the results intended. That is before considering the critical issue of carbon leakage thanks to the additional pressure this policy will place on energy-intensive industry.

Unilateral

There is a longstanding problem when combining other climate policies with the EU ETS. The other policies will not cut emissions, but merely dictate how emissions should be cut within the cap.

For example, if renewable energy subsidies cut emissions that will reduce the carbon price – as demand for emissions allowances will be lower – and emissions elsewhere will therefore be higher. The final result will be that emissions are capped at the same level with or without the renewable energy subsidies. Those subsidies merely dictate how emissions will be cut. Der Spiegel uncovered an e-mail exchange between experts working for the German Green Party about the country's Renewable Energy Law (EEG) in which one stated:[14]

[14] Waldermann, A. *Wind Turbines in Europe Do Nothing for Emissions-Reduction Goals*, 2 October 2009

> *'Dear Daniel, sorry, but the EEG won't do anything for the climate anyway.' Ever since the introduction of the emissions trading system, the Renewable Energy Law had become 'an instrument of structural change, but not an instrument to combat climate change'.*

In the same way, the carbon floor price – implemented through an additional tax rather than a reserve price when emissions are auctioned – does not adjust the overall cap and therefore will not reduce overall EU emissions. The result will be a shift in emissions from Britain, with a higher carbon price, to the rest of Europe, with a lower carbon price.

The Institute for Public Policy Research (IPPR) estimate that the carbon price in the rest of Europe will be substantially lower as a result of the carbon floor price in the UK:[15]

> *By increasing the supply of carbon permits in the rest of Europe (from reducing the supply in the UK), the policy will also affect the carbon price in the rest of Europe. The expected value is estimated to fall by eight per cent in 2020, and up to an additional 18 per cent reduction when business-as-usual (BAU) emissions are lower than forecast. If the carbon price in the rest of Europe is expected to be lower and more variable, low-carbon investments are likely to be less attractive.*

That means there will be no reduction in emissions either: "the floor price has no impact on the total number of permits: every ton of carbon that is priced out of the UK will be emitted elsewhere in Europe." In fact, as emissions will not be cut where it is most affordable to do so, but in the UK where the carbon price is higher, they believe that it will lead to a £1.18 billion Net Present Value economic waste in 2020.

To the extent that this policy achieves what it is supposed to, and encourages investment in low carbon generation here in Britain by providing greater certainty for investors, it will produce exactly the opposite result in the rest of Europe. In the short term, and to the extent the policy fails to deliver on its objectives in the long term, it will mean higher costs for British consumers and industry to no end. Instead of creating an overall reduction in emissions it will essentially result in Britain volunteering to take on a greater share of the burden of delivering on Europe's overall emissions reduction goals.

Credibility

In order for the carbon floor price to be effective in reducing the uncertainty facing investors it needs to be credible that the Government will stick to that price, and the

[15] Maxwell, D. *Hot Air: The carbon price floor in the UK*, IPPR, 28 June 2011

policy itself, over time. The political risk that a future government will drop climate targets or seize investors' returns in taxes – in response to popular pressure with rising energy prices and pressure on living standards – is already a substantial problem with existing climate policies.

Citigroup have identified twenty-seven policy shocks that have dented confidence in policy stability in the European energy sector already – and which they think account for the poor performance of the sector. The list includes the carbon price floor and its potential effect on investments in the rest of Europe:[16]

- January 2010 Spain — 2.6 per cent total tariff increase (not enough to tackle the generation deficit)
- May 2010 Portugal — Corporate tax rate increased by 250bps.
- June 2010 Germany — Imposition of a nuclear tax starting in 2011.
- July 2010 Spain — Industry Ministry freezes the tariff to make a thorough revision of the costs. Outcome of the revision on the 23rd Dec 2010 (measures to tackle the ongoing deficit):
    - Iberian generators (every technology) will pay additional €0.5/MWh access tariff.
    - Utilities will finance the social bonus up to 2013 (6 additional months from initial expectation), representing a €150 million cost.
    - Utilities will assume the cost of strategy for energy savings and efficiency during three years from the 1st January 2011. This will represent a €670 million saving in the period.
    - Solar PV assets. Cap the number of working hours for the useful life of the asset, plus more restrictive cap for the three coming years. Consumer savings would amount to €740 million per annum
    - Wind assets: 35 per cent cut in the premium for 2011-12 for assets started into operation from 1st Jan 08.
    - Solar thermal assets: No premium in the first year in operation.
    - New tariff deficit yearly targets are €5.5 billion for 2010 (previously €3.0 billion), €2.0 billion for 2011 and €1.5 billion for 2012 (previously €1.0 billion), with no deficit in 2013.
- September 2010 Germany — Utilities to pay a power price linked renewable levy.
- September 2010 Spain — EU approves state aid for Spanish coal sector (negative for Utilities as it is a new interference in the liberalised system and decreases load factors in CCGTs).
- October 2010 Czech Republic — Government introduces a tax on solar plants and tax on the free CO_2 permits for 2011-12.

