

| | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| Title: Eligibility for an exemption from the costs of Contracts for Difference IA No: DECC0178 Lead department or agency: DECC Other departments or agencies: BIS | Impact Assessment (IA) |
| | Date: 13/01/2015 |
| | Stage: Final |
| | Source of intervention: Domestic |
| | Type of measure: Secondary legislation |
| | Contact for enquiries: Robert Dixon |
| Summary: Intervention and Options | RPC: N/A |

| Cost of Preferred (or more likely) Option | | | | |
|-------------------------------------------|----------------------------|---------------------------------------------------------|------------------------------|----------------------|
| Total Net Present Value | Business Net Present Value | Net cost to business per year (EANCB in 2009 prices) | In scope of One-In, One-Out? | Measure qualifies as |
| £295m | - | - | No | Tax & Spend |

What is the problem under consideration? Why is government intervention necessary?

The Contract for Difference (CfD) regime is one of a number of policies which the Government has put in place to incentivise the necessary investment in low-carbon generation under the Electricity Market Reform (EMR), as part of the measures set out in the Energy Act 2013. EMR analysis indicates that while consumers will benefit from lower prices, relative to meeting similar decarbonisation ambitions using existing policy instruments, in the short to medium term, CfDs will require a top up on the wholesale electricity price. For electricity intensive manufacturers, this can pose a risk to competitiveness as competitors in other countries may not be subject to similar energy and climate change policy costs, or may be shielded or exempt from them. The Government is seeking to lessen the cost disadvantage faced by Electricity-Intensive Industries (EIs) as a result of energy and climate change policy costs relative to their EU and international competitors and has announced its intention to exempt EIs from a proportion of CfD support costs.

What are the policy objectives and the intended effects?

An exemption from a proportion of the costs of CfDs would mean that eligible firms avoid some of the extra CfD costs which otherwise would be added to their electricity bill. However, whilst reducing EIs' electricity costs, any exemption provided to industry will narrow the base of consumption from which total CfD support costs are recovered, and therefore increase electricity costs for non-exempt households and businesses. Policy options are primarily assessed based on the trade-offs associated with these two impacts.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

In July 2013 three core policy options of eligibility and size of exemption from CfD costs (each with two sub-options, (a) and (b)) were presented in a consultation document. The options were:

- July 2013 option 1 (proposed Carbon Price Support (CPS) compensation sectors, with either 80% and 67% exemption rates) exempted sectors covering up to ~30TWh total electricity consumption per annum. Sectors included in this option were in line with those proposed in BIS' Carbon Price Support (CPS) compensation package (which was subject to state aid clearance at the time of publication).
- July 2013 option 2 (CPS + taper sectors, with either 80% and 50% exemption rates) covered ~40TWh and was the broadest option, covering more sectors than Option 1 and 3. Option 2 exempted sectors which fell under Option 1 (i.e. proposed CPS coverage) from 80% of costs and the additional sectors from 50% of costs.
- July 2013 option 3 (Emissions Trading System (ETS) compensation sectors, with either 80% and 67% exemption rates) proposed the same exemption to sectors covering ~20TWh. Sectors included in this narrower option were only those sectors already approved for compensation from the indirect costs of the EU ETS.

In the July 2013 consultation the Government's preferred option, based on NACE rev. 1.1 sector definitions, was to use the same eligibility criteria as for EU ETS and CPS indirect costs compensation (Option 1). Analysis at the time showed this option best achieved the balance between costs to other consumers and addressing the competitiveness risks to the most electro-intensive industries.

Following the publication of the original consultation in July 2013, the European Commission published updated Energy and Environmental State Aid Guidelines (EEAG), which provide a legal basis for the provision of relief for energy-intensive businesses from the indirect costs of renewable energy subsidies and carbon taxes. These guidelines assessed the competitiveness of sectors based on the latest definition of sectors, NACE rev. 2.0, and gave a framework for the design of policies mitigating the costs of renewables support schemes. All options considered in the 2013 consultation were incompatible with the latest revised EEAG.

Building on the options assessed in the July 2013 consultation, the Government developed a further option compatible with the latest revised EEAG, which suggested exempting sectors which pass a sector-level and company-level eligibility test. These sectors had a combined consumption of around 20TWh per annum with an exemption rate of up to 85%. This option was published in a consultation document in July 2014, with a consultation on changes to the Supplier Obligation published in September 2014 alongside a consultation version of this IA.¹

After reviewing consultation responses the Government will implement an exemption broadly consistent with the July 2014 Consultation proposal, with minor amendments to increase the baseline for determining eligibility. Eligible businesses continue to have an estimated combined consumption of around 20TWh per annum, and will be eligible for an exemption rate of up to 85%. This option is referred to as the 'final eligibility option' in the remainder of this IA, in order to distinguish it from the previously considered options.

All these options have been measured against a counterfactual scenario in which CfDs are put in place without exemptions for EIs. Analysis suggests that value for money is generated by exempting sectors which cannot pass on costs to customers without losing market share to overseas rivals. Sectors investigated are shown to have varying degrees of high electro-intensity, low margins and high overseas market shares. The sample of sectors used in this analysis are judged to be representative of the group of sectors which would be covered under the different policy options. The analysis suggests that the final eligibility option minimises negative impacts on other sections of the economy and consumers whilst still effectively targeting support at sectors most exposed to competitiveness risks. Therefore, the analysis presented in this Impact Assessment is broadly supportive of implementing an exemption using the final eligibility option.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** 2020

| | | | | | |
|--------------------------------------------------------------------------------------------------|---------------------|-----------------------|-----------------------|----------------------|---------------------------|
| Does implementation go beyond minimum EU requirements? | | | N/A | | |
| Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base. | Micro N/A | < 20 N/A | Small N/A | Medium N/A | Large N/A |
| What is the CO2 equivalent change in greenhouse gas emissions? (Million tonnes CO2 equivalent) | | | Traded: N/A | | Non-traded: N/A |

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister: Matt Hancock

Date: 15.01.2015

¹ <https://www.gov.uk/government/consultations/emr-changes-to-the-cfd-supplier-obligation>

Summary: Analysis & Evidence²

Final Eligibility Option

Description: This option provides an exemption from up to 85% of CfD support costs to eligible businesses.

FULL ECONOMIC ASSESSMENT

| Price Base Year 2012 | PV Base Year 2012 | Time Period Years 2016-2020 | Net Benefit (Present Value (PV)) (£m) | | |
|----------------------|-------------------|-----------------------------|---------------------------------------|-------|----------------|
| | | | Low: | High: | Best Estimate: |
| | | | - | - | £295m |

| COSTS (£m) | Total Transition (Constant Price) Years | Average Annual (excl. Transition) (Constant Price) | Total Cost (£m) (Present Value) |
|---------------|-----------------------------------------|----------------------------------------------------|---------------------------------|
| Low | - | - | - |
| High | - | - | - |
| Best Estimate | - | £79m | £394m |

Description and scale of key monetised costs by 'main affected groups'

The final eligibility option is estimated to increase average annual household electricity bills by £1.80 (0.3%) in 2020. For non-exempt medium sized businesses this equates to £5,600 (0.4%) in 2020. The discounted value of the exemption from CfD support costs totals £394m from 2016 - 2020 for EIs (and therefore the additional costs met by non-exempt consumers).

At a macroeconomic level, all July 2013 exemption options are judged to have a negligible effect on the UK economy; with effects on consumer spending, imports, exports and GDP expected to be broadly neutral. The final eligibility option is expected to have similar macroeconomic impacts, given the overlap in sectors covered between July 2013 Consultation options and the final eligibility option, and the low variability in results between options analysed by Cambridge Econometrics.

Other key non-monetised costs by 'main affected groups'

As low income households typically spend a higher proportion of their income on electricity, lower income households are disproportionately affected by an electricity price increase. Modelling shows a negligible change in employment at a national level as a result of the July 2013 exemption options. A small increase in UK carbon emissions is seen under the exemption options using sectoral analysis, while macroeconomic analysis expects a negligible impact.

² In the following summary table an attempt has been made to aggregate the sectoral results provided by Vivid Economics into costs, benefits and NPV estimates for the final eligibility option. The principal aim of this aggregation is to aid the presentation of results. As such the relevant estimates should be interpreted cautiously. They represent a partial assessment of the costs and benefits associated with the exemption and a simplifying assumption is required to take the sample of sectors analysed by Vivid Economics and aggregate them into an overall policy option impact. The methodology and limitations of the approach used is discussed further in Section 6.3.3. The costs, benefits and NPV figures are unchanged from those presented in the September 2014 consultation IA. This reflects the fact total exempt consumption under the final eligibility option is still estimated to be around 20TWh, and the aggregation of sectors modelled by Vivid Economics remains illustrative of the electro and trade intensity of eligible sectors.

| BENEFITS (£m) | Total Transition (Constant Price) Years | | Average Annual (excl. Transition) (Constant Price) | Total Benefit (£m) (Present Value) |
|----------------------|----------------------------------------------------|--|-------------------------------------------------------------------|-----------------------------------------------|
| Low | - | | - | - |
| High | - | | - | - |
| Best Estimate | - | | £138m | £689m |

Description and scale of key monetised benefits by 'main affected groups'

Based on microeconomic modelling, output in the sectors covered by the final eligibility option could be expected to increase by between 1% and 53% in 2020 as a result of the exemption.

Vivid Economics' analysis can be used to provide a partial assessment of the Value for Money (VfM) of exempting different sectors, as well as identifying characteristics which could help in identifying which sectors are likely to provide the largest net benefits from an exemption. VfM is defined as the ratio of benefits to costs, using a Benefit Cost Ratio (BCR), with benefits defined as the sum of producer and consumer surpluses from those in receipt of the exemption, and the costs defined as the funds raised elsewhere to pay for the exemption.³

In interpreting the VfM results across sectors it is important to take into account that the BCR estimates are a partial assessment of the VfM of providing support to individual sectors. By considering the direct support costs only, this analysis fails to reflect the additional loss in surplus incurred through raising funds to pay for the exemption. As a result, this is a partial assessment best suited to identifying the relative scale across sectors, and the characteristics which determine the degree to which different sectors benefit from an exemption.

With this limitation in mind, the sector specific BCR estimates have been grouped and averaged to provide indicative BCR's for the final eligibility option as a whole. As the final eligibility option would cover more sectors than the small sample modelled by Vivid Economics, we have attempted to derive an indicative average BCR for the option as a whole, by averaging the results for the modelled sectors that would be eligible for the exemption under the final eligibility option. This introduces a further limitation to these figures. The modelled sectors represent only a sample of those that would be covered under the eligibility option and the average of this limited sample may not be indicative of the average of all sectors, and firms, covered by the policy. Because of these limitations the summary costs, benefits and NPVs should be interpreted cautiously, with the principal aim being to aid the presentation of results.

The aggregated BCR suggests that the final eligibility option will generate a benefit of around £1.70 to every pound cost of the exemption. Producers are estimated to receive the majority of the benefit through higher profits, with consumers of exempt industries products benefiting through lower prices (dependent on the degree of cost pass through). Given the direct cost of the exemption (the funds raised from other consumers), an indicative BCR of £1.70 under the final eligibility option would suggest a total discounted benefit of £689m up to 2020.

Other key non-monetised benefits by 'main affected groups'

Sector level modelling suggests small employment increases in exempt sectors under the final eligibility option in 2020. At least some of the employment gains for the exempt sectors will accrue to areas where the exempt sectors are the region's dominant employer and where there may be few alternative employment opportunities.

Key assumptions/sensitivities/risks

Discount Rate (%)

3.5%

Within the sector-level modelling undertaken, the competitive structure of the market (influenced by profit margins, price elasticities and domestic market share) determines the rate of cost pass-through to consumers. This, in conjunction with the relative fall in production costs (dependent largely on the degree of electricity usage), determines output responses. Alternative states of the world (and variation to input assumptions, such as profit margins, domestic market share, price elasticities of demand) are used to test the robustness of results to market changes, but these do not impact on the key findings or conclusions.

BUSINESS ASSESSMENT (Option 1)

| Direct impact on business (Equivalent Annual) £m: | | | In scope of OIOO? | Measure qualifies as |
|----------------------------------------------------------|------------------|-------------|--------------------------|-----------------------------|
| Costs: | Benefits: | Net: | No | Tax & Spend |
| | | | | |

³ Vivid Economics' models derive Producer Surplus (PS) and Consumer Surplus (CS) based on cost saving as a result of an exemption that are retained by firms or passed through to consumers.

Contents

| | |
|------------------------------------------------------------------------------|----|
| 1. Background | 6 |
| 2. Problem under consideration | 8 |
| 3. Rationale for intervention..... | 9 |
| 4. Policy objective | 11 |
| 4.1. July 2013 Policy Options | 12 |
| 4.2. Final Policy Option | 14 |
| 4.3. Options Summary | 16 |
| 5. Cost Benefit Analysis (CBA)..... | 17 |
| 5.1. CBA Approach..... | 17 |
| 5.2. Choice of models and sectors..... | 19 |
| 5.2.1. Identifying sectors for analysis | 20 |
| 6. Analysis and Results: monetised and non-monetised costs and benefits..... | 23 |
| 6.1. Price and Bills impacts | 23 |
| 6.2. Sector level impacts..... | 27 |
| 6.2.1. Industrial Market Models (Vivid Economics)..... | 27 |
| 6.2.1.1. Output responses for exempt sectors – FIMM analysis..... | 27 |
| 6.2.1.2. Output responses for exempt sectors – RIMM analysis..... | 30 |
| 6.2.2. MDM-E3 (Cambridge Econometrics)..... | 32 |
| 6.2.2.1. Why do results differ between MDM-E3 and IMM? | 33 |
| 6.3. Value for Money Results..... | 33 |
| 6.3.1. Macroeconomic impacts (using MDM-E3 model)..... | 34 |
| 6.3.2. Sector impacts (using IMM models)..... | 35 |
| 6.3.3. Implied NPV range | 38 |
| 6.4. Wider impacts..... | 39 |
| 6.4.1. Employment | 39 |
| 6.4.2. Distributional Impact | 39 |
| 6.4.3. Carbon Emissions..... | 40 |
| 7. Summary of Results | 40 |
| 8. Conclusion..... | 48 |
| Annex A..... | 50 |

1. Background

1. As part of the measures set out in the Energy Act 2013, Electricity Market Reform (EMR) aims to incentivise investment in secure, low-carbon electricity generation, while maintaining affordability for consumers.⁴ The electricity sector is a critical part of the UK economy and is an important driver of growth. EMR is the Government's response to the challenges facing the electricity sector:
 - Around a third of plant that we have on the system today are due to reach the end of their technical lifetime by 2030
 - The need to transform our generation mix to respond to the challenge of climate change and meet our legally-binding carbon and renewable targets
 - The expectation that electricity demand will continue to increase over the coming decades
2. A significant element of EMR is the introduction of a Feed-in Tariff with Contracts for Difference (CfD) regime to support investment in low carbon electricity generation⁵. The CfD regime is one of a number of policies which the Government has put in place to incentivise the necessary investment in the UK's energy infrastructure to meet our challenging decarbonisation goals and maintain security of supply.
3. CfDs aim to incentivise investment in low carbon electricity generation by providing a stable price signal for low carbon electricity generation via a predetermined 'strike price'. The price difference between the 'reference price', i.e. the market price, and the strike price determines the support cost of CfDs. CfDs will be signed and managed by the Low Carbon Contracts Company (the CfD counterparty); a Government owned company. The costs of CfDs will be met by electricity suppliers and it is assumed these costs will be passed on to consumers via electricity bills.
4. The CfD was chosen as a support mechanism for low-carbon generation as a cost-effective means to accomplish Government's energy policy goals. For example, average annual household electricity bills are estimated to be 6% (£41) lower over the period 2014 – 2030 (2012 prices), when compared to achieving a similar decarbonisation level using existing policy instruments⁶. Cumulatively, however, due to the current gap between the wholesale market price and the strike price under CfDs, in the short to medium term there will be upward price pressure, leading to a competitiveness risk for Electro-Intensive Industries (EIIs).
5. In the 2011 Autumn Statement the Government committed to compensate a range of EIIs to help offset the indirect cost of the EU emissions Trading System (EU ETS) and carbon price floor. The European Commission set out a list of 15 sectors deemed to be exposed to a significant risk of carbon leakage due to the indirect impact of the EU ETS⁷ and this determined the list of sectors eligible for the EU ETS compensation scheme (these sectors

⁴ <https://www.gov.uk/government/collections/energy-act>

⁵ Further detail available at: <https://www.gov.uk/government/consultations/proposals-for-implementation-of-electricity-market-reform>

⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/288463/final_delivery_plan_ia.pdf

⁷ [http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012XC0605\(01\)&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012XC0605(01)&from=EN)

and subsectors are included in the July 2013 Consultation⁸). Based on these state aid guidelines, a scheme to compensate for the indirect cost of the EU ETS began in 2013.⁹

6. When the Government announced its intention to compensate for the indirect impact of carbon pricing it was envisaged that while the European Commission restricted compensation from the indirect impacts of the EU ETS to 15 sectors, there was scope to compensate additional sectors for the indirect impact of the UK's unilateral Carbon Price Support (CPS) mechanism¹⁰. The Government later announced an intention to exempt some sectors from a proportion of the costs of CfDs¹¹, confirmed with the introduction of the Energy Bill in November 2012¹². It was envisaged that an exemption would be targeted at some of the same additional sectors compensated from CPS costs.
7. Government first consulted on the 'Eligibility for an exemption from the costs of Contracts for Difference'¹³ in July 2013 to set out broad options for exempting EIs from the associated costs of CfDs. As part of this Consultation an external research project was jointly commissioned by DECC and BIS and undertaken by Vivid Economics and Cambridge Econometrics. This project established a methodology for assessing the value for money of an exemption based on microeconomic and macroeconomic modelling, and provided research to improve the evidence base for this approach. Utilising this analysis, an Impact Assessment (IA) was developed to analyse the policy options presented in the Consultation in greater detail and, considering Consultation responses, present evidence on the costs and benefits associated with the alternative exemption options.
8. The July 2013 Consultation set out a number of eligibility options that were subject to European State Aid approval. At the time, the Government's preferred option, based on NACE rev. 1.1 sector definitions, was to use the same eligibility criteria as for EU ETS and CPS indirect costs compensation.
9. On 9 April 2014 the European Commission published its new Energy and Environmental Aid Guidelines (EEAG)¹⁴. The new guidelines provide a legal basis for EU Member States to provide relief for energy intensive businesses from the indirect costs of renewable energy subsidies and carbon taxes. These guidelines assessed the competitiveness of sectors based on the latest definition of sectors, NACE rev. 2.0, and gave a framework for the design of policies mitigating the costs of renewables supports schemes. All options considered in the 2013 consultation were incompatible with the latest revised EEAG.
10. Building on the options assessed in the July 2013 consultation the Government developed a further option compatible with the latest revised EEAG, which suggested exempting sectors which fall within the new EEAG and pass a sector-level and company-level eligibility test. These sectors had a combined consumption of around 20TWh per annum

⁸ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/210724/bis-13-974-electricity-market-reform-consultation-eligibility-for-an-exemption-from-the-costs-of-contracts-for-difference.pdf

⁹ <https://www.gov.uk/government/news/compensation-scheme-for-energy-intensive-businesses>

¹⁰ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32707/12-1179-energy-intensive-industries-compensation-consultation-on-scheme.pdf

¹¹ Although the obligation to pay CfD costs falls on the supplier, we expect these costs to be passed on to customers via electricity bills. Therefore, we refer to an exemption being granted to EIs

¹² <https://www.gov.uk/energy-intensive-industries-compensation-for-carbon-leakage>

¹³ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/210724/bis-13-974-electricity-market-reform-consultation-eligibility-for-an-exemption-from-the-costs-of-contracts-for-difference.pdf

¹⁴ [http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XC0628\(01\)&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XC0628(01)&from=EN)

with a maximum exemption rate of 85%. A consultation with these new eligibility criteria was published in July 2014, with a consultation on changes to the Supplier Obligation required to implement the exemption (and other matters) published in September 2014 alongside a consultation version of this IA.¹⁵

11. Respondents to the July 2014 Consultation disputed the need for a sector and business level test. In the response to the consultation the Government highlighted the redistributive nature of the exemption and the need to target relief to those sectors and businesses most affected while minimising the impact on other consumers.
12. The September 2014 Consultation set out the proposed process for implementing the exemption including the way in which exemption certificates will be issued, the actions that suppliers must take in order to claim the exemption, and the processes for when a certificate is revoked or an EII changes supplier. Following the feedback received, DECC published a Balancing and Settlement Code (BSC) consultation that sought views on changes to the BSC to enable the CfD Counterparty to identify electricity supplied to EIIs that hold a valid exemption certificate. Following responses, suppliers will now be required to instruct their half-hourly data aggregators (HHDA) to flag meters belonging to an EII such that the metered data is sent directly to the CfD Counterparty.
13. After reviewing consultation responses the Government has decided to implement an exemption broadly consistent with the July 2014 Consultation, with minor amendments to increase the baseline for determining eligibility. These sectors are estimated to have a combined consumption of around 20TWh per annum, and will be eligible for an exemption rate of up to 85%. This option is referred to as the 'final eligibility option' in the remainder of this IA, in order to distinguish it from the previously considered options.
14. This IA provides an assessment of the impact of the final eligibility option. However, to provide context to the research report, this IA also presents the evidence used to assess the July 2013 policy options, alongside the evidence assessing the final eligibility option.
15. This IA focuses on impacts up to 2020. The scheme as a whole will be reviewed by the UK government after 5 years, and after ten years it is likely that the scheme will require fresh state aid approval if it is to continue.

2. Problem under consideration

16. Whilst CfDs and other energy policies will encourage the investment needed in the UK's energy infrastructure, they may put pressure on electricity prices over the medium term putting UK EIIs at a competitive risk. Without Government intervention, EIIs in the UK are likely to face higher electricity costs than competitors in other countries. Any resulting loss of investment from these industries to other countries would negatively impact on the UK economy. These industries are significant employers and play an important role in the UK economy through the products they manufacture (e.g. steel, paper, and glass).
17. For EIIs, increasing electricity prices can pose a risk to competitiveness as:

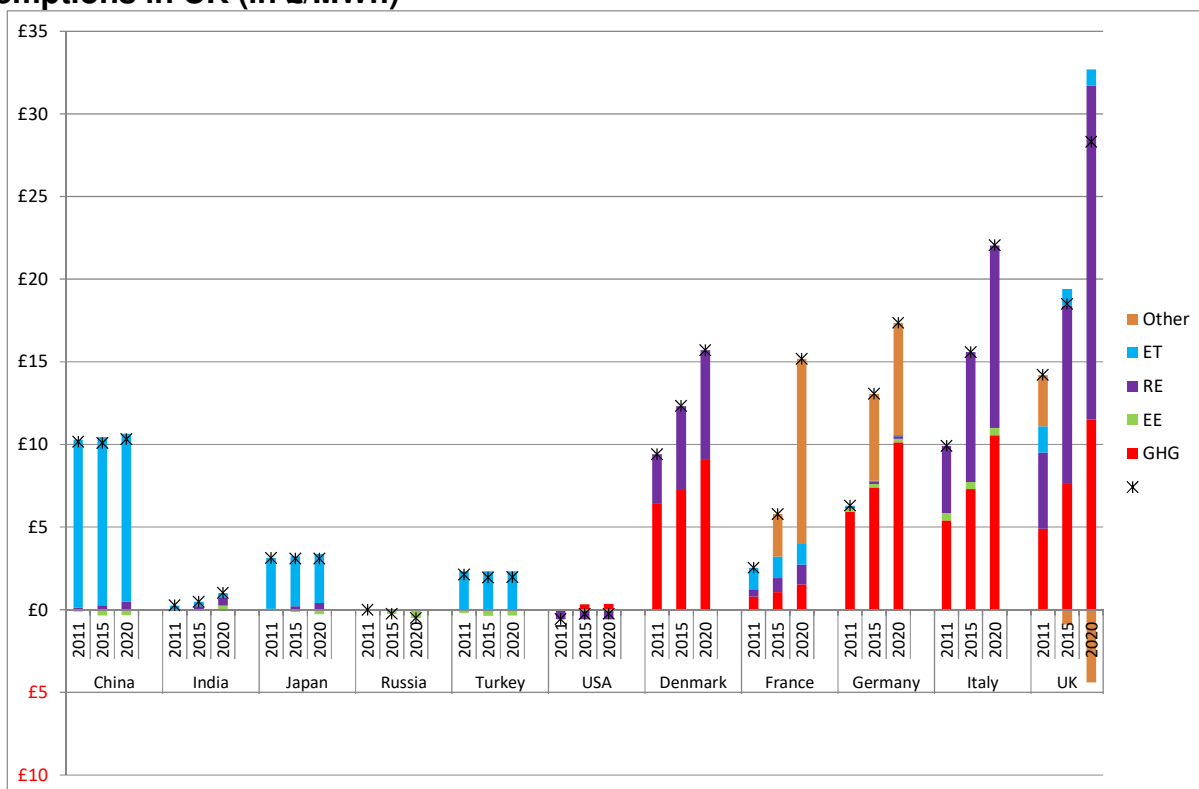
¹⁵ [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/342851/bis_14_995 - Relief from the indirect costs of Renewables - consultation on eligibility.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/342851/bis_14_995_-_Relief_from_the_indirect_costs_of_Renewables_-_consultation_on_eligibility.pdf) and <https://www.gov.uk/government/consultations/emr-changes-to-the-cfd-supplier-obligation>

- In the absence of a global approach on climate change, some countries may invest in low carbon generation to a lesser degree and, therefore, will not face comparable policy costs; and
 - Industrial sites in other countries may be shielded or exempted from similar energy and climate change policy costs meaning they face a lower electricity price overall;
18. It is assumed that suppliers will pass on CfD costs on a per-unit of electricity basis in the same way as energy suppliers are assumed to pass on the costs of the Renewables Obligation and a number of other climate change policies. Industries which are highly electro-intensive (such as steel and chemical plants) may see their costs increase significantly, without any exemption.

3. Rationale for intervention

19. Where EILs operate in global markets they are unlikely to be able to pass through increases in these costs to the price of their products, due to a lack of market power. To do so would make their products relatively more expensive compared to global competitors not facing similar policy costs, placing them at a competitive disadvantage. Therefore, electricity price increases (such as those involved with the introduction of CfDs) may pose a risk to EIL competitiveness. As a result, EILs may move their current production abroad and undertake future investment overseas in countries with lower policy costs than the UK. As well as lost output and employment, this can lead to carbon leakage, where emissions associated with production of goods in the UK move overseas.
20. International comparisons of energy and climate change policy costs, such as those shown in Figure 1, suggest that policy costs faced by EILs in the UK may be much higher than in other countries, in the absence of Government intervention. The chart below, published in 2012, takes into account the exemptions that existed at the time of publication for industry in other countries and assumes no such exemption for UK-based EILs. Within the EU, the governments of Belgium (Flanders), Denmark, Germany, Republic of Ireland, Norway and Sweden currently make provision in their renewable energy support schemes for supporting EILs. There are a wide range of approaches to reducing costs.

Figure 1: International comparison of energy and climate change policy costs prior to exemptions in UK (in £/MWh)¹⁶



Source: ICF International 2012¹⁷

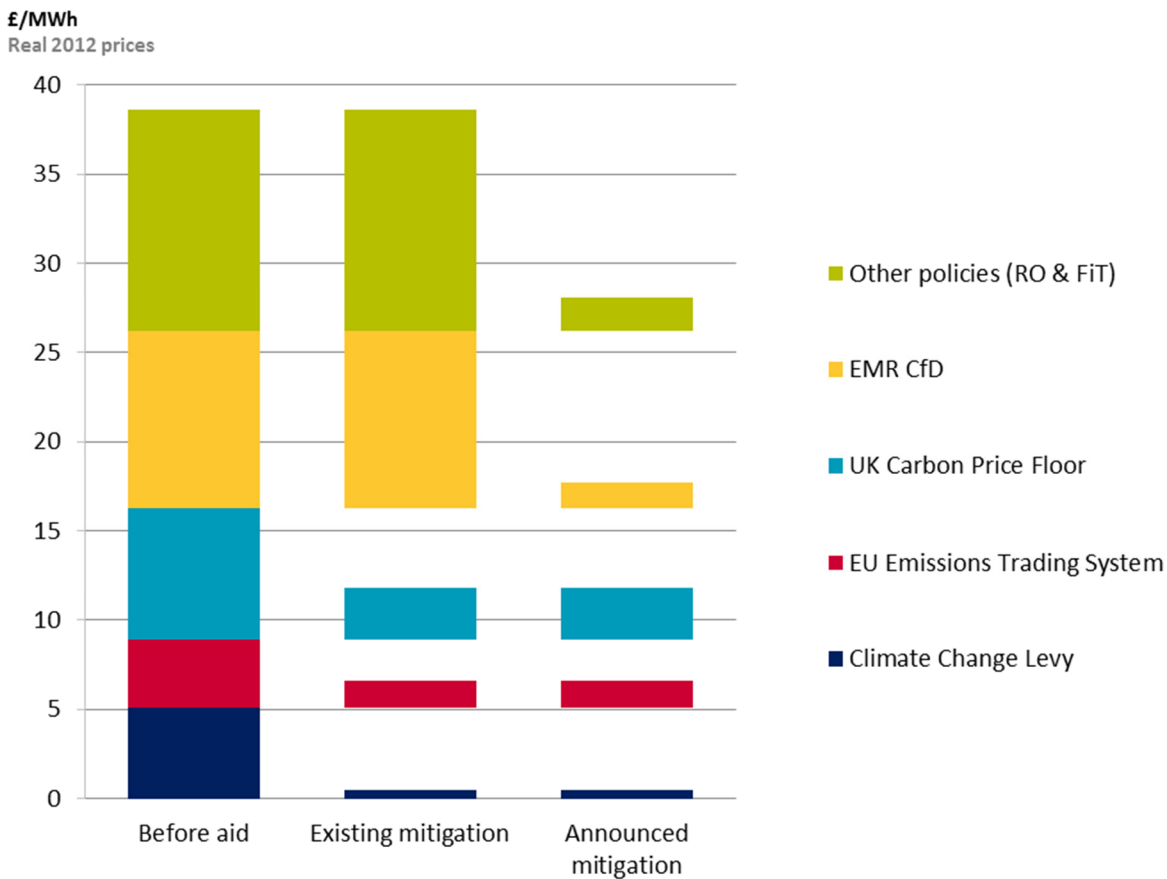
21. Figure 2 shows the effect of mitigation measures already in place or proposed that provide relief to UK-based EIs from energy policy costs.