[16] Citi *A Very Hostile Political Environment*, 13 September 2011

- February 2011 UK — Emergency review of feed-in-tariffs and the withdrawal of support for industrial scale solar energy.
- March 2011 Germany — Announced temporary 3-month shutdown of oldest nuclear plants in the country post Fukushima.
- April 2011 Spain — Tariff to final customers remains flat (despite decrease in the energy component), meaning a roughly 10 per cent access tariff increase.
- April 2011 France — Announced out of schedule a below-expectations and below inflation tariff increase for residential customers of 1.7 per cent for July 2011 (April 2011).
- April 2011 France — Announced change in the formula for regulated gas customers and no tariff changes until the new formula is approved (April 2011).
- March 2011 UK — Government imposes an additional 12 per cent corporation tax charge on north sea oil and gas production.
- March 2011 UK — Government imposes a higher-than-expected carbon tax at €21 /t from 2013 rising to circa €46 /t by 2020.
- May 2011 Germany — Announces removal of nuclear life extensions and permanent shutdown of oldest nuclear plants.
- May 2011 Germany — Announces intentions to boost competition by providing investment incentives to the non-incumbent utilities (May 2011).
- May 2011 Portugal — Memorandum of Understanding between the IMF and the Portuguese Government. The document stated a number of measures that included full divestment of public sector shares in EDP and REN by the end of the 2011, and a complete review of the power market and renewable support mechanisms.
- June 2011 Spain — Spanish regulator recommends to the Spanish Government that the extra cost from the deficit securitisation should be shared between utilities and customers instead of being fully financed by final customers.
- June 2011 Finland — Proposed windfall tax and nuclear fuel tax. While details are still to be confirmed, a cost of at least €170 million per annum has been proposed.
- August 2011 Italy — Government proposes new "Robin Hood" tax that could cost the utility companies around €650 million per annum for three years.

In their view this amounts to a "shattered compact" between governments and the energy companies, and that as a result "capital markets are clearly unwilling to provide the sector with the level of finance that would be required" under current policy. The carbon floor price needs to be understood within that wider context, as the energy companies who have been affected by that policy instability are also critical to the success of the carbon floor price.

The credibility of the carbon floor price is likely to be particularly strained as it commits the Government to significant future tax rises, and probably particularly

sharp tax rises at times when the economy is weakest. The IPPR identified this issue as critical in their report:[17]

> *Even taking account of the fact that market participants may be behaving inefficiently, or perhaps discounting the long-term viability of the EU ETS, there is no indication that the European-wide market foresees EUA prices at anything like the levels assumed for the carbon price floor in the government's scenarios in 2030.*
>
> *As a result, for this policy to be credible, investors must believe that the government will make very large market interventions.*
>
> *[...]*
>
> *Generally the EU ETS price will be lowest when the EU economy is weak and so the supplementary carbon price support will be needed to top it up to the floor price. It is at precisely these moments, however, that a large increase in the carbon price support may be most politically difficult. Supporters of cap and trade or quantity-based approaches to carbon pricing have pointed out that during the recession of 2008 it would have been very hard for governments to maintain high carbon taxes. Under the government's proposed hybrid EUA plus tax approach, there would be pressure to reduce carbon price support levels.*

There are ways that the Government could try to increase the credibility of the policy. The IPPR look at three potential options:

First, they could delegate the decision over the level of the carbon price floor or embed a process in which a body like the Committee on Climate Change (CCC) makes recommendations about the proper level. It is unlikely that would be sufficient though, unless firms really believe that the political harms from ignoring the CCC would outweigh the gains from responding to popular demand for lower energy prices.

Second, they could offer a contract for difference (CfD) on the price of carbon – "investors would receive a payment equal to the difference between the EUA price and the carbon floor price". The Government is trying something like this with the contracts for difference on the price of electricity that are part of their electricity market reforms. Such an approach constitutes a major financial risk for the Treasury though, as the costs could be very high if the price is much lower than they expect. The Government's decisions suggest that – wisely or not – they are willing

[17] Maxwell, D. *Hot Air: The carbon price floor in the UK*, IPPR, 28 June 2011

to take that risk with respect to energy prices but not with respect to the carbon price.

Third, they could offer a CfD not on the price of carbon itself but on the price of carbon after carbon price support. They wouldn't be guaranteeing the carbon price itself but just their own commitment to support it with the floor price.

In the IPPR's view, the last option is the best but it may be that none of them are sufficient to make the policy effective. And they constitute a transfer of risk from energy companies to consumers that could be extremely expensive. If new supplies of shale gas or continued fresh weakness in the global economy lead to falls in energy prices then covering the difference between that and the price guaranteed for energy firms could be very expensive. Equally policy changes at the European level could undermine the carbon price. They could do that either by raising the cap on emissions in some way, or by implementing other policies that reduce emissions and therefore the demand for allowances, depressing the carbon price.

And no matter how credible the commitment to the policy itself, it is always possible for governments to step in and tax industries perceived to be receiving a generous windfall. Current policy could lead to a combination of rising profits (the return for substantial investment) and rising prices to pay for those profits in the energy sector. That will create a powerful political temptation for a windfall tax of some kind that would threaten investor returns even if the policy itself could not be reversed.

Broader challenges for investments in low carbon generation

Government electricity market reforms are concentrated on providing electricity and carbon price stability, giving investors greater certainty over the revenues that can be earned in the sector. But the risks in constructing and maintaining low carbon generation capacity could be just as severe.

The key low carbon sources of energy that the carbon floor price appears intended to support, which is not already supported by other means, is nuclear power and carbon capture and storage (CCS). Renewable energy already receives substantial support in the form of the Renewables Obligation, already worth over £1 billion a year,[18] and feed-in tariffs for smaller installations. In that context, greater certainty over the carbon price is likely to have a limited effect on the economics of investment in renewable energy.

[18] The value of the obligation can be estimated by multiplying the buy-out price by the size of the obligation, both published by Ofgem

Even with generous subsidies and a guaranteed carbon price there are significant risks investing in certain key technologies like offshore wind. Particularly as they are installed deeper and deeper in the North Sea, construction costs are high and the industry has "little experience" of "the long-term operations costs of these assets, or even how long they will last".[19]

CCS is still at an early stage of technological development. The Government has set aside £1 billion to fund demonstration plants and the critical challenge seems to be finding the right project. The carbon price could become more important to support CCS projects as the technology matures and it becomes practical to deploy it more widely and without other specific support. But there is a big difference between the small scale demonstrators being built today and a technology that can be fitted to a substantial portion of Britain's energy supply.

For now a substantial expansion of nuclear capacity certainly seems to be the only way that the policy can – by the end of the next decade – significantly reduce energy prices, as the Government have argued it will.