¹⁶ Originally Figure 2B: Indicative incremental impacts in 2011, 2015 and 2020 on electricity price (£/MWh, 2010 prices) of energy and climate change policies – Sensitivity using market forecasts of EUA prices.

‘Other’ – the incremental costs of other policies including energy policy
 ‘ET’ – the incremental costs of Energy Taxes e.g. the Climate Change Levy
 ‘RE’ – the incremental costs of Renewable Energy policy measures e.g. EMR and the RO.
 ‘EE’ – the incremental costs of Energy Efficiency policy measures
 ‘GHG’ – the incremental cost of GHG policy measures e.g. EU ETS and CPS
 ‘X’ – the final price

¹⁷ “An international comparison of energy and climate change policies impacting energy intensive industries in selected countries”, ICF international, July 2012. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/31768/12-527-international-policies-impacting-energy-intensive-industries.pdf

Figure 2: Illustrative example of aid measures in 2020



Source: BIS, 2014

Note: Initial aid measures include CCL discount, and compensation from the indirect costs of the EU ETS and UK carbon price floor.

4. Policy objective

22. The Government is seeking to lessen the cost disadvantage faced by EILs as a result of energy and climate change policy costs relative to their EU and international competitors. An exemption from the costs of CfDs would reduce some of the extra cost imposed on EILs as a result of energy and climate change policy costs¹⁸.

23. However, whilst reducing EILs electricity costs, any exemption provided to industry will narrow the base of consumption from which CfD support costs are recovered, and therefore increase electricity costs for non-exempt businesses and households.

24. The July 2013 Consultation set out five criteria against which the options were assessed. These were supplemented in the September 2014 Consultation IA in order to bring them into line with the revised EEAG.¹⁹ The July 2013 consultation concluded that based on the original 5 criteria (1 – 5 below), Government's preferred approach was to propose

¹⁸ Exemptions are targeted at energy and climate change policy costs only and do not seek to address other cost disadvantages faced by UK EILs when compared to other EU Member States or the rest of the world due to differences in energy costs faced by EILs in different countries (e.g. shale gas and tight oil in US giving EILs there a competitive cost advantage).

¹⁹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358163/ANNEX_B_-_Impact_Assessment_-_Eligibility_for_an_exemption_from_the_cost.pdf

exempting EILs in line with eligibility for the ETS and CPS compensation schemes, option 1a below.²⁰

25. Following the publication of new EEAG, the eligibility criteria were revised in the September 2014 Consultation IA to ensure they met the revised requirements of the new state aid guidelines. This was done by including a 6th criterion:

1. an exemption should be targeted at companies whose competitiveness is at risk from rising electricity policy costs, i.e. only those companies that are both electricity intensive and trade intensive should be exempt
2. eligibility should be designed to minimise distortions within the UK economy
3. the exemption should avoid creating perverse incentives around electricity use, e.g. discouraging take-up of energy efficiency measures
4. the exemption should minimise administrative burdens for all stakeholders: EILs, electricity suppliers and Government
5. the exemption should minimise the costs to consumers outside of the scope of the exemption (both business and household) whilst still meeting the policy objective
6. An exemption should align as closely as possible to the criteria set out in the April 2014 revised Energy and Environmental Aid Guidelines to give a legal basis for providing an exemption.

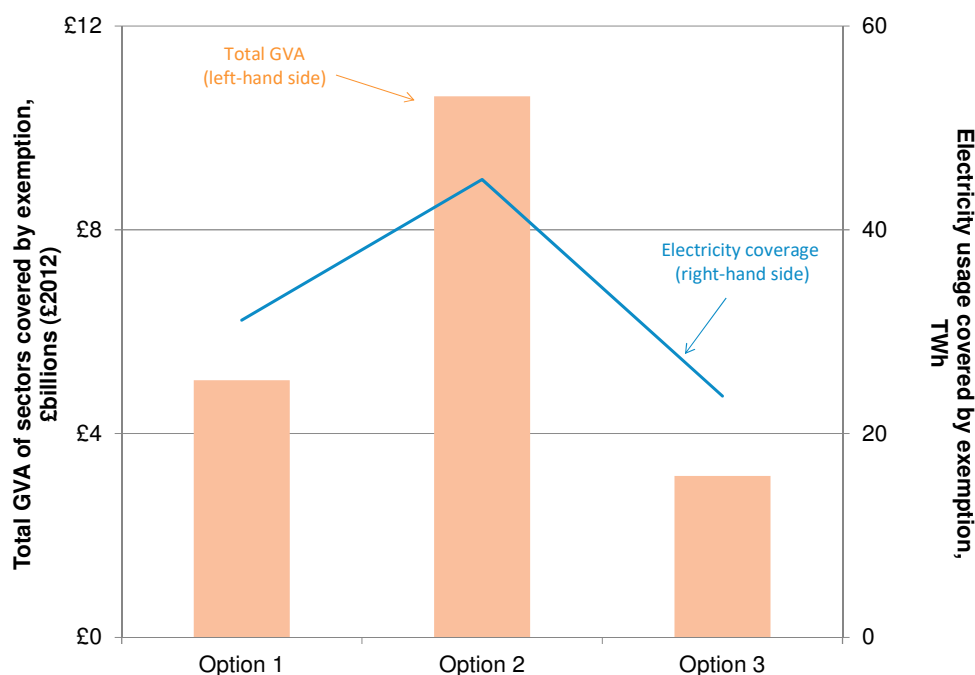
4.1. July 2013 Policy Options

26. Three main exemption policy options were considered in the July 2013 Consultation, and assessed in the research report conducted by Vivid Economics and Cambridge Econometrics (presented in Table 1), each with two sub-options, applying exemption rates of 50% - 80% to a range of sectors. Options presented here are consistent with those published in the July 2013 Consultation. Note that Option 3a and 3b are equivalent to the lower bounds of Option 1a and 1b range from the July 2013 Consultation. This has been done to provide a more accurate assessment of eligibility for an exemption.

27. An indication of the scope of the policy scenarios and Gross Value Added (GVA) is provided in Figure 3:

²⁰ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/210724/bis-13-974-electricity-market-reform-consultation-eligibility-for-an-exemption-from-the-costs-of-contracts-for-difference.pdf (see page 14).

Figure 3: Gross Value Added and Electricity Usage Coverage under Policy Options²¹



Source: Vivid Economics²²

28. The options considered were as follows:

July 2013 Consultation Option 1

- a – CPS/ETS compensation sectors, 80% exemption rate (July 2013 preferred option)**
- b – CPS/ETS compensation sectors, 67% exemption rate**

29. Option 1 exempted sectors with a combined total annual electricity consumption of around 30 Tera-Watt hours (TWh) per annum. This closely aligns with sectors originally proposed to receive CPS compensation as outlined in the July 2013 Consultation and informed by state aid guidelines at the time. Option 1a offered an exemption from 80% of CfD costs, and 1b a 67% exemption.

30. Clusters of these sectors are to be found in areas of relatively high unemployment such as the Humber, Teesside and South Wales as well as in other locations across the UK. Examples of proposed sectors covered under this option included cement and rubber.

July 2013 Consultation Option 2

- a – CPS compensation + wider sectors, 80% exemption rate**
- b – CPS compensation sectors, 80% exemption, additional sectors 50% exemption rate**

31. Option 2 presented an exemption scenario covering electricity consumption up to around 40TWh; here coverage was extended to a wider range of sectors than under Option 1. Exempt sectors under Option 2a would have received an exemption to 80% of CfD costs. Under Option 2b, the level of exemption would have been staggered, with the most electro-

²¹ GVA is based on sector estimates for 2009, while electricity data is 2007 vintage. Later data with wide coverage across energy intensive industry is unavailable, with GVA estimates for many sectors of interest suppressed to avoid disclosure. Source: ONS 2013.

²² Vivid Economics with Cambridge Econometrics, *The impact of exempting electro-intensive industries from Contracts for Difference support costs*, report prepared for DECC and BIS, February 2014 - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358164/Vivid_Economics_Cambridge_Economics_-_Impact_of_exemptions_from_CfD.pdf

intensive businesses, i.e. those proposed in the CPS compensation list at the time (as in Option 1a), receiving an 80% exemption while other less electro-intensive industries included in Option 2a received a 50% exemption. This would have widened the number of sectors and products eligible to firms that may have marginally missed out on compensation from the CPS package and that proposed under Option 1, and mitigated any “cliff edge” effects of the exemption. Some administrative costs would have been associated with this option as an extension to the CPS compensation list would have been required.

July 2013 Consultation Option 3

a – Narrow sectors, 80% exemption rate

b – Narrow sectors, 67% exemption rate

32. Option 3 offered an exemption to sectors with electricity consumption up to around 20TWh exemption per annum, i.e. the narrowest range of sectors considered. This option exempted those sectors receiving compensation for the indirect impact of the EU ETS from the costs of CfDs. It did not include an extension to additional sectors as proposed under the CPS compensation package in line with Option 1. In a similar fashion to Option 1, Option 3a exempted sectors from 80% of CfD costs and 3b exempted sectors from 67% of CfD costs. Administrative costs were expected to be lowest under this option as fewer companies would be exempt.

4.2. Final Policy Option

33. Based on the revision of the EEAG in April 2014, a new policy option was developed and presented in the July 2014 Consultation and assessed in the September 2014 Consultation IA.²³ After reviewing consultation responses the Government’s final eligibility option is detailed below. As stated in the Consultation IA, direct comparisons of sectoral coverage across the final eligibility option and July 2013 consultation options is not possible given the change in statistical classification, however further detail on the sectors covered by the final eligibility option is detailed below.²⁴

Final Eligibility Option, up to 85% exemption rate

34. The Government will implement an eligibility option broadly consistent with the July 2014 Consultation proposal, with minor amendments to increase the baseline for determining eligibility. As such the final eligibility option considers sectors which are both electricity intensive and which operate in internationally competitive markets. As presented in the July 2014 consultation a sector and business-level test is applied to identify those most at competitive risk.²⁵

- **A sector-level test** - To focus the support at the most trade and electricity-intensive sectors

²³ [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/342851/bis_14_995 -
Relief from the indirect costs of Renewables - consultation on eligibility.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/342851/bis_14_995_-_Relief_from_the_indirect_costs_of_Renewables_-_consultation_on_eligibility.pdf) and
<https://www.gov.uk/government/consultations/emr-changes-to-the-cfd-supplier-obligation>

²⁴ July 2013 Consultation options were based on NACE rev. 1.1 classification while the July 2014 Consultation option is based on NACE rev. 2.0 classification.

²⁵ [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/342851/bis_14_995 -
Relief from the indirect costs of Renewables - consultation on eligibility.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/342851/bis_14_995_-_Relief_from_the_indirect_costs_of_Renewables_-_consultation_on_eligibility.pdf)

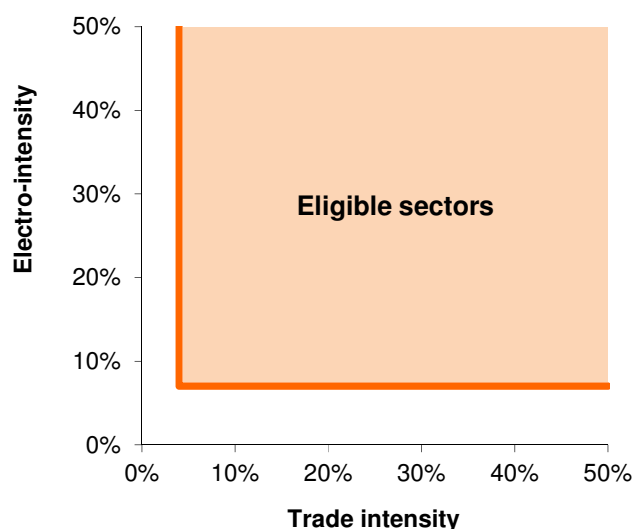
- **A business-level test** - To ensure that as part of any application we are providing support to the most electricity-intensive businesses.

35. In arriving at the eligible sector list for support from the costs of renewables the European Commission used a criteria based on the sector's electricity-intensity and trade intensity. The July 2014 consultation option proposed mirroring this approach.

36. Starting with the list of sectors from Annex 3 of the EEAG a sector-level test based on trade intensity and electricity-intensity of the sector was proposed, using 4 digit SIC 2007 (NACE v2.) sector codes. Sectors must have a trade intensity of at least 4% and an electricity-intensity of at least 7% to pass this test. To ensure that all eligible sectors were included, the July 2014 consultation also proposed applying the test outlined above to the sectors listed in Annex 5 of the EEAG.²⁶

37. The figure below indicates the threshold for the sector level test: only sectors above and to the right of this line pass the test. A list of sectors from the EEAG list that pass the sector-level test was presented in the July 2014 Consultation.²⁷

Figure 4: Illustrative example of UK aid measure in 2015-16



38. This list of eligible sectors is broader than the original CPS compensation sector list, but eligibility also depends on passing a more stringent company-level test, targeting the exemption at the most electricity-intensive companies within each sector.

39. The July 2014 Consultation proposed a business level test using a 20% electricity-intensity threshold to align to the EEAG. In order to satisfy the 20% test, businesses will need to show that their electricity costs in 2014 will amount to 20% of their GVA.

40. We estimate that the exemption will cover around 20TWh across all eligible companies. A full description of these tests and the list of eligible sectors can be found in the July 2014 Consultation²⁸. This option will use up to an 85% exemption rate now allowed under the revised EEAG.

²⁶ [http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XC0628\(01\)&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XC0628(01)&from=EN)

²⁷ [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/342851/bis_14_995 - Relief from the indirect costs of Renewables - consultation on eligibility.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/342851/bis_14_995_-_Relief_from_the_indirect_costs_of_Renewables_-_consultation_on_eligibility.pdf)

²⁸ [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/342851/bis_14_995 - Relief from the indirect costs of Renewables - consultation on eligibility.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/342851/bis_14_995_-_Relief_from_the_indirect_costs_of_Renewables_-_consultation_on_eligibility.pdf)

41. In estimating the electricity consumption covered by the final eligibility option (20TWh), we have considered estimates of auto-generated electricity, not subject to CfD costs, within the eligible sectors. This was a development to the analysis since the July 2013 consultation, which did not take into consideration auto-generated electricity.

4.3. Options Summary

42. The July 2013 Consultation options are consistent with the analysis performed by Vivid Economics and Cambridge Econometrics²⁹, and this evidence can also be used to assess the impact of the final eligibility option. The original July 2013 Consultation options and the final eligibility option are summarised in the table below.