In nuclear power there is substantial construction risk as the costs are very uncertain. In an electricity market like that in Britain, where electricity prices need to cover the construction costs over the life of a nuclear plant, any overrun threatens investors' returns. Citigroup have looked at a range of estimates for nuclear costs and overruns, which show the scale of uncertainty about the final cost of constructing new nuclear capacity:[20]

> *Both Westinghouse and Areva claim to be able to construct a new third generation plant (AP-1000 and EPR, respectively) in 3 years from first pouring of concrete. However, evidence to date suggests this is not necessarily the case as Olkiluoto and Flamanville projects have both suffered delays, while the first AP-1000 unit under construction, in SanMen China, is running significantly over its $1,000/KW construction cost target and is expected to be over $3,500/KW.*
>
> *Georgia Power stated in mid 2008 that two 1100MW reactors would cost up to $14 billion, depending on financing terms. This gives significantly high cost assumptions of $6,360 per kilowatt.*
>
> *In November 2008, Tennessee Valley Authority updated its estimates for Bellefonte units 3 & 4 relating to two AP1000 reactors of 2234MW combined. It said that overnight capital cost estimates ranged from $2,516 to $4,649/kW for a combined construction cost of $5.6 to $10.4 billion.*

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[19] Citi *A Very Hostile Political Environment*, 13 September 2011
[20] Citi *Pan European Utilities*, 22 October 2009

Towards the end of 2008, at its investor day, EdF increased its cost assumptions for the Flamanville 3 EPR, raising them to €4 billion/$5.6 billion or €2,434/kW or $3,400/kW in real money terms. These costs were confirmed in mid 2009, when EdF had spent nearly €2billion.

Another estimate from Nuclear Innovation North America, in June 2009, said that the cost of two 1350 MW GE ABWR units at the South Texas Project near Houston would be about $10 billion, including financing costs. This would be a merchant plant, not a regulated one operating on cost plus basis with the first unit expected on line in 2016. This equates to $3,700/KW.

The Finnish EPR at Olkiluoto has been plagued by many delays during construction and is currently 3 years behind schedule, having originally targeted commissioning in 2009. The original cost estimate for Olkiluoto was €3bn. However, due to delays, planning problems (construction started in 2005) and issues with materials, Areva's latest estimate (August 2009) is that costs have risen by €2.3bn and could increase further depending on the outcome of negotiations between the owner, TVO, and Areva on the timeline for completion. Therefore at a running total of €5.3bn, costs stand at €3,300/kw ($4,785/KW) and although this is the first EPR project, and teething troubles ought to be expected, it is still indicative of the risks that we think equity investors should be concerned about.

Also, in May 2009, MIT published an update of its 2003 study in to construction costs of large scale engineering projects. The report stated that "since 2003 construction costs for all types of large-scale engineered projects have escalated dramatically." In addition, according to the report, the estimated cost of constructing a nuclear power plant has increased at a rate of 15% per year heading into the current economic downturn. This is based both on the cost of actual builds in Japan and Korea and on the projected cost of new plants planned for in the United States. The overnight capital cost was given as $4,000/kW, in 2007 money.

There are a number of groups planning to invest in nuclear power. But the carbon floor price may not be sufficient to secure sufficient plants are built to do more than slow the decline in capacity, with older plants due to go offline. Even EDF Energy, which lobbied most aggressively for the carbon floor price, while other companies did not view it as a priority, has since described it as "just a first step" according to the *Daily Telegraph*.[21]

[21] Mason, R. & Townsend, A. Britain is struggling to power the nuclear revolution, *Daily Telegraph*, 14 August 2010

For all of those reasons the carbon floor price is unlikely to prove effective in encouraging low carbon generation. The critical problem though, is that it could lead to emissions not being cut but exported to other countries, inside or outside the European Union.

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Effect on industry

The carbon floor price will increase energy prices for domestic consumers, which could have serious social consequences. The Hills Review recently found that fuel poverty contributes to excessive winter mortality to such an extent that it leads to 2,700 people in England and Wales dying each year.[22] That poses a serious challenge for the Government's commitment to tackle poverty and benefit dependency.

It is also a threat to energy intensive industry, and will undermine the economic growth that the Government needs in order to meet economic objectives such as closing the fiscal deficit. Rising prices threaten energy intensive industries, those where energy costs are the highest share of their total costs, in particular. The problems that will create have been seriously underestimated and the consequences could be severe if the policy is not abandoned, or effective mitigation introduced.

Rises in energy prices

Energy and climate policy already places a substantial burden on industry. Official estimates and independent studies have confirmed that the costs are substantial and rising:

- In July 2010, the Department of Energy and Climate Change (DECC) estimated that those policies added 14 per cent to non-domestic energy bills on average, increasing gas prices by 6 per cent and electricity prices by 20 per cent. By 2020, they have estimated it will add 26 per cent to bills, increasing gas prices by 24 per cent and electricity prices by 43 per cent.[23]
- Another DECC study in July 2011 estimated that large energy intensive users would face a rise in electricity prices of between 11 per cent and 52 per cent by 2020, and between 16 per cent and 58 per cent by 2030 depending on whether the gas price rises or falls (if it rises, the cost of policy will be less).[24]
- It is thought that DECC estimates may understate the degree to which policy will increase energy bills. In response to the July 2011 report, Jeremy Nicholson from the Energy Intensive Users Group said that:

> *There are a number of weaknesses in DECC's analysis which are of concern to EIUG members. These include questionable assumptions about future fossil fuel prices and the likely trend in underlying wholesale electricity prices*

[22] Hills, J. *Fuel Poverty: The problem and its measurement*, Centre for Analysis of Social Exclusion, October 2011
[23] DECC *Estimated impacts of energy and climate change policies on energy prices and bills*, July 2010
[24] DECC *Provisional estimates of the impacts of energy and climate change policies on energy prices and bills of large energy intensive users*, July 2011