Table 1: Policy Options

| Option | July 2013 Consultation description | Policy Name | Eligibility | Exemption Rate |
|---------------------------------------|--------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| July 2013 Consultation Options | | | | |
| 1(a) | Option 1a Upper bound (30 TWh) | Compensation Mirror ~30TWh | Sectors eligible under CPS and ETS compensation packages | 80% |
| 1(b) | Option 1b Upper bound (30TWh) | 'Compensation Mirror' reduced exemption rate ~30TWh | Sectors eligible under CPS and ETS compensation packages | 67% |
| 2(a) | 2a | 'Compensation +' ~40TWh | Expanded set of sectors beyond those eligible under CPS and ETS compensation packages | 80% |
| 2(b) | 2b | 'Compensation + Taper' ~40TWh | Expanded set of sectors beyond those eligible under CPS and ETS compensation packages | 80% exemption for CPS and ETS lists, 50% exemption for remaining sectors included in Option 2(a) |
| 3(a) | Option 1a Lower bound (20 TWh) | Compensation Narrow ~20TWh | Sectors eligible under ETS compensation package | 80% |
| 3(b) | Option 1b Lower bound (20 TWh) | Compensation Narrow reduced exemption rate ~20TWh | Sectors eligible under ETS compensation package | 67% |
| Final Eligibility Option | | | | |
| Final Eligibility Option | NA | ~20TWhs | Sectors eligible in line with final eligibility option | 85% |

²⁹ Vivid Economics with Cambridge Econometrics, *The impact of exempting electro-intensive industries from Contracts for Difference support costs*, report prepared for DECC and BIS, February 2014 - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358164/Vivid_Economics_Cambridge_Econometrics_-_Impact_of_exemptions_from_CfD.pdf

5. Cost Benefit Analysis (CBA)

5.1. CBA Approach

43. A Cost Benefit Analysis (CBA) should assess the relative size of the costs and benefits across different policy options to provide insight into which policy options provide the best overall value for money. This IA considers the wider economic impact of electricity price changes, including their effect on production, employment and distributional impacts in exempt industries and non-exempt sections of the economy. The costs and benefits considered are summarised in Table 2.

Table 2: Summary of Costs and Benefits considered in cost benefit analysis

| Costs | Benefits |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Decreased output for non-exempt sectors due to higher production costs, which will disadvantage producers and consumers of non-electro intensive goods, as well as employees of non electro-intensive sectors | Increased competitiveness of exempt sectors due to lower production costs, which will benefit producers and consumers of electro-intensive goods, as well as employees of electro-intensive sectors |
| Decreased investment in non-exempt sectors | Increased investment in exempt sectors |
| Decreased demand for other goods due to lower employment in non-electro intensive sectors; consequent macroeconomic effects | Increased demand for other goods due to higher employment in electro-intensive sectors; consequent macroeconomic effects |
| Risk of increased fuel poverty due to higher electricity prices, and potentially due to changes in employment and output | Potential decrease in fuel poverty due to changes in employment and output |
| Administration costs | |
| Alterations in the level of global carbon emissions | |

44. To quantify these costs and benefits and evaluate the overall impact of the different options from the July 2013 Consultation, Vivid Economics and Cambridge Econometrics undertook a CBA of the exemption options presented in the July 2013 Consultation, comparing them against a counterfactual case where the exemption is not granted. Vivid Economics' sector analysis was applied to the July 2014 Consultation option in the September 2014 Consultation IA. While the consultation IA also showed that broad conclusions could be drawn from Cambridge Econometrics' macroeconomic analysis for the July 2014 Consultation option. This IA updates the Cost Benefit Analysis presented in the September 2014 Consultation IA to ensure consistency with the final eligibility option.

45. The analysis presented in this IA does not lend itself to a standard Net Present Value approach, whereby costs and benefits are discounted over a defined period and an NPV calculated. The research project resulted in a number of quantitative and qualitative results, across two different sets of models. These are best considered together qualitatively, taking into consideration the methodologies and limitations of the modelling where appropriate.³⁰

46. As a result, in line with best practice on appraisal techniques outlined in the Green Book³¹, we have made use of a Multi-Criteria Assessment (MCA) on the basis of the key criteria against which a policy decision is made³². We use this approach to present the results of

³⁰ An estimation of the VfM of exempting individual sectors is one such quantitative result, providing a relative assessment of which sectors provide the largest benefits per pound of exemption and the characteristics which influence this.

³¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf

³² This Impact Assessment has undertaken an unweighted MCA, as per guidance available at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/191506/Mult-crisis_analysis_a_manual.pdf

the quantitative and qualitative analysis undertaken as part of the research project. Each policy option's outcomes are considered against the original five key principles presented in the July 2013 consultation document, and supplemented by a sixth key principle in response to the revised EEAG. The main considerations are:

1. Targeted at companies whose competitiveness is at risk from rising electricity policy costs

47. As the eligibility for the exemption widens, more sectors and firms can be supported. This may be particularly valuable to sectors which might be at the threshold of an eligibility option. However, widening the exemption too far may exempt sectors which generate little or no additional benefits.

2. Eligibility should be designed to minimise distortions within the UK economy

48. In assessing the impact of the alternative options on the wider UK economy, we make use of the modelling undertaken by Cambridge Econometrics, as well as considering the wider impacts reported above, such as employment effects as well as potential geographical and distributional impacts.

3. Avoid creating perverse incentives around electricity use

49. An exemption results in lower electricity prices for exempt sectors and higher electricity prices for non-exempt sectors and households. As such we may expect an increase in electricity demand from exempt sectors and a reduction from non-exempt sectors and households (and potentially leading to an increase in UK CO₂ emissions). It could also result in lessening the incentive for exempt sectors to take up energy efficiency measures.

4. Minimise administrative burdens for all stakeholders: EIs, electricity suppliers and Government

50. Aligning the eligibility for an exemption from the costs of CfDs with existing compensation schemes is likely to have administrative benefits as companies would likely be able to apply once to several schemes.

5. Minimise the costs to consumers outside of the scope of the exemption (both business and household) whilst still meeting the policy objective

51. There is a positive relationship between the scope and value of the exemption and non-exempt sectors and households' bill impacts (the larger the exemption the larger the energy bill impact for non-exempt consumers).

52. Additionally, options are assessed against a sixth criterion to account for the revision of the EEAG and the likelihood of policy options gaining state aid clearance:

6. An exemption should align as closely as possible to the criteria set out in the April 2014 revised Energy and Environmental Aid Guidelines to give a legal basis for providing an exemption

53. The MCA framework, and underlying analysis from the research project, was applied to the eligibility option presented in the July 2014 Consultation option in the September 2014 Consultation IA, even though this option was not explicitly considered in the original research project. That exercise is updated in this IA to reflect the final eligibility option.

5.2. Choice of models and sectors

54. Vivid Economics and Cambridge Econometrics' research project utilised two models and methodologies to provide a broad evidence base: assessing the costs and benefits of each policy option, as well as determining the characteristics which influence an individual sector's response to an exemption. The two models are:

- MDM-E3, Cambridge Econometrics
- Industrial Market Models (IMM), Vivid Economics³³

55. Cambridge Econometrics' multi-sector dynamic model of the UK economy, MDM-E3, models the interaction between energy, environment and the economy. It can assess the impact of policies, such as an exemption of the costs of CfDs, on macroeconomic indicators such as sector output, GDP, employment, exports, imports, energy use, and carbon emissions. The MDM-E3 is designed to answer a range of policy questions concerning energy, the environment, and the economy. The model captures and represents the impacts at the macro, industrial, regional and energy system levels simultaneously within a single framework.

56. Vivid Economics undertook additional modelling to complement the results presented by MDM-E3, and inform policy decisions based on a wider spectrum of evidence. Vivid Economics uses an Industrial Market Model (IMM) which analyses the interaction between rival firms and consumers within asset-intensive industries, such as an electro-intensive goods market. The model is well-suited to industrial sectors in which firms have high fixed costs, such as EIs. The model comes in two forms: the Full Industrial Market Model (FIMM), which incorporates information on individual facilities within the market, and the Reduced Industrial Market Model (RIMM), which takes a simpler approach.

57. The sectoral nature of the modelling conducted by Vivid Economics meant it could also be applied to the July 2014 Consultation option under the revised EEAG, and equally can now be applied to the final eligibility option. In contrast, the Cambridge Econometrics modelling explicitly considered the policy options presented in the July 2013 Consultation. However, there is large overlap between sectors covered under the July 2013 Consultation options and the final eligibility option, and macroeconomic impacts (as discussed later in this IA) do not vary greatly between options analysed by Cambridge Econometrics. Thus, the results can be used to draw high-level conclusions on the likely economic impact of an exemption, in line with the final eligibility option.

58. The two models' strengths and weaknesses complement each other, allowing a broader consideration of the exemption's net impact. Due to methodological differences in modelling techniques employed, the two models cannot be drawn together effectively (this is discussed further in section 6.2.2.1). The IMMs cannot provide a complete assessment of each option's overall effect on all sectors of the economy, as the MDM-E3 results do.

³³ The Vivid Economics and Cambridge Econometrics report provides further detail on the models used.

However, the IMM can provide sector-specific results on a more granular level than the MDM-E3 model.

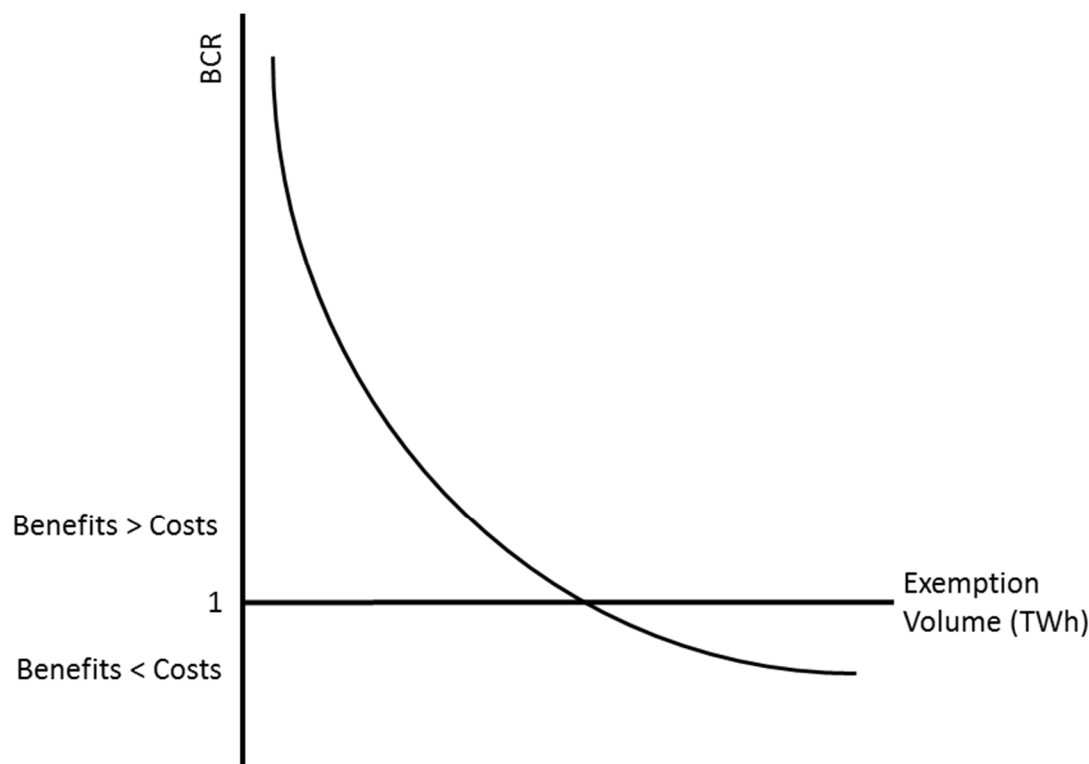
5.2.1. Identifying sectors for analysis

59. The results generated by Vivid’s IMM provide a way of assessing the relative Value for Money (VfM) of sectors which might be eligible for an exemption. This allows us to assess the relative benefits of exempting different sectors, as well as identifying characteristics which could help in selecting which sectors are likely to provide the largest net benefits from an exemption.

60. It is expected that not all sectors would benefit to the same degree from an exemption. For example, it is expected that very electro-intensive sectors, whose costs are likely to fall relatively more as a result of the exemption, are likely to generate proportionately larger benefits than less electro-intensive sectors. Other characteristics such as trade intensity were also expected to influence the relative benefit of exempting a given sector.

61. In addition, as the number of exempt sectors increases, the costs imposed on non-exempt sectors increases. A hypothetical VfM curve can be drawn to illustrate this (as shown in figure 5), with the largest benefits accruing from exempting the most at-risk sectors, but with falling marginal benefits as sectors become less responsive to an exemption and the marginal costs rise, i.e. the additional benefit enjoyed by an EII as result of an additional pound of exemption falls as we extend an exemption to less electro-intensive industries. In theory, the level at which the marginal benefit of exempting a given sector equated to the marginal cost of doing so would provide the ‘optimal’ exemption level.

Figure 5: Hypothetical Value for Money Curve

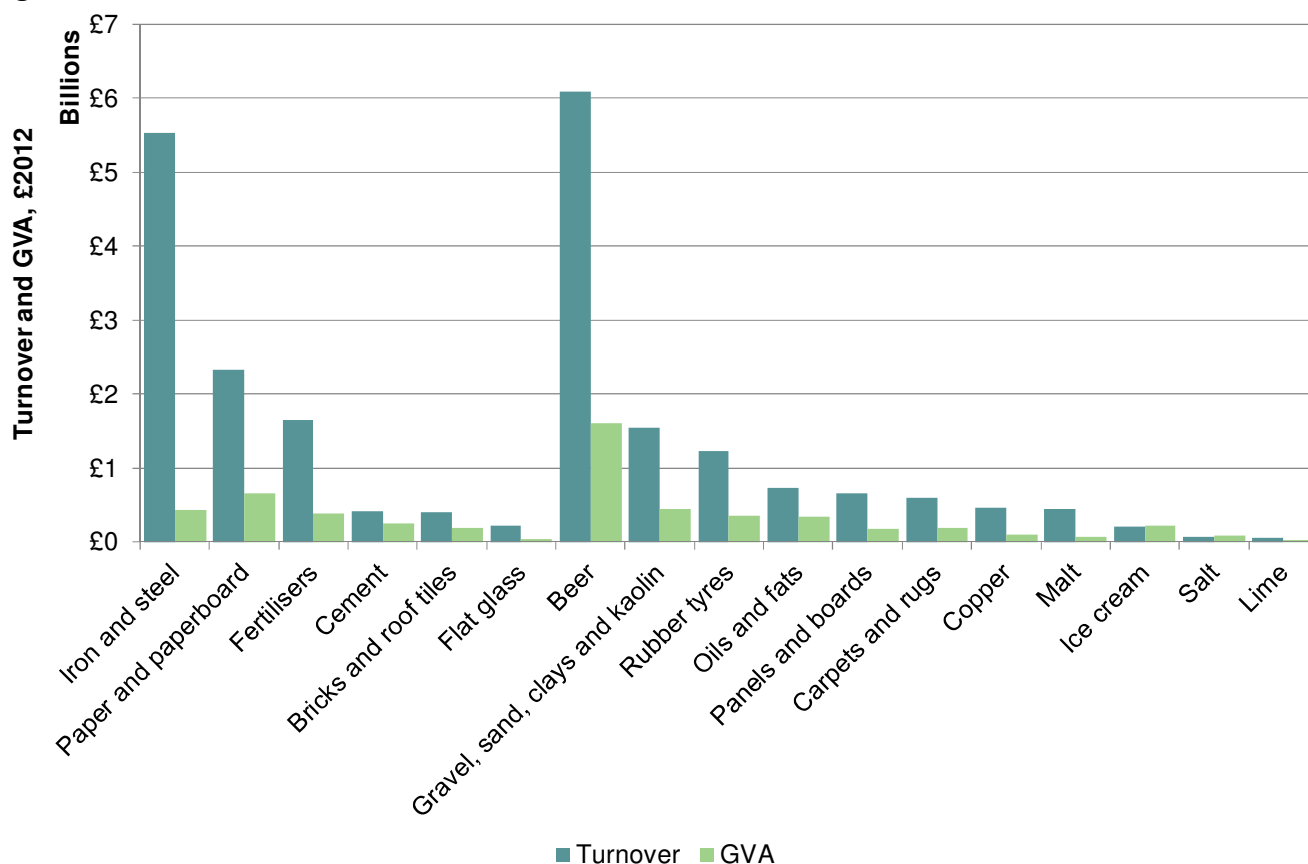


62. However, modelling on a sector-by-sector basis is a resource-intensive process. It was impractical to assess all of the potential sectors considered for exemption under each of

the original policy options on an individual basis. Instead, a sample of sectors was selected to provide insight into the potential range of possible benefits and identify the characteristics which determine the extent of each sector’s response to the exemption.³⁴ This sample of sectors was selected from different sections of this hypothetical VfM curve, to provide an indicative level of the relative benefits of exempting sectors at different points along the curve, and the characteristics determining the relative benefits of exempting different sectors.

63. Twenty electricity-intensive sectors were investigated between FIMM and RIMM. Six sectors were investigated in full detail³⁵. Five of these were modelled using the FIMM approach while one sector, paper manufacturing, was investigated using RIMM to explore several subsectors, making the best use of available data. The 14 other sectors were modelled in less detail using RIMM. Turnover, GVA, and electricity intensity for the sectors analysed using the IMM is illustrated in Figures 6 and 7.

Figure 6: Turnover & GVA for IMM sectors

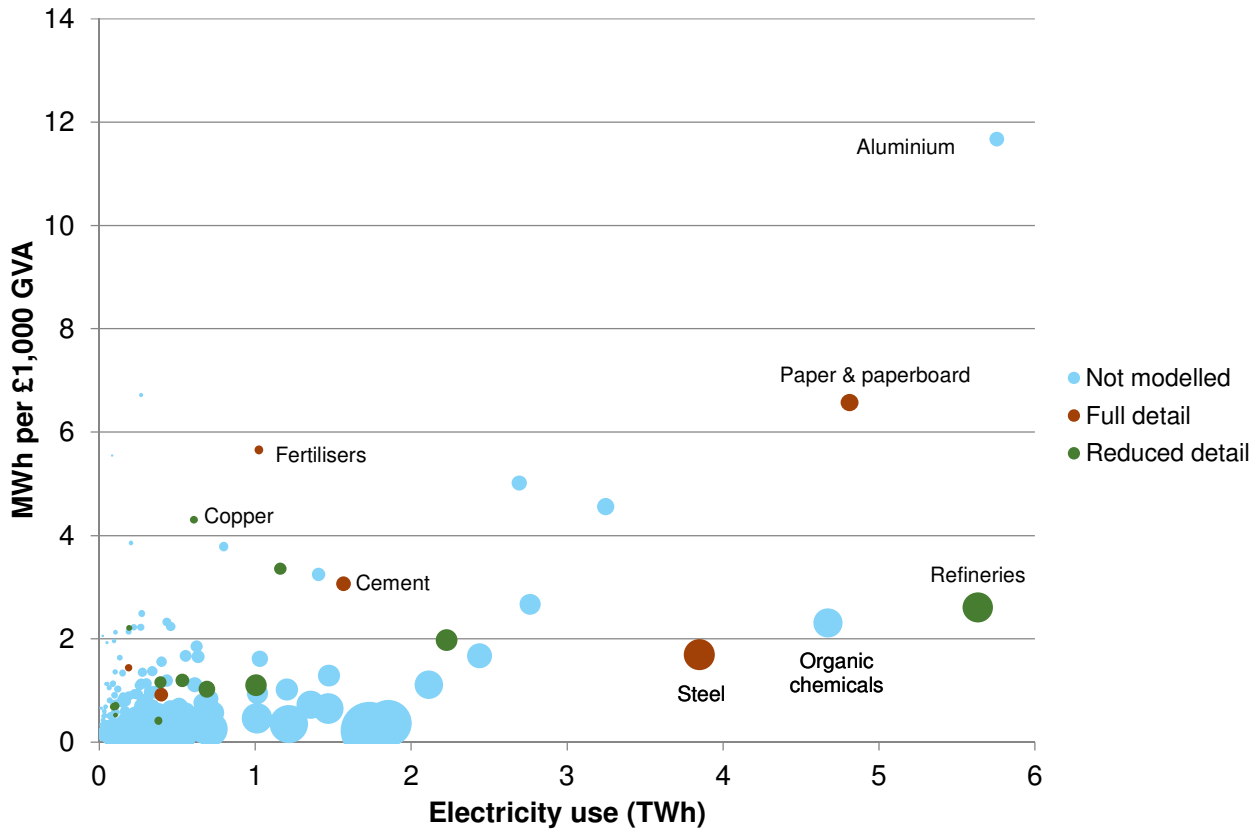


Source: Vivid Economics

³⁴ Vivid Economics with Cambridge Econometrics, *The impact of exempting electro-intensive industries from Contracts for Difference support costs*, report prepared for DECC and BIS, February 2014 - [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358164/Vivid Economics Cambridge Econometrics - Impact of exemptions from CfD.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358164/Vivid_Economics_Cambridge_Economics_-_Impact_of_exemptions_from_CfD.pdf)

³⁵ The six sectors investigated in detail were paper, fertiliser, flat glass, and steel manufacture, cement and ceramics.

Figure 7: Modelled sectors' electricity intensities and total electricity consumption



Notes: Size of circle corresponds to sector GVA. Includes all manufacturing and mining sectors with data available on electricity usage. Latest data on electricity usage is from 2007. Sector GVA from 2007 is also used to ensure consistency. The outlier to the upper right is the aluminium sector.

Source: DECC, ONS, Vivid Economics

64. Sectors chosen for more detailed analysis using FIMM were generally more suitable for the model itself; the output of these sectors are homogenous commodities, there is a clearly defined market and market price for the good, and data available on these sectors is typically more accessible.
65. Paper, fertiliser, flat glass, and steel manufacture are considered to be highly electro-intensive and subject to intense international competition, leaving them vulnerable to carbon leakage and output leakage, and were expected to result in relatively high VfM from an exemption. Ceramics are considered less electro-intensive than the above sectors and cement less trade intensive, but these could also be considered candidates for an exemption under certain options, and were modelled to give a fuller representation for all policy options available. The remaining sectors analysed, using RIMM, were on average, both less electro-intensive and less trade exposed.

6. Analysis and Results: monetised and non-monetised costs and benefits

66. This section presents the quantitative and qualitative results of the research project in isolation, before considering them as a whole as part of the Multi-Criteria Assessment. The results are presented across four areas:

- **Direct Price and Bill impacts:** the direct impact of each exemption option on consumers' electricity prices and bills.
- **Sector level output impacts:** How a sector's production, output and value responds to alternative exemption options (as well as the key characteristics determining the extent of the response).
- **Value for Money:** What output responses imply for the VfM of each policy option, and the VfM of exempting individual sectors.
- **Wider impacts:** the quantitative and qualitative wider impacts, for example, employment impacts, distributional welfare impacts and impacts on carbon emissions.

67. The modelling undertaken considered the impact of the exemption in 2016, 2020 and 2030. For presentational ease, the majority of evidence presented in this IA focuses on the impact of the exemption in 2020. In addition, to test the robustness of the analysis, as part of the research project a number of scenarios and sensitivities were undertaken. These are discussed in more detail in the Vivid Report³⁶, however two are worth highlighting in terms of the presentation of the results:

- **Output downside and upside ranges:** The VfM of an exemption will reflect the future impacts on EILs. Since the size and competitive structure of these markets is somewhat uncertain, market scenarios are used to test the robustness of the exemption policy to future situations. In the IMM analysis, downside and upside ranges were considered by varying parameters which might result in UK production growing at faster or slower rates than its competitors. As such the VfM of exempting modelled sectors is presented in ranges.
- **Input sensitivities³⁷:** In addition to presenting a range of results to reflect uncertainty, the analysis also tested the robustness of the modelling to alternative input assumptions. In the IMM analysis, this involves sensitivity testing around key inputs such as profit margins, demand elasticities and market share. Under the Cambridge Econometric modelling, alternative fossil-fuel price sensitivities were tested.

6.1. Price and Bills impacts

68. The direct impact of the exemption on consumers is to change their cost of electricity, relative to what it would have been without the exemption in place. While EMR is expected to reduce average annual household electricity bills over the period 2014 to 2030 compared to meeting a similar decarbonisation ambition using existing policy instruments, in the short to medium term low carbon generators will require a top up on the wholesale

³⁶ Vivid Economics with Cambridge Econometrics, *The impact of exempting electro-intensive industries from Contracts for Difference support costs, report prepared for DECC and BIS*, February 2014 - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358164/Vivid_Economics_Cambridge_Economics_-_Impact_of_exemptions_from_CfD.pdf

³⁷ The Vivid Economics and Cambridge Econometrics report provides a detailed sensitivity analysis

electricity price.³⁸ The July 2013 Consultation presented the estimated consumer bill impacts across different exemption options for the years up to 2020³⁹, using the latest modelling available at that point in time. In August 2013 updated analysis was published bringing the analysis into line with the modelling for the draft EMR Delivery Plan.⁴⁰

69. Updated price and bills analysis was published alongside the July 2014 Consultation to illustrate the impact of the new eligibility proposal consistent with the latest EEAG guidelines and in line with December 2013 EMR Delivery Plan analysis. In the September 2014 Consultation IA price and bills analysis using the same December 2013 EMR Delivery Plan modelling was presented, although reflecting a methodological change this differed from the analysis presented in the July 2014 consultation and earlier consultations.⁴¹
70. Before the September 2014 Consultation IA, the price and bills impacts presented in the various consultations were estimated by applying an exemption on a £/MWh CfD support cost basis. Following finalisation of the implementation mechanism of the exemption, the analysis presented in the September 2014 Consultation IA, and continued in this IA, assumes that the exemption rate is applied to a proportion of electricity consumption for eligible EIs rather than a proportion of the total cost. This change in approach to implementing an exemption results in marginally different price and bill impacts, with exempt EIs faring marginally worse (in terms of higher bills, i.e. a smaller reduction due to the exemption) under a volume-based exemption than a cost-based exemption, and non-exempt consumers slightly better off (in terms of lower bills, i.e. a smaller increase due to the exemption); however, in most cases there is no difference in rounded estimates and the change has a negligible impact on exempt costs.
71. In this IA results for both the July 2013 and final eligibility options in 2020 are presented in Table 3.⁴² To present the impact of all options using consistent data source Table 3 presents results for the alternative options using updated modelling consistent with DECC's 2014 'Estimated impacts of energy and climate change policies on energy prices and bills' publication.⁴³ Additional price and bills impacts over the period 2015 - 2020 are provided in Annex A.

³⁸ EMR is estimated to reduce annual household electricity bills by an average of £41 (6%) over the period 2014 to 2030 (2012 prices), compared to what they would have been if a similar decarbonisation ambition were achieved through existing policy instruments. This £41 estimated impact is before the impact of an exemption for EIs from some of the costs of CfDs is applied.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/268221/181213_2013_EMR_Delivery_Plan_FI_NAL.pdf

³⁹ <https://www.gov.uk/government/consultations/electricity-market-reform-contracts-for-difference-costs-exemption-eligibility>

⁴⁰ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/232224/bis-13-1137-electricity-market-reform-eligibility-for-exemption-from-the-costs-of-contracts-for-difference-updated-cost-estimates.pdf

⁴¹ The price and bills impacts presented in the various consultations differ from those used in Vivid Economics and Cambridge Econometrics' report, which based its costs on EMR modelling from early 2013 when the project was commissioned.

⁴² Figures rounded to the nearest 10p and are in real 2012 prices. The exemption includes both the supplier obligation and the operational cost levy which recovers the operational costs incurred in administering CfDs and the supplier obligation. Consistent with previous analysis, only CfD support costs are considered in the analysis presented in this consultation, and not the wider impacts on consumers of the Supplier Obligation. The Supplier Obligation Impact Assessment suggested the annual average impact on household electricity prices from the quarterly fixed unit cost levy was between 20 and 40p/MWh from 2014 to 2020. The exemption will apply to at least a portion of these costs as well as the CfD support costs presented in the following tables, and as such EIs will benefit from exemption from a portion of these costs, while additional costs will be passed on to non-exempt consumers.

⁴³ <https://www.gov.uk/government/publications/estimated-impacts-of-energy-and-climate-change-policies-on-energy-prices-and-bills-2014>

72. Of the July 2013 Consultation options, Option 2 provides an exemption to the widest range of sectors. By extension, this option shows the highest increase in non-exempt consumer costs (up to a 0.6% increase in household electricity bills in 2020). Option 1b and Option 3b resulted in a lower cost to non-exempt consumers than Option 1a and 3a respectively, reflecting the lower exemption rate (67% rather than 80%), although correspondingly the benefit (in terms of lower electricity costs) to exempt EIs is also smaller.
73. Under the final eligibility option, we see a £1.80 (0.3%) increase in 2020 household electricity bills as a result of an exemption. Compared to the results presented in the September 2014 Consultation IA, the domestic bill impact is 10p higher under the latest modelling, for Medium-sized business users there is no change, and for eligible EI's there is a larger percentage reduction in bills under the latest analysis. The £ per MWh price impact of the exemption is also unchanged. The changes from the Consultation IA reflect the combined net impact of a number of changes to the modelling, as a result of it being updated to ensure consistency with DECC's latest Price and Bills report. This includes updates to assumptions over average consumer consumption, total electricity sales estimates and CfD support costs.
74. Although there is significant overlap between eligibility for an exemption as presented in the final eligibility option and the July 2013 Policy options, the estimate of total consumption from eligible sectors has reduced. This reflects improvements in the modelling of the number of firms within each sector that are likely to be eligible for the exemption (the company-level test outline in the final eligibility option, and an assessment of potential autogeneration levels in the relevant sectors).
75. The actual cost in future years, both of CfD payments themselves, and the exemption, are dependent on a number of variables, including wholesale prices, the actual investment attracted into new generation capacity, realised CfD support costs, electricity demand and the final scope of the exemption. The estimates of impacts given in this IA are based on our best estimates of these variables but it should be recalled that changes to these variables will alter the impact of the exemption. Although the agreed Levy Control Framework provides some constraint on total future energy and climate change policy costs, we cannot accurately predict the value of the exemption, nor its cost to non-exempt consumers far into the future. The exemption has no effect on the level of the Levy Control Framework.