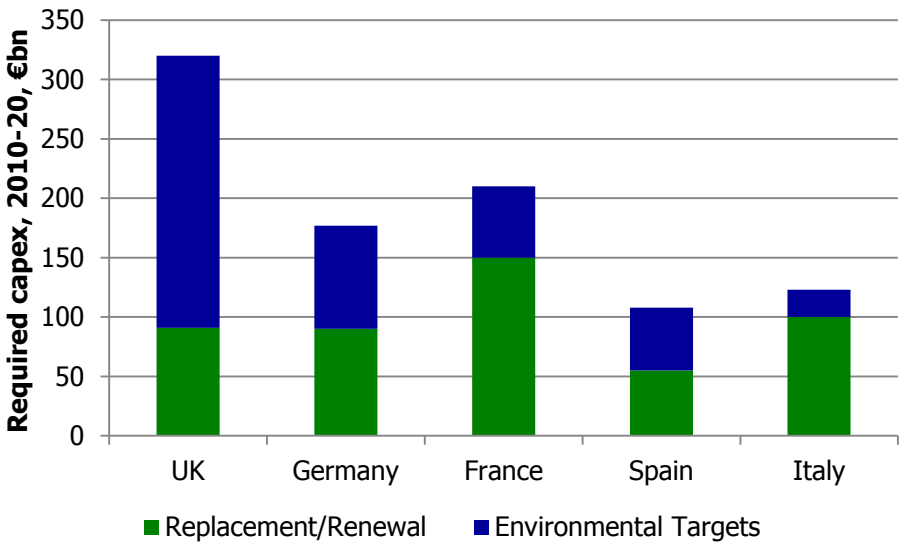
(excluding environmental costs), the degree of pass through of carbon and renewable subsidy costs by generators and suppliers, the scope for reductions in energy consumption by intensive users and the lack of transparency in accounting for the impacts of climate policies on transmission, distribution and balancing costs.

- In July 2010, Waters Wye Associates released a study for the Energy Intensive Users Group and the Trades Union Congress and projected that – including the costs of the third phase of the EU ETS – total energy bills for companies would increase by between 18 per cent and 141 per cent.[25]

Those increases in price will make it harder for manufacturing industry to compete, particularly if foreign competitors are not facing a similar increase in costs. They will also make it impossible for the most energy intensive industries.

Even within the European Union – the only major economic area implementing climate regulation on a similar scale – Britain faces particularly high climate policy costs before the implementation of the carbon floor price. The British target requires the largest increase in the use of renewable energy and, thanks to geographical constraints, that target will be met in large part through particularly expensive offshore wind. For example, Citigroup have estimated that Britain would have to invest more than the other major European economies put together to meet environmental targets this decade.[26]

Citi estimate of required energy sector capex, 2010-20, €bn



[25] Waters Wye Associates *The Cumulative Impact of Climate Change Policies on UK Energy Intensive Industries – Are Policies Effectively Focussed?* July 2010
[26] Citi *The €1trn Euro Decade – Revisited*, 29 September 2010

The carbon floor price is not being implemented in other countries and, as discussed earlier, is expected to depress the carbon price in the rest of Europe while raising the price here. The price in Europe will be depressed by eight per cent in 2020 according to the IPPR, reducing the electricity price paid by industry while it is increased here.

The EU ETS cost residential and industrial energy consumers in Britain around £2 billion in 2010 at a carbon price of just over €14 /t CO_2. At the Government's target price for 2020 of £30 /t CO_2 that would have been £4.6 billion, equivalent to around £178 a family.[27]

The HM Treasury consultation document on the carbon price floor suggested that it would add a further 3 per cent to an average medium-sized non-domestic user's electricity bill by 2020.[28] They argue that after that costs will fall as it produces a stronger incentive to invest in low carbon generation, but those falls will not materialise if the policy is ineffective for the reasons discussed earlier. The Engineering Employers' Federation reports that the carbon floor price could add 10 per cent to electricity prices for 'Extra Large' industrial consumers by 2020.[29]

Carbon Price Floor Impact	2013	2014	2015	2016	2017	2018	2019	2020
Cost to Manufacturing Sector (£m)	250	380	500	650	780	930	1,000	1,200
Impact on Electricity Price paid by 'Extra Large' Industrial Consumers	3%	4%	5%	6%	7%	8%	9%	10%

Their estimate is based on replicating the HM Treasury methodology for calculating the price and Department of Energy and Climate Change projections for the EU ETS price.

Rises in energy prices mean the carbon floor price will create a further disadvantage for British industry when competing with other firms, or other possible locations for investment, in or outside the European Union. Energy intensive firms in particular are already vulnerable thanks to existing policies expected to increase prices. This further burden may make a critical difference to whether they can continue to invest and operate here.

It is important to note that a simplistic comparison of overall energy prices in different countries – sometimes used to downplay the problem for industry – does not properly illustrate the scale of the problem for British energy intensive industry. The difference in prices for the largest consumers, which tend to receive more generous discounts in other countries, is considerably larger. The Engineering