Table 3: Price and Bills impacts for EII CfD exemption options in 2020 (real 2012 prices)

| | Price impact in £ per MWh in 2020 (excl. VAT) vs. no EMR | Electricity bill impact 2020 in pounds and as a percentage of final bill | | | |
|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------|--------------------------------|--------------------------------|
| | | Domestic consumer (incl. VAT) ⁴⁴ | Medium-sized business user ⁴⁵ | Eligible company ⁴⁶ | Company eligible for the taper |
| EMR support cost (without exemption, excluding Capacity Market and CfD administrative costs) | £8.60 | £28.80 (5%) | £87,600 (7%) | £806,400 (8%) | |
| | Price impact in £ per MWh in 2020 (excl. VAT) | Additional annual electricity bill impact in 2020 in pounds and as a percentage change | | | |
| July 2013 Consultation Options | | | | | |
| Option 1a: Compensation Mirror | £0.80 | £2.70 0.5% | £8,100 0.6% | -£630,200 -6.2% | N/A |
| Option 1b: Compensation Mirror, reduced exemption rate | £0.70 | £2.20 0.4% | £6,700 0.5% | -£520,000 -5.1% | N/A |
| Option 2a: Compensation + | £1.10 | £3.70 0.6% | £11,200 0.9% | -£624,500 -6.2% | N/A |
| Option 2b: Compensation + Taper | £1.00 | £3.30 0.6% | £10,000 0.8% | -£626,700 -6.2% | -£357,100 -3.5% |
| Option 3a: Compensation Narrow | £0.50 | £1.70 0.3% | £5,300 0.4% | -£635,500 -6.3% | N/A |
| Option 3b: Compensation Narrow, reduced exemption rate | £0.40 | £1.40 0.2% | £4,400 0.3% | -£527,100 -5.2% | N/A |
| Final Eligibility Option | | | | | |
| Final Eligibility Option | £0.50 | £1.80 0.3% | £5,600 0.4% | -£677,700 -6.7% | N/A |

Source: DECC, 2015⁴⁷

⁴⁴ Based on a household consuming around 3.20 MWh of electricity after policies in 2020.

⁴⁵ Based on consumption of 10,200 MWh of electricity after policies in 2020.

⁴⁶ Eligible companies and companies eligible for the taper are described in the text of the relevant consultation documents. Based on consumption from the grid of 93,900 MWh of electricity after policies in 2020.

⁴⁷ The price and bill impacts presented here have been updated in line with DECC's 2014 Price and Bills report (<https://www.gov.uk/government/publications/estimated-impacts-of-energy-and-climate-change-policies-on-energy-prices-and-bills-2014>), to present the most up to date information available. However, the cost assumptions used in the work undertaken by Vivid Economics and Cambridge Econometrics are based on different CfD support cost assumptions (those available at the time of the project). Whilst changes to input assumptions will influence the outputs reported by the relevant models, the sensitivity analysis undertaken as part of the project has shown that the qualitative conclusions are robust to input assumption changes.

6.2. Sector level impacts

76. Both Vivid Economics' IMMs and Cambridge Econometrics MDM-E3 models produce sector-level analysis. The two models are derived from different methodological approaches, reflecting different views on how markets, sectors and the economy would respond to an exemption. Both sets of results are instructive and are considered below.

6.2.1. Industrial Market Models (Vivid Economics)

77. Vivid Economics' IMMs have considered the impact of the exemption on individual sectors. This is more useful for drawing sector-level results as analysis is more granular. Five sectors were considered in 'full' detail (using a combination of FIMM and RIMM)⁴⁸ and 14 were considered using the reduced modelling framework (i.e. with RIMM).

78. The exemption is treated as a 'cost shock' for firms, reducing the price they pay for electricity, relative to what they would have paid without an exemption. The change in costs is expected to change the production decisions of firms in relevant markets. Considering how the decisions of all firms in a given market change as a result of the exemption, both those impacted by the exemption and those that are not, the modelling attempts to assess how the market equilibrium changes before and after the exemption. In this way key outputs such as changes in market prices, production levels and profits can be assessed.

79. Within the IMMs the change in market prices and production levels as a result of the exemption is strongly linked to the cost pass-through rate of a given market. A cost pass-through rate of 25 per cent would suggest that for every £1 reduction in per-unit costs resulting from the exemption, the sale price of the product would reduce by 25p.

80. In the IMMs the rate of cost pass-through is determined by the degree of competitiveness of firms and the strength of competition in the relevant market.⁴⁹ The cost pass-through rate influences a firm's change in profit margins and the absolute size of the change in market prices. In conjunction with the absolute size of the exemption to the firm, the impact on production is driven both by increased demand (as a result of lower prices) and rising market share (as exempt producers enjoy greater profitability). While both these outcomes result in increases in output, the models suggest that the latter effect is stronger.

6.2.1.1. Output responses for exempt sectors – FIMM analysis

81. Cost pass-through rates and output responses for the sectors considered in full detail under an 80% exemption rate proposed in the July 2013 consultation are provided in Table 4. This consists of the Steel, Cement, Ceramics, Flat Glass and Fertilisers sectors modelled using FIMM and the Paper sector modelled using RIMM. Within the IMMs, the rate of cost pass-through is not an input or assumption but an output of the models, determined as a function of the various parameters describing sector competitiveness: the

⁴⁸ Sectors modelled in 'full' detail were Cement, Fertilisers, Flat Glass, Ceramics, Steel and Paper. FIMM was used to assess the impact of an exemption on Cement, Fertilisers, Flat Glass, Ceramics, and Steel (with Long Steel and Flat Steel modelled separately due to the size of the sector). As a result of data constraints, paper could not be modelled using FIMM, so RIMM was used in its place with the sector broken down into sub sectors of Printing and Writing, Newsprint, Sanitary, and Packaging to provide greater accuracy.

⁴⁹ Which in turn is determined by the market share of UK producers, profit margins and elasticity of demand.

size and number of competing firms, the exposure to international trade, the magnitude of profit margins, and the responsiveness of demand to price changes.

Table 4: Cost pass-through and output responses for sectors modelled in full detail (FIMM and RIMM, July 2013 consultation 80% exemption rates, 2020)

| Sector | Cost Pass-Through Rate | Output Response |
|----------------------------|------------------------|-----------------|
| Paper (Newsprint) | 9% | 50% |
| Paper (Printing & Writing) | 1% | 31% |
| Steel | 2% - 5% | 10 - 20% |
| Cement | 49% | 18% |
| Paper (Packaging) | 3% | 17% |
| Paper (Sanitary) | 62% | 17% |
| Ceramics | 78% | 8% |
| Nitrogenous Fertilisers | 18% | 8% |
| Flat Glass | 4% | 3% |

Source: Vivid Economics and Cambridge Econometrics

82. Steel and Paper (Printing & Writing, Packaging) exhibit the smallest cost pass-through rates: 5% or less. For the steel sector, UK domestic production accounts for a relatively small proportion of total market output, resulting in a relatively low rate of cost pass-through. The same is true for the Printing and Writing sectors, where competition in the market leads to small profit margins earned by the sectors and lower cost pass-through rates. Both sectors also have relatively price-responsive consumers, restricting their ability to pass through costs. In combination with the exemptions' relatively high value for producers in these sectors, and their relatively low margins, a large proportionate output increase is generated as a result of the exemption⁵⁰.

83. In contrast, in the Ceramics sector the cost pass through rate is 78%. In this sector, although profit margins are relatively small and consumers are relatively responsive to prices changes, UK production accounts for a large proportion of total market production. This large market share allows Ceramics to pass on a large proportion of their costs. In conjunction with the relatively high cost pass-through rate, a small value of the exemption for producers in this sector results in a relatively small proportionate increase in output.

84. There is a non-linear relationship between cost pass-through rates, profit margins and changes in domestic production. For example, the Cement sector exhibits high levels of cost pass through at 49%, partly reflecting the fact that UK domestic production accounts for a large proportion of the market's production. However, an increase in output of around 18% is seen. This partially reflects the high value of the exemption to cement producers (the exemption represents just over 1% of cement's sale price). In combination with a relatively low profit margin (around 5%), these factors combine to increase the cement sectors profit margin by over 10%, resulting in a proportionately large increase in the sectors output.⁵¹

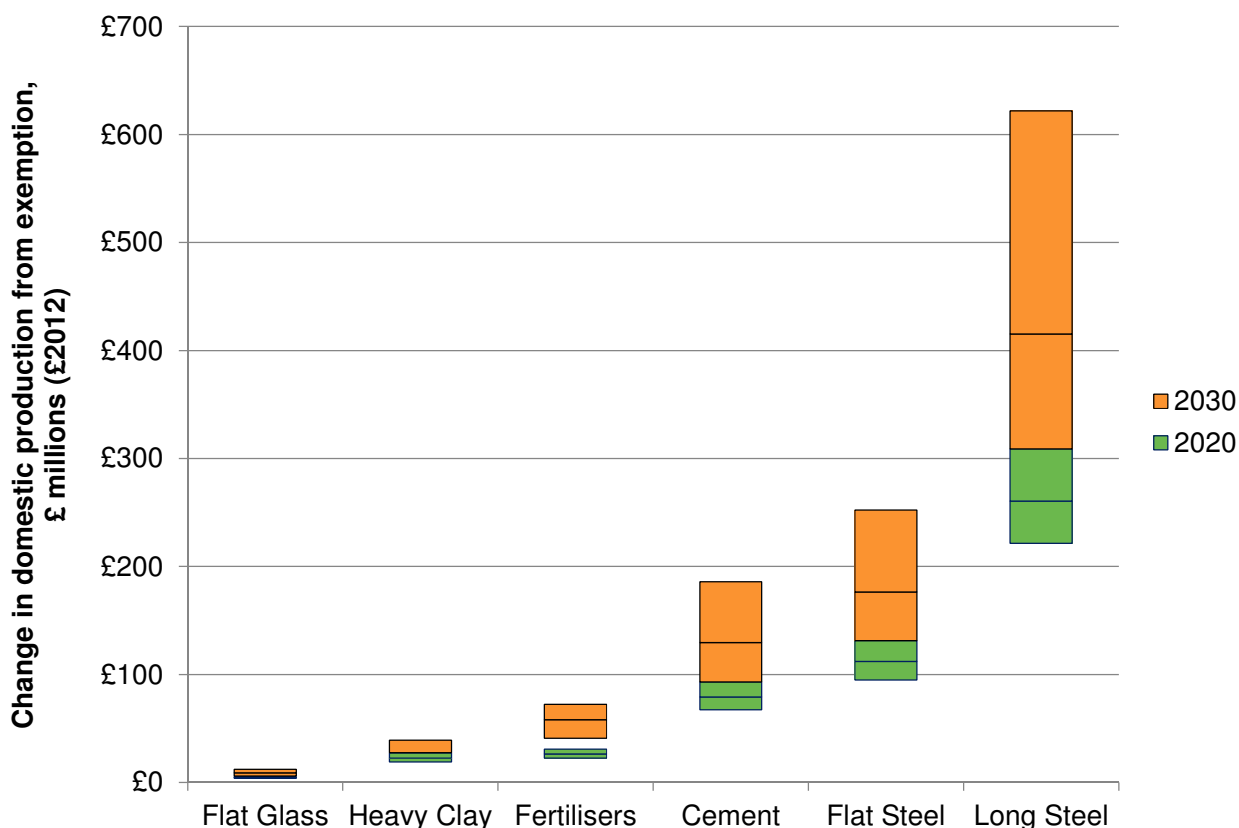
85. Figure 8 illustrates the absolute values of the change in production across the FIMM modelled sectors. It reflects the value of an 80% exemption in 2020 and 2030 (consistent

⁵⁰ As noted previously paper manufacture was split into four subsectors and analysed using RIMM rather than FIMM.

⁵¹ With a cost pass through rate of 50%, 0.5% of the cost reduction would be retained by the firm, implying the firm's gross profit margin would increase from 5.0% to 5.5%, or a 10% increase.

with the July 2013 consultation preferred option), with results given within upside and downside ranges, around a central estimate.

Figure 8: Change in domestic production in 2020 and 2030 under an upside and downside range for sectors analysed with FIMM



Notes: Each bar shows the highest, lowest and central estimate of the value of the exemption. Note that for all sectors and years the highest value changes occur in the upside scenario and the lowest occur in the downside scenario. An exception is 'heavy clay', i.e. Ceramics, in 2030 where the largest value change occurs in the core scenario, and the lowest occurs in the upside scenario.

Source: Vivid Economics

86. In this case, the scale of the impact reflects the existing size and value of the relevant sector, in addition to their relative responsiveness to the exemption (in terms of their percentage change in output). The depiction shows that an exemption would result in a significant increase in the value of Steel output (for both Flat and Long Steel). For relatively smaller sectors, such as flat glass and heavy clay, the absolute value of the change in output is much smaller.

87. The exemption is worth more in a scenario of high UK domestic growth and relatively low gas prices. This is partly a consequence of there being more to lose, the larger the domestic market. Out to 2030, the value change in the upside scenario can be several hundred million pounds for the most affected sectors, or more than twice the impact recorded in the downside scenario⁵².

⁵² Vivid Economics with Cambridge Econometrics, *The impact of exempting electro-intensive industries from Contracts for Difference support costs*, report prepared for DECC and BIS, February 2014 - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358164/Vivid_Economics_Cambridge_Econometrics_-_Impact_of_exemptions_from_CfD.pdf

6.2.1.2. Output responses for exempt sectors – RIMM analysis

88. For the remaining 14 sectors analysed in less detail using RIMM, we generally see smaller output responses to 2020 based on an 80% exemption rate proposed in the July 2013 consultation, with many of the sectors being less at risk of output leakage as a result of lower electro or trade intensity (in comparison with sectors modelled using FIMM).

Compared to a counterfactual scenario with no exemption, the most significant increases in domestic production are seen in the manufacture of plywood and board (17%), copper (7%), malt (7%), polypropylene (6%), and clay (5%). Salt, beer, ice cream, gravel, oils and fats, and lime all show no growth in domestic production or negligible increase of less than 1% as a result of the exemption.

89. Table 5 shows the cost pass-through and output response for each of the 14 RIMM sectors, along with a brief explanation of the output response observed. Several sectors modelled using RIMM benefit from having very low electro-intensities, or from being UK-based markets with limited trade exposure; all of those with only a UK market scope have a market share of over 50% and as much as 97% in the case of salt, though market share is shown to be lower in sectors operating in EU-based markets. For this reason, cost pass-through rates vary amongst sectors, from 1% in the case of copper to 93% for salt. Overall, the RIMM sectors indicate the potential diversity of impacts of exemptions on the UK manufacturing sector.