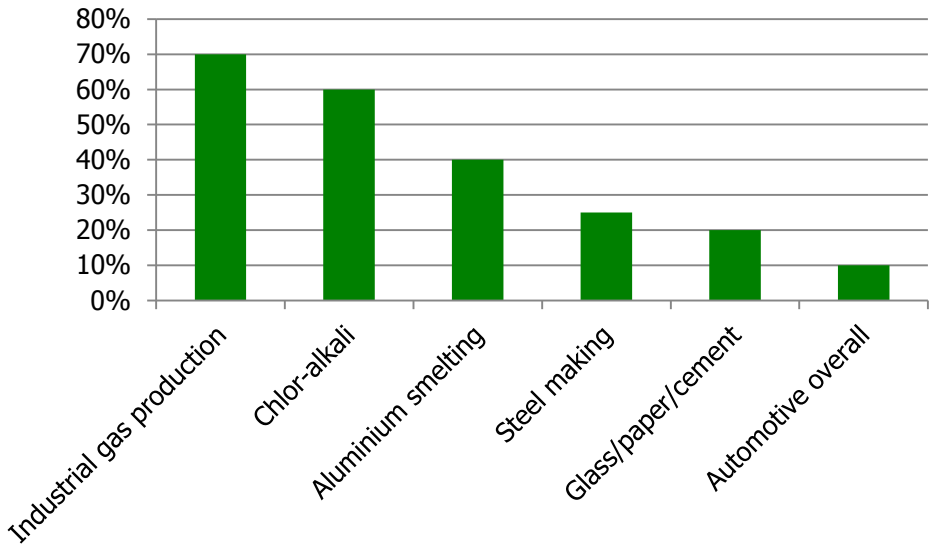
[27] Sinclair, M. *Let them eat carbon*, pgs. 52-53
[28] HM Treasury *Carbon price floor: support and certainty for low-carbon investment*, December 2010
[29] EEF *UK Manufacturing: Reducing emissions, investing in energy efficiency, cutting out waste*, 20 October 2011

Employers' Federation has reported that prices for the largest consumers have recently been 10 to 25 per cent higher than they are in Germany, and 60 to 75 per cent higher than they are in France.[30] That gap will grow with the carbon floor price increasing costs here, and decreasing them in the rest of Europe.

Threat to energy intensive industry

The industries that suffer first will be those where energy is the highest share of their costs, and those where reductions in emissions are the most difficult. Some of the industries and rough estimates of energy as a share of their total production costs are given below:

Energy as a percentage of total production costs, by industry



Industries where a fifth of total costs or more are driven by energy prices are extremely likely to suffer if prices rise substantially, particularly if they rise in Britain and not in other countries whose industries compete. INEOS have released figures about the impact on their businesses:

- INEOS ChlorVinyls face increased costs of £5 million a year rising to a potential £30 million a year at 2009 prices by 2020 – nearly 1.5 times average earnings before interest, taxes, depreciation and amortization (EBITDA).
- The INEOS business at Grangemouth faces costs of between £26 million and £61 million over the same period.

Karl-Ulrich Köhler, head of Tata Steel Europe, has warned that the carbon floor price, along with other climate policies increasing energy prices, could put the firm's

[30] EEF *UK Manufacturing: Reducing emissions, investing in energy efficiency, cutting out waste*, 20 October 2011

£1.2 billion investment programme in Britain at risk. Rising energy costs are likely to pose a particular immediate threat to new investment. While it will be expensive to relocate existing plants, and firms will try to avoid giving up on the expertise and networks of suppliers and contractors built up around established industries, those factors are less relevant to new investment, and new industries. Over time though, even well-established energy intensive plants will be rendered uneconomical by rising costs.

The importance of energy prices to the viability of energy-intensive industry can be seen in earlier cases where prices rose for reasons other than policy. In a study for the think tank Civitas, Ruth Lea and Jeremy Nicholson looked at a number of examples:

> *There is no doubt that high energy prices have already been a factor behind industry closures. In 2003 the energy intensive Britannia Zinc works near Bristol was closed, with a loss of 400 jobs. And in May 2006 the EIUG reported that the UK gas price spike of 2005–06 had contributed to 6,000 jobs lost over the previous eighteen months in the glass sector; several paper mills had also been closed. In addition, brick capacity had been cut back and manufacturers of chlorine and ammonia-based fertiliser had reduced production. In July 2006 EIUG reported that even where production was continuing investment was being reduced, thus cutting back the potential capacity and potential contribution of these businesses to employment and GDP.*
>
> *Anglesey Aluminium's plant closed last year, following the ending of its deal to buy competitively priced electricity from the nearby Wylfa nuclear power station, which had recently passed into state ownership. Under EU law the electricity deal with the now state-owned Wylfa was classified as 'state aid' and therefore deemed illegal. Of Britain's two other primary aluminium plants, the one at Lynemouth in Northumberland uses electricity from its own coal-fired power station. This power station will require the fitting of costly scrubbers in order to comply technically with the EU's Large Combustion Plants Directive even though they will have no improved environmental impact because the air quality is already controlled using another, more sophisticated, procedure. Such extra costs will inevitably undermine the economic viability of the plant.*
>
> *It is important to note that high energy prices are not just damaging energy intensive industrial businesses. It was reported last year that high electricity prices, then quoted as the third highest in Europe, were a factor in forcing companies to locate power-hungry data centres outside Britain.*

Uncompetitive energy prices are undermining the ability of a wide spectrum of industries to locate in Britain and remain competitive.

Rises in energy prices clearly have the potential to render energy intensive industries uncompetitive. Over time they may threaten a much wider range of industries as well.

Carbon price spikes

While volatility can undermine the effectiveness of the EU ETS, it can also exacerbate the burden the scheme imposes on industry. Jos Delbeke argued that "political reality makes it unlikely to have a price floor without getting a price ceiling at the same time" in 2009. But the Government's planned carbon floor price is not accompanied by a ceiling. That means that spikes in the price are still possible. There are two ways that a spike in the carbon price could occur within the next few years:

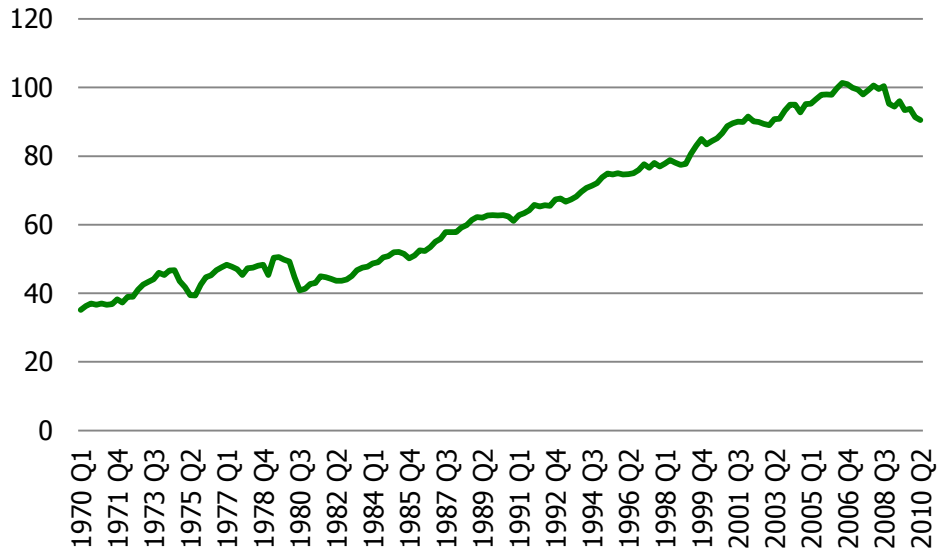
- Just as the recession has seen the price collapse, unexpectedly rapid economic growth could increase demand for allowances and lead to rapid rises in the price.
- It may not be possible to improve carbon efficiency at the rate envisioned by those setting the ETS cap on emissions. Again, once that was appreciated it could lead to rapid rises in the price.

This would be particularly likely if the European Union were to move from a 20 per cent to a 30 per cent target for emissions reductions by 2020, bringing down the emissions cap in the EU ETS. The risk of a spike at that stage would have the same kind of negative effects on investment – particularly in energy intensive industry – that carbon price volatility is currently understood to be having on investment in low carbon generation.

Consequences of harm to energy intensive industry

Energy intensive industries have been successful and growing in Britain. For example, the chemical industry has increased production in Britain steadily up to the recent recession.

Index of production, manufacture of chemicals and man-made fibres



They employ substantial numbers of people, pay large amounts of tax and have been steadily reducing their emissions intensity. If the sectors contract in the face of higher energy costs, particularly relative to our industrial competitors, that will have serious consequences.

Carbon leakage

The Impact Assessment for the Climate Change Act 2008 reflects that: "The economic case for the UK continuing to act alone where global action cannot be achieved would be weak."[31] This is true for two principle reasons:

1. Only a small share of global emissions is produced in Britain, well under two per cent. If our actions do not contribute to a global reduction in emissions then they will have no significant effect on expected warming.
2. Actions to reduce emissions produced here may increase them elsewhere – they may lead to "carbon leakage".

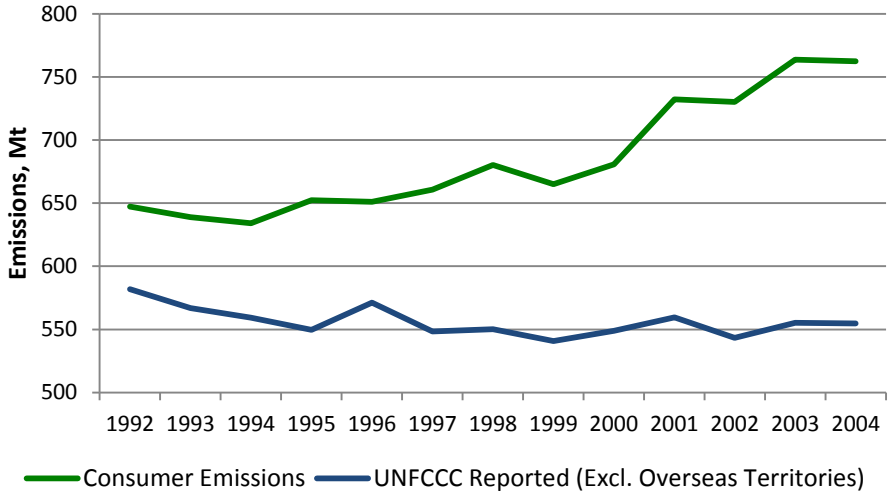
Dieter Helm has raised that problem in discussing the EU's target to reduce emissions by 2020:[32]

[31] DECC *Climate Change Act 2008: Impact Assessment*, March 2009

This international dimension raises perhaps the most important aspect of the 20 per cent overall target: it is based on production of carbon within the EU, and not on consumption. Thus the EU can achieve its targets if it switches carbon production that would have taken place within the EU to overseas, and then imports back the goods and services which would have caused the emissions internally.

This is not just a hypothetical concern. Research for the Department for the Environment, Food and Rural Affairs (DEFRA) has found that, while the emissions produced in the UK fell between 1992 and 2004, consumer emissions rose.

British consumer and producer emissions, 1992-2004



Not all emissions exports are the result of climate policy. Countries may import more manufactures because their industry is less competitive for some other reason, such as higher labour costs, poor skills or a comparative advantage in some other sector. But if energy policy increases prices substantially there is a clear risk that it could force industry to relocate in order to avoid those costs and remain competitive. That can even mean that policies which cut producer emissions in Britain increase global emissions, if industry in other countries is more energy intensive.

The risk is particularly acute as Britain's emissions intensity of production is a lot lower than many other countries. Fewer emissions are produced here for a given quantity of output than would be in other places.

Across the economy Britain emitted 0.29 kg CO_2 per dollar of income in 2009. By contrast, in the United States they emitted 0.46 kg CO_2 per dollar of income and in

[32] Helm, D. EU climate-change policy – a critique, from *The Economics and Politics of Climate Change*, Helm D. & Hepburn, C. October 2009

China 0.56 kg CO_2 per dollar.[33] Part of that is because Britain has a larger service sector, as a share of our economy, which emits much less. But it is also because British industry is relatively efficient. INEOS estimate that emissions for chlorine production would be twice as high in China, and five times as high for PVC manufacture.

That fits with a longstanding pattern that industry in developed countries tends to have a lower energy – and therefore emissions - intensity, which has only been reinforced with developed countries implementing aggressive unilateral climate policy.