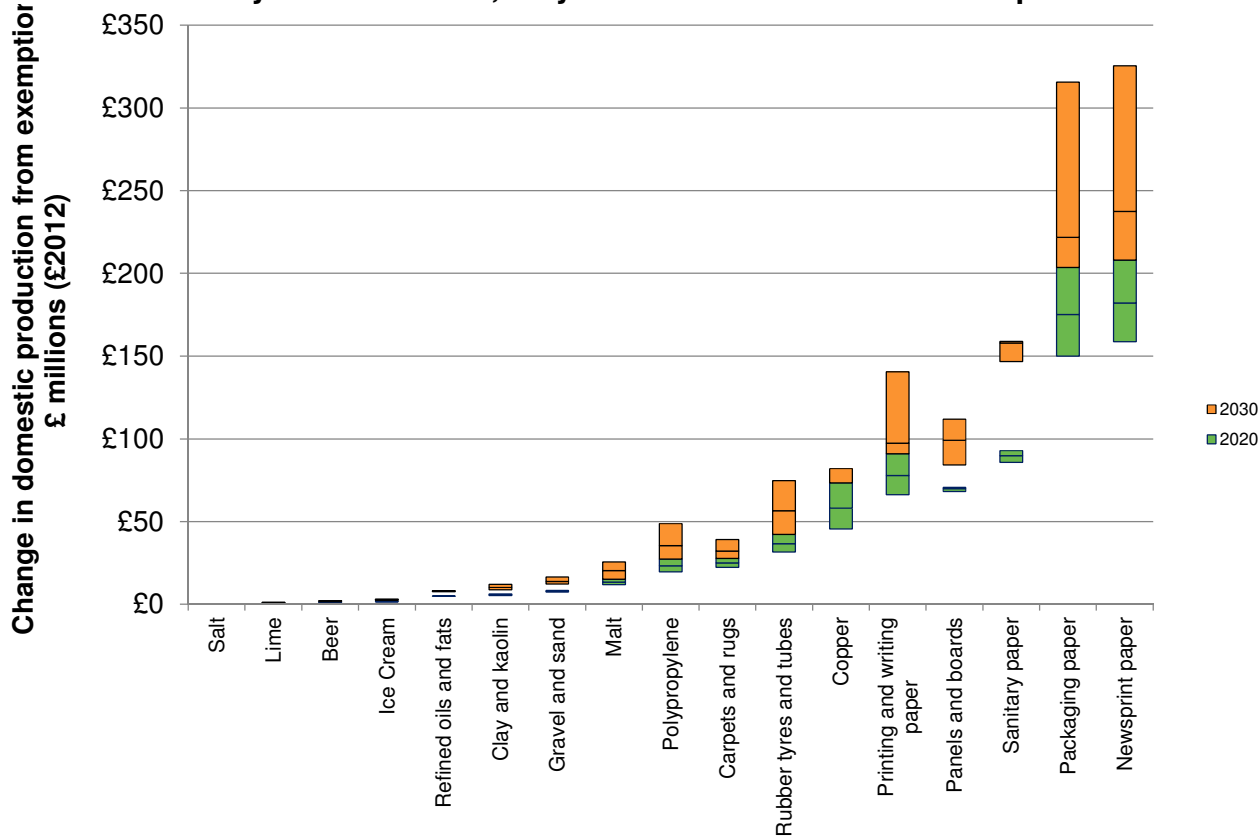
Table 5: Summary inputs and outputs for sectors investigated in less detail (RIMM, July 2013 consultation 80% exemption rates, 2020)

| Sector | Cost Pass-Through Rate | Output Response | Commentary |
|-------------------------------------------------------------------------------------------------------------------|------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manufacture of veneer sheets, plywood, laminboard, particle board, fibre board and other panels and boards | 45% | 17% | A relatively large cost shock, coupled with significant exposure to foreign trade, results in UK producers gaining substantial market share |
| Manufacture of copper products (pipes, cables) | 1% | 7% | A high-value product, but nonetheless sufficiently electro-intense to be strongly affected, due particularly to the UK's small market share |
| Manufacture of malt | 16% | 7% | Strong effect due to low market share and large electro-intensity |
| Manufacture of polypropylene | 3% | 6% | Similar to the broader refined petroleum products, polypropylene production increases due to opportunity for capturing market share from foreign producers |
| Production of clay | 80% | 5% | Large response is driven by a relatively large cost shock in proportion to price, despite low trade exposure |
| Manufacture of carpets and rugs | 15% | 3% | The cost decline per unit of value is quite small, but low margin and high elasticity results in low CPT and relatively large output increase |
| Manufacture of refined petroleum products | 7% | 2% | The largest sector examined by value. Exposure to EU trade amplifies the impact of the exemption, though the proportional cost shock is small. |
| Manufacture of rubber tyres and tubes | 8% | 2% | A high value product with relatively elastic demand and low UK market share, rubber products are reasonably responsive to the exemption |
| Manufacture of lime | 78% | 1% | High domestic market share and a relatively low cost shock, along with high gross profit margins, result in only a moderate response in production. |
| Manufacture of oils and fats | 49% | 1% | A minimal cost shock for a product with high value per unit of weight results in a small impact on domestic production. |
| Production of gravel | 89% | 0% | Very low trade exposure and low emissions intensity result in a small impact on production overall |
| Manufacture of ice cream | 79% | 0% | High domestic market share, partly due to high cost of trading frozen dairy products, means little foreign competition. |
| Manufacture of beer | 73% | 0% | Low electro-intensity and high value per tonne leaves the relatively large sector unaffected. |
| Production of salt | 93% | 0% | Salt production, having low electro-intensity and high UK market share, is largely unaffected by the exemption. |

Source: Vivid Economics

90. Figure 9 depicts the absolute value of the change in production for the RIMM modelled sectors. The paper sector generates the highest output value from the exemption, with Panel and boards, Copper and Rubber generating the next highest output values. In contrast Salt, Lime, Beer and Ice Cream generate relatively small absolute changes in the value of production.

Figure 9: Change in domestic production in 2020 and 2030 under non-policy scenarios for sectors analysed with RIMM, July 2013 consultation 80% exemption



Note: The petrochemicals sector is not shown on the chart for scaling reasons; in 2030, the change in the value of petroleum production ranges from around £550m to over £1,050m. This is due to the substantially larger size of the petrochemicals sector compared to other sectors examined.

Source: Vivid Economics

6.2.2. MDM-E3 (Cambridge Econometrics)

91. MDM-E3 allows a macroeconomic assessment of the impact on both exempt and non-exempt sectors. Generally, all the exemption options considered from the July 2013 consultation have relatively small impacts on output, both for exempt and non-exempt sectors.

92. The relatively small impacts on sector output within the MDM-E3 model reflects the relatively small reduction on aggregated sectors' production costs as a result of the exemption, and the associated small change in output prices. Industrial gross output and value added are, therefore, relatively unchanged between scenarios in this model. This partly reflects the aggregated nature of the MDM-E3 approach to sector modelling. For example, within MDM-E3 the 'Basic Metals' sector contains a number of sub-sectors, some of whom are eligible for the exemption under each of the policy options, and some of whom are not. Further reasons for the differences between the IMM and MDM-E3 sectoral modelling results are briefly summarised below, with further information provided in the research report⁵³.

⁵³ Vivid Economics with Cambridge Econometrics, *The impact of exempting electro-intensive industries from Contracts for Difference support costs*, report prepared for DECC and BIS, February 2014 - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358164/Vivid_Economics_Cambridge_Econometrics_-_Impact_of_exemptions_from_CfD.pdf

6.2.2.1. Why do results differ between MDM-E3 and IMM?

93. In general the impact of the exemption on sector output is notably smaller within MDM-E3 in contrast to the RIMM and FIMM results.⁵⁴ Much of the analysis is therefore presented separately and drawn together with a qualitative assessment of the policy options. This is discussed further in the Vivid Economics report⁵⁵. However, two key areas were identified as driving the differences in output responses across the two models.

- **Cost pass-through rate:** Cost pass-through rates in both the FIMM and RIMM are determined from the various competitive factors that the model considers in the decisions of firms. In MDM-E3, cost pass-through rates are estimated empirically from historic data sets or are assumed to be equal to 100% where empirical estimates are not available. This results in cost pass-through rates differing significantly in some instances. For example, in the IMMs the Steel sector exhibits a very low cost pass-through rate 2% – 5%, while in MDM-E3 the rate is 30.4%.⁵⁶
- **Import elasticities:** In both models, a cost decrease to Ells as a result of an exemption is partially reflected in a price change, resulting in substitution from imports to domestic production (the import elasticity). The IMMs exhibit greater responsiveness to competition from imports than MDM-E3. The implicit IMM import elasticities (although these are an outcome of the modelling rather than an input assumption) are substantially larger than the MDM-E3 equivalent assumptions. This partly reflects the different methodological approaches of the two models.

94. In general the differences across the models reflect differences in their economic modelling methodology. The IMMs are theoretically driven, particularly by an assumption that production is unsustainable if profit margins are zero, and it produces an approximately linear relationship between domestic output and margin. This assumption is derived from the underlying construction of market equilibrium. In contrast, MDM-E3 reflects history, as measured by empirical analysis in statistical models.

6.3. Value for Money Results

95. The previous section focused on the impact of an exemption on individual sectors in isolation. To assess the efficiency of the alternative exemption options we consider the aggregate impact of the exemption across all sectors, both positive and negative.

96. The MDM-E3 results are well suited to this task. They allow the benefits to the exempt sectors to be compared to the costs incurred to non-exempt sectors, to provide a complete assessment of the impact of each policy option on different sections of the economy. The net impact is presented in terms of its aggregate impact on macroeconomic indicators such as GDP and trade. However, the aggregated nature of the MDM-E3 modelling makes it

⁵⁴ This is the case even when adjustments are made to sectoral definitions to provide a closer comparison between Vivid and Cambridge sectoral definitions of sectors/markets.

⁵⁵ Vivid Economics with Cambridge Econometrics, *The impact of exempting electro-intensive industries from Contracts for Difference support costs*, report prepared for DECC and BIS, February 2014 - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358164/Vivid_Economics_Cambridge_Economics_-_Impact_of_exemptions_from_CfD.pdf

⁵⁶ Ibid.

more difficult to apply to the final eligibility option (although its impact can be inferred from the results of the July 2013 consultation options).

97. In contrast, the IMM results allow us to assess the Value for Money of exempting individual sectors in a much more granular level of detail than MDM-E3 allows (and using an alternative methodological framework). These results allow us to assess the relative benefits of exempting different sectors, and identify the characteristics determining which sectors provide the highest returns. As such it is easier to apply to the new policy option.

6.3.1. Macroeconomic impacts (using MDM-E3 model)

98. At the Macroeconomic level, the exemption results in two direct effects. For businesses receiving an exemption, profits increase, and customers of those businesses benefit from lower prices (the degree to which is determined by the cost pass-through rates). By contrast, sectors and consumers not receiving an exemption face higher electricity costs as well as increases in the price of goods from sectors which are not exempt. The MDM-E3 modelling captures both these effects.

99. Table 6 shows the major macroeconomic variables in 2020 according to MDM-E3. The more aggregated results suggest that the July 2013 consultation exemption scenarios have a very small impact on the UK economy. The change in consumer spending and GDP is a decrease of a few thousandths of a percentile. The impact on imports, exports and price indices is similarly muted. This result is unsurprising; manufacturing sectors benefiting from the exemption constitute a relatively small proportion of total UK GDP, with the aggregate effect the net sum of all the gains and losses.

Table 6: Major macroeconomic variables in 2020, under July 2013 consultation options

Percentage difference in outcome relative to the no exemptions case

| Variable | No exemptions | Option 1a | Option 1b | Option 2a | Option 2b | Option 3a | Option 3b |
|--------------------------------------------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Consumer spending | £1,070 bn | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 |
| Exports | £540 bn | -0.01 | -0.01 | -0.02 | -0.02 | -0.01 | -0.01 |
| Imports | £564 bn | -0.01 | -0.01 | -0.01 | -0.01 | 0 | 0 |
| GDP | £1,680 bn | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 |
| Consumer prices index (2009 = 1) | 1.41 | 0.12 | 0.1 | 0.16 | 0.15 | 0.09 | 0.07 |
| Domestic electricity prices (£/MWh) | 201.7 | 0.26 | 0.21 | 0.35 | 0.31 | 0.19 | 0.16 |

Source: Cambridge Econometrics (2009 prices)

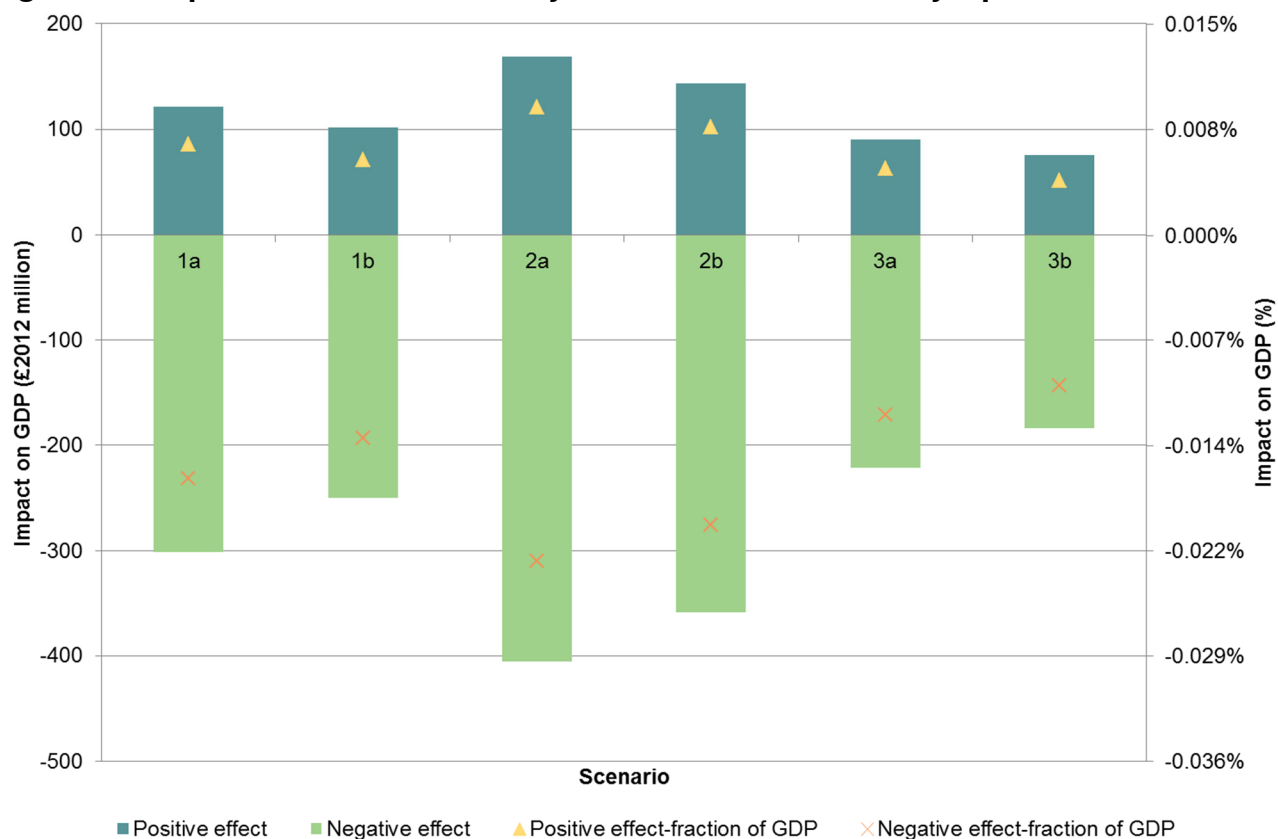
100. The MDM-E3 results suggest that the additional costs passed on to non-exempt businesses and domestic consumers generally offsets any benefit of cost-savings passed on through lower prices of goods sold by exempt sectors.⁵⁷ Thus, there is a largely neutral

⁵⁷ A contributing factor to this result is that MDM-E3 suggests that as many of the sectors covered by the exemption are export focused, foreign consumers may benefit from the exemption through lower product prices.

effect on output in the UK as a result of an exemption for EIs. This is true across all the July 2013 consultation options, with the size of the GDP impact correlated with the size of the exemption.

101. The final eligibility option was not specifically analysed by Cambridge Econometrics in the research report, but (based on the results above and the comparability of the level of the exemption) impacts are expected to be similarly small.

Figure 10: Impact on GDP across July 2013 consultation Policy Options



Source: Cambridge Econometrics

6.3.2. Sector impacts (using IMM models)

102. Vivid Economics’ IMM models cannot provide a complete assessment of the exemption on all sectors of the economy, as the MDM-E3 results do. However, they can provide sector-specific results on a more granular level than the MDM-E3 model, allowing us to assess the relative benefits of exempting different sectors, as well as identifying characteristics which could help in identifying which sectors are likely to provide the largest net benefits from an exemption.