Comparison between Chinese and International Advanced Level Energy Intensity for Selected Industries, Gj /t, 1998[34]

Industry	China	International Advanced Level
Iron and Steel	27.5	19.3
Cement	4.2	2.9
Large Synthetic Ammonia	40.6	27.8
Alumina – Bayer Method	16.6	14.7
Alumina – Complex Method	44.5	19.0

More recently, the IEA completed a major study in 2007 looking at the issue and found that:[35]

> *Broadly, it is the Asian OECD countries, Japan and Korea, that have the highest levels of manufacturing industry energy efficiency, followed by Europe and North America. This reflects differences in natural resource endowments, national circumstances, energy prices, average age of plant, and energy and environmental policy measures.*
>
> *The energy and CO2 intensities of emerging and transition economies show a mixed picture. Where production has expanded, industry may be using new plant with the latest technology. For example, the most efficient aluminium smelters are in Africa and some of the most efficient cement kilns are in*

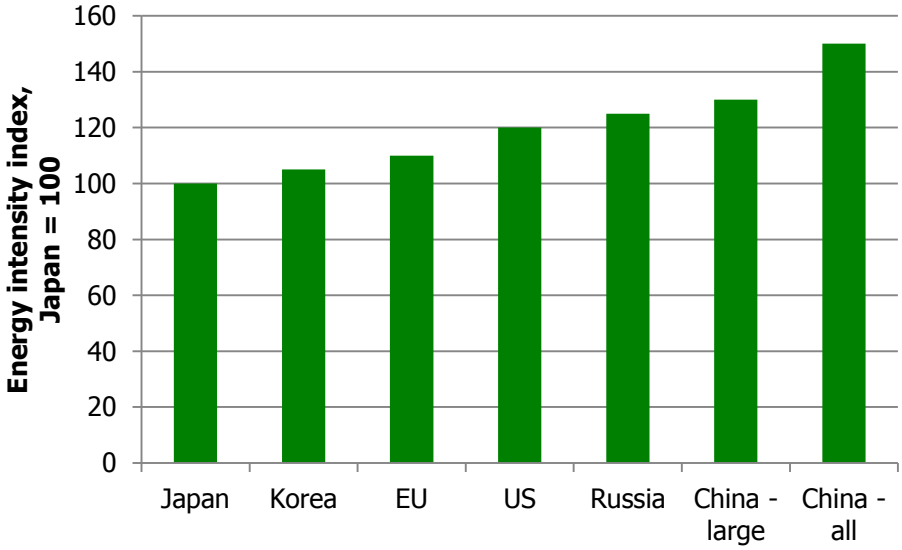
[33] IEA *CO_2 Emissions from Fuel Combustion 2011*
[34] Price, L., Worrell, E. Sinton, J. & Yun, J. *Industrial Energy Efficiency Policy in China*, Conference Paper, 2001 ACEEE Summer Study on Energy Efficiency in Industry, 2, Issue: 4, October 29-30, 2001
[35] IEA *Tracking Industrial Energy Efficiency and CO_2 emissions*, June 2007

India. However, in some industries and regions where production levels have stalled, manufacturers have failed to upgrade to most efficient technology. For example, older equipment remains dominant in parts of the Russian Federation and Ukraine. The widespread use of coal in China reduces its energy efficiency, as coal is often a less efficient energy source than other fuels due to factors such as ash content and the need for gasification. In China and India, small-scale operations with relatively low efficiency continue to flourish, driven by transport constraints and local resource characteristics, e.g. poor coal and ore quality. The direct use of low grade coal with poor preparation is a major source of inefficiency in industrial processes in these countries.

They go on to highlight how the relocation of industry to locations where it is relatively emissions intensive has undermined the effect of improvements in efficiency, for example in the iron and steel industry:

Worldwide the iron and steel industry has achieved important efficiency gains during the last twenty years. Iron and steel manufacturing in all countries have improved their efficiency; however, the global average level has not improved substantially. This reflects a concentration of growth in China, which has a relatively low average efficiency. In 2005, China accounted for 50% of global coke production, 42% of pig iron production and 31% of steel production.

Data prepared by the Energy Conservative Centre, Japan, in 2007 again showed that European steel works are often significantly more energy efficient than those elsewhere:[36]



[36] Nuibe, T. *Energy Intensity in Industrial Sub Sectors*, 19 June 2007

If the carbon floor price renders industry here uncompetitive, and thereby increases the share of the market taken by firms abroad that emit far more for a given quantity of production, then it will have been completely counterproductive. Particularly if new investment in the UK is threatened, as newer plants will tend to be even more efficient.

The policy will not reduce emissions in Europe, as it is unilateral and does not alter the overall emissions cap. And it will increase emissions outside Europe by driving investment and possibly existing capacity overseas. That means it will lead to an overall net increase in global emissions.

Employment

If energy intensive industry is threatened by this new regulation then it endangers a large number of jobs.

In the study mentioned earlier for the think tank Civitas, Ruth Lea and Jeremy Nicholson used the INEOS Chlor plant in Runcorn as one example of how many jobs hang on energy intensive industries, and their ability to compete. As they pointed out, it isn't just significant in itself but has a wider importance because the chlorine and caustic soda it produces has so many uses in other industries:

> *It is used as a disinfectant and a purifier, and in the manufacture of plastics (Polyvinyl chloride, PVC), solvents, agrochemicals and pharmaceuticals. It is also an intermediate in manufacturing other substances where it is not contained in the final product. Products relying on chlorine's unique properties include household items such as bleach and disinfectant to bullet-resistant vests, computer hardware, silicon chips and automotive parts.*

That's why an industry study suggested that not just the 1,000 who work at the plant will risk losing their jobs, but 46,000 jobs could be lost directly within ten years if the plant closed and a further 87,000 would be threatened in the wider economy. Jim Ratcliffe, founder of INEOS, has warned the Government that it may not be possible to keep the plant open if energy costs continue to mount.[37] Energy costs are highly significant for large parts of the chemicals industry and the Chemical Industries Assocation estimates that "the jobs of 600,000 workers in the UK depend on chemical and pharmaceutical businesses".[38]

Tata Steel currently employs around 20,000 people in Britain. It contracts out large amounts of its work though which means that there are three to four times as many

[37] Fortson, D. Industry rebels on carbon targets, *Sunday Times*, 22 May 2011
[38] Chemicals Industries Association *Chemical and Pharmaceutical Businesses in the UK*

jobs at stake should the business contract, even before considering the effects on the wider economy.

Overall, and according to the EIUG/TUC report, energy intensive sectors currently employ 225,000 workers in Britain and again far more jobs will be at risk if the factories move abroad.

Tax

In the Budget 2011 report, the Government announced that they expected the carbon floor price to increase revenue by £1.4 billion in 2015-16. If energy intensive industries suffer with the introduction of the carbon floor price, then the measure may produce less revenue or even lead to a net reduction in revenue.

There could be reductions in revenue from corporate taxes, Income Tax, Value Added Tax and other taxes if the firms are forced to invest elsewhere or close major facilities. For example:

- INEOS report that they contribute £600 million a year in Value Added Tax and £70 million in PAYE and NICs.
- Tata Steel contribute £280 million a year in PAYE and NICs.

For the revenue projection to be credible the Government need to establish either that the new tax can raise sufficient revenue to outweigh a potential reduction in other taxes paid by energy intensive industry, and the wider effects on the economy from any contraction in its output, or that they can effectively mitigate the effect on the sector. At this stage, neither of those claims would be credible.

Mitigation

In the Electricity Market Reform White Paper, the Government pledged that "a package of measures to reduce the impact of government policy on electricity costs for energy intensive manufacturers whose international competitiveness is most affected by our energy and climate change policies".

It is unclear how they will do that but they clearly recognise that the mitigation of the harms to energy intensive industry announced at Budget 2011 was insufficient. In the Budget, the Government pledged that to "mitigate the impacts, the Budget also announces an increase in the discount from CCL for electricity from 65 per cent to 80 per cent from 1 April 2013 for energy intensive sectors with Climate Change Agreements".

That discount was reduced from 80 per cent to 65 per cent in the Pre-Budget Report 2009. It has now been increased back to the original rate. As such, those industries have only had their original position with respect to the Climate Change Levy

restored, and this does not mitigate the substantial increase in costs resulting from the carbon price floor, and they are also facing highly unstable taxes. It is unlikely they will be able to invest on the basis of such an unreliable discount. The discount is also no help to some industries, like chlor-alkali, that are not affected by the Climate Change Levy. And it is a fixed rate while the carbon floor price becomes steadily more expensive over the decade.

In other European countries, there have been more substantial efforts to mitigate the effect on energy intensive industries:

- The largely state-owned EDF in France signed a memorandum of understanding for at least fifteen years in 2007, with the Exeltium consortium, to supply power to a number of energy intensive users – including Air Liquide, Arcelor Mittal, Arkema, Rhodia, Rio Tinto Alcan and Solvay – at discounted rates.[39] The European Commission opened anti-trust proceedings against EDF over the deal – and Belgian generator Electrabel over a similar deal there – on the grounds that the long term contracts, and the substantial share of the market they accounted for, might mean new electricity suppliers could not enter the market.[40] But the introduction of an opt-out for members of the consortium wishing to contract with other suppliers appears to have largely addressed those concerns.[41]
- Energy intensive industry in Germany receives an extensive set of rebates against the cost of climate policy. They receive a 98.5 per cent rebate against the renewables fee; an up to 90 per cent rebate against the "Ecotax"; and a 61.5 per cent rebate against the CHP Financing Surcharge. The Engineering Employers' Federation estimates that the total taxes before rebates are around €52 /MWh but less than €3 /MWh after the rebates.[42] Similar rebates exist in Sweden.

The *Financial Times* has reported that rebates of the kind used in Germany are likely to be part of the growth review.[43] While mitigation measures will not reduce the burden on domestic consumers, they can significantly alleviate the pressure on energy intensive industry. That in turn will reduce the likely impact on employment and tax revenue, and reduce the chances of carbon leakage. The key is that any solution shouldn't just work for some or all current installations. It needs to make it possible for new investment to go ahead, and new energy intensive industries to establish themselves here.

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[39] ProjectFinance *Exeltium: Virtually impressive*, February 2011
[40] European Commission *Antitrust: Commission initiates formal proceedings against Electrabel and EDF for suspected foreclosures of the Belgian and French electricity markets*, 26 July 2007
[41] European Commission *Commissioner Kroes welcomes amendments in EDF/Exeltium announced framework*, 31 July 2008
[42] Engineering Employers' Federation *German Electricity Price Comparison*
[43] Pickard, J. 'Growth review' to include carbon tax breaks, *Financial Times*, 18 October 2011

We also need to keep the existence of these rebates and discounts in mind when considering the impact of any policy on the competitive position of British industry.

Conclusions

The carbon floor price addresses a genuine problem: the volatility of the carbon price produced by the EU ETS. But it does so in a way that will create more problems than it solves. The carbon floor price calls the entire point of the EU ETS into question: why operate the carbon market if we don't trust the price it produces?

Unlike other policies which are at least also being followed by other European economies, though often at significantly lower cost, this one is completely unilateral. It will actually lower the carbon price in the rest of Europe. That means it will be a nightmare for energy intensive industries if we add the new carbon floor price to other regulations which are already substantially increasing energy prices. Tens of thousands of jobs are at risk.

The Government needs to be a lot more cautious about ploughing ahead with expensive, unilateral climate policy at a time when they need industry growing more than ever. Ideally this policy should be scrapped. Failing that, more credible and substantial measures will need to be introduced to reduce the impact on energy intensive industry and avoid driving investment, jobs, tax revenues and emissions abroad to little purpose.

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