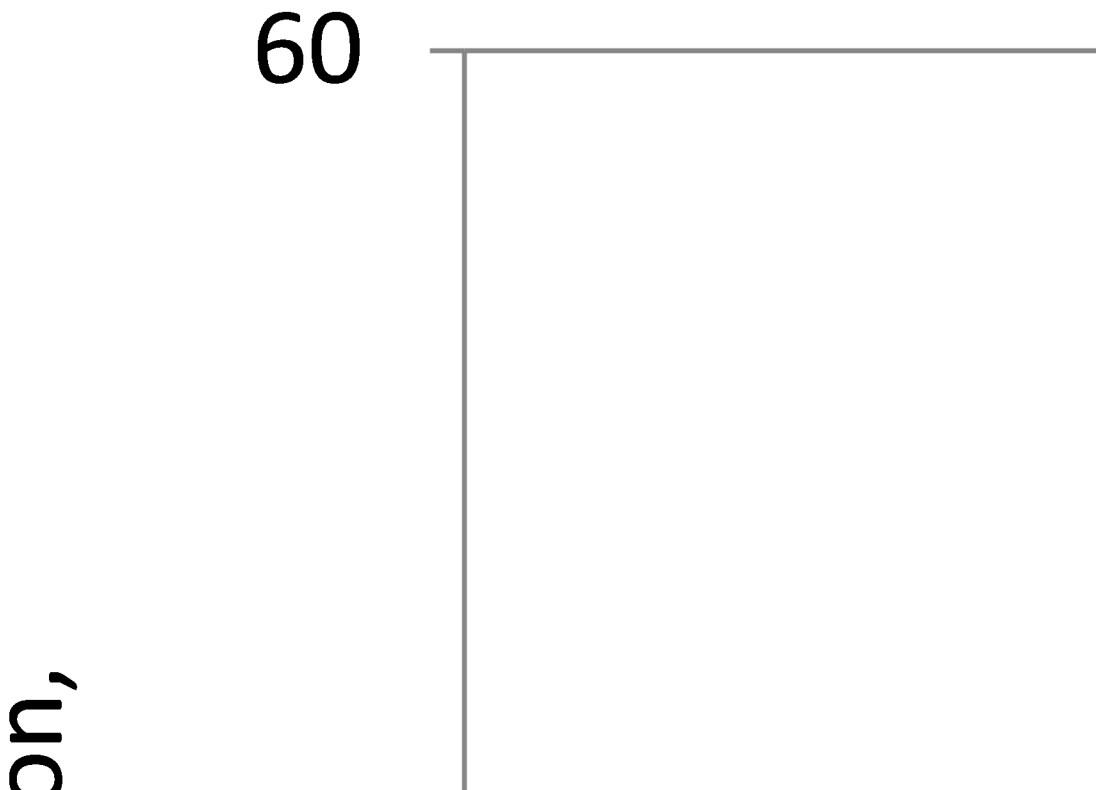
103. Here, Value for Money (VfM) is defined as the ratio of benefits to costs. Thus a high VfM implies particularly high returns for the funds employed. The two relevant variables are:

- benefits – defined as the sum of producer and consumer surpluses from those in receipt of the exemption; and
- costs – defined as the funds raised elsewhere to pay for the exemption (as measured by the value of the exemption per MWh, multiplied by the quantity of sectoral electricity use after the application of the exemption).

104. The IMM's derive Producer Surplus (PS) and Consumer Surplus (CS) based on cost saving as a result of an exemption that are retained by firms or passed through to consumers. PS refers to welfare gained by producers in a market; within the IMM, PS is defined as the change in firm profits⁵⁸. CS refers to the gain in welfare that consumers obtain from consumption of a product (over and above the price they are willing to pay). Following the exemption, consumers of that sector's output generally enjoy a lower price, relative to the price there would have been without the exemption⁵⁹.

105. Figure 11 illustrates the relative size of PS and CS. In general, PS benefits are larger than CS benefits, meaning that firms enjoy relatively more of the benefits as a result of the exemption (through higher profits), in comparison to the benefits consumers enjoy through lower product prices. The relative size of CS to PS is related to the degree of cost pass-through in the sector in question. Where cost pass-through rates are low, firms are able to retain gains from an exemption as profits, and therefore PS is larger than CS (for example, in the Steel sector). In contrast, where pass-through rates are high, consumers enjoy relatively more of the benefits of the exemption (in the Gravel sector, for example).

Figure 11: Producer and Consumer Surplus July 2013 Policy Options, (2020 central scenario)



Source: Vivid Economics

106. In interpreting the VfM results across sectors it is important to take into account that the following results are a partial assessment of the VfM of providing support to individual sectors. By considering the direct support costs only, this analysis fails to reflect the

⁵⁸ Wages earned by employees are not included in the VfM estimates as it is assumed that labour markets are unaffected by small changes in sector employment. Employment impacts are presented in the wider impacts section.

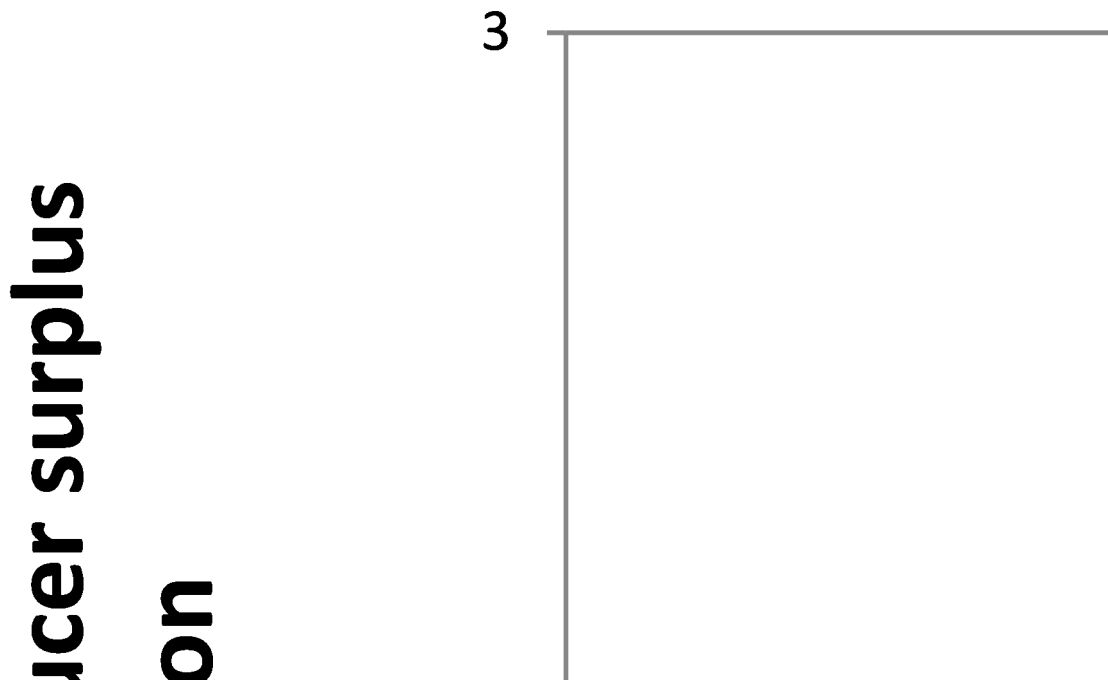
⁵⁹ For this analysis the products demand curve is assumed to be linear and consumer surplus is calculated as the change in the price of the good multiplied by the pre-exemption market quantity, plus one-half of the change in price multiplied by the change in quantity.

additional loss in surplus incurred through raising funds to pay for the exemption.⁶⁰ As a result, this is a partial assessment best suited to identifying the relative scale across sectors, and the characteristics which determine the degree to which different sectors benefit from an exemption.

107. With this in mind, the VfM of exempting the various sectors modelled using RIMM and FIMM are shown in Figure 12. For sectors analysed using FIMM, Fertilisers, Steel and Flat Glass are shown to provide VfM benefits in the region of £2 for every £1 of support. Ceramics is found to provide the smallest net benefits, with a Benefit Cost Ratio (BCR) of around 1.1. For sectors modelled using RIMM there is an even broader range. Malt generated a BCR of around 2.5, whilst the Salt and Gravel sectors have BCRs just above 1.
108. Higher values of VfM, as defined here, are largely driven by the responsiveness of the sector in terms of output changes. Variations across sectors are driven by:
- Differences in market share of UK producers, insofar as this is the largest single driver of the responsiveness of output to exemptions. Other factors driving responsiveness – profit margins and price elasticity of demand – will also influence VfM;
 - Differences in the market share of UK consumers, affecting the share of consumer surplus that is included in the VfM calculations.
109. Figure 12 illustrates VfM estimates across the upside and downside ranges. Across all sectors the VfM ratios are quite similar, as they reflect the relative extent to which consumers and producers benefit. In nearly all the sectors, the VfM ratios are highest in the downside scenario, which occurs because the benefit of an exemption is higher when profit margins are tightened.

⁶⁰ Traditionally a BCR estimate would be said to provide net benefits if the Benefit Cost Ratio exceeded 1. However, in this case, all sectors result in a BCR above 1. Note that, due to the lack of accounting for additional costs associated with fund-raising, it is impossible for the VfM ratio at the sectoral level to be below 1: any pound sterling given to industry via the exemption must be distributed among either firm profits or consumer surplus. This would be true even if the quantity of production remained unchanged after the exemption. This result should be treated cautiously, taking into consideration the wider economic costs of raising the exemption funds, the threshold determining whether or not benefits outweigh costs will be higher than unity. It is not possible to determine what this threshold might be within the IMM models, and therefore the results are best interpreted as providing guidance on the relative scale of benefits across sectors, rather than the absolute net benefits of exempting a given scenario.

Figure 12: Value for Money Ratios across non-policy scenarios (2020), July 2013 Policy Options



Source: Vivid Economics

110. In general, sector level analysis finds that VfM is found by exempting sectors which cannot pass on costs to customers without losing market share to overseas rivals. Sectors with high electro-intensity, low margin and high overseas market share are likely to provide the best value for money of an exemption.

6.3.3. Implied NPV range

111. The methodology for selecting sectors provides an indicative assessment of the VfM of exempting individual sectors on the grounds of providing a snapshot across the hypothetical VfM curve. To illustrate this further, and provide an indicative range in the overall potential impact of the exemption, the sector specific VfM estimates have been grouped and averaged to provide indicative BCRs for both the July 2013 Consultation options, and the final eligibility option. These estimates are provided in the summary table (Table 7) in the concluding section of this IA.⁶¹

112. VfM estimates for each of the 20 sectors analysed are representative of sectors across the policy options proposed. To derive an indicative VfM rating for each policy option, the sectors modelled by Vivid Economics were grouped on the basis of which policy option they would be exempted under. As each policy option would cover more sectors than the small sample modelled by Vivid Economics we have attempted to derive an indicative average BCR for each policy option by averaging the results for the sectors we have modelled. In addition to the partial nature of the VfM estimates as described previously,

⁶¹ The BCR, costs, benefits and NPV figures are unchanged from those presented in the September 2014 consultation IA, despite the changes to the final eligibility option. This reflects the fact total exempt consumption under the final eligibility option is still estimated to be around 20TWh, and the aggregation of sectors modelled by Vivid Economics is unchanged under the final eligibility option.

these results should be treated cautiously and are principally derived to aid presentation of the results. Inferring VfM estimates of the policy options from these figures alone should be avoided. The modelled sectors represent only a sample of those that would be covered under each policy option and the average of this limited sample may not be indicative of the average of all sectors covered by the policy.⁶² The partial NPV estimates are presented in Table 7.

6.4. Wider impacts

113. In addition to impacts on output, profit and prices discussed above, an exemption could be expected to make an impact on wider areas of the economy, which should be considered as part of the overall assessment of the policy options. This section provides a brief outline of wider impacts of an exemption, with further detail provided in the Vivid Economics and Cambridge Econometrics report⁶³.

6.4.1. Employment

114. MDM-E3 analysis of the July 2013 policy consultation options suggests that an exemption is likely to have a negligible impact on national employment across all policy options. A simplifying assumption is made to assess sectoral level impacts in the IMM models, which also shows a negligible impact on employment in 2020⁶⁴. Regional employment effects were also assessed, with the results suggesting that local authority areas dependant on EIs for employment might be disproportionately affected if an exemption is insufficient to maintain EI production.

6.4.2. Distributional Impact

115. As lower-income households tend to spend a higher proportion of their income on electricity than higher-income households, a change in electricity prices as a result of an exemption is likely to have distributional consequences. MDM-E3 modelling of the July 2013 Consultation options suggests that lower-income households are slightly more adversely affected by an electricity price increase in comparison to high-income households. Distributional analysis was also presented in the July 2013 consultation

⁶² The average BCR of each policy option will be sensitive to the relative size of the sectors modelled, and in particular how much support they receive. For example, the average BCR of a policy that provides a high proportion of support to a sector that yields very high returns, and a low proportion to a sector with very low returns, would not be a simple average of the two individual sectors BCRs. For this reason we derive a weighted average BCR, weighting each individual sector BCR by the proportion of total support provided to that sector. Average policy option BCRs are estimated for 2016, 2020, and 2030, with intervening years estimated through linear interpolation. Total costs are estimated as the value of support under each option (consistent with CfD support costs used in the modelling) with total benefits determined by the level of support and the average policy option BCR. Total costs are determined by exempting a per MWh cost, rather than a proportion of consumption, as the price and bill impacts presented in this IA are, to ensure consistency with the original modelling undertaken by Vivid Economics. Costs and benefits are discounted and an indicative NPV estimated as the difference between discounted costs and discounted benefits.

⁶³ Vivid Economics with Cambridge Econometrics, *The impact of exempting electro-intensive industries from Contracts for Difference support costs*, report prepared for DECC and BIS, February 2014 - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358164/Vivid_Economics_Cambridge_Economics_-_Impact_of_exemptions_from_CfD.pdf

⁶⁴ Specifically, turnover and employment share a linear relationship, i.e. a 1% increase in turnover leads to 1% increase in employment and vice versa. In reality, this is unlikely to be completely accurate especially for a decrease in turnover, where a 1% fall in turnover would be expected to result in a less than 1% fall in employment, as a certain amount of labour 'hoarding' by employers may exist to position a firm to rebound effectively.

document. Analysis of the four options presented in the July 2013 consultation indicated that the impact on fuel poverty levels would be minimal⁶⁵.

6.4.3. Carbon Emissions

116. MDM-E3 results of the July 2013 Consultation options suggests that the overall impact on CO₂ emissions across the UK economy is negligible, partly reflecting the fact that increases in electricity consumption by exempt industries are more or less offset by decreases in electricity consumption in non-exempt sectors. Considering the individual sectors, the IMM results suggest that global carbon savings within individual sectors subject to exemptions range from minimal to over 500,000 tonnes annually by 2030 under the July 2013 policy options. This largely reflects differences in the accounting treatment of carbon emissions between sectors, and specifically the role the EU ETS cap plays in limiting carbon emissions within the EU. Specifically, within the Vivid modelling, if output in non-EU countries decreases, to the benefit of production within the UK, it is assumed that there is no net change in EU wide emissions due to the EU ETS cap, while there is a saving in emissions due to the non-EU production declines (discussed further in the Vivid Economic and Cambridge Econometrics report⁶⁶).

7. Summary of Results

117. Table 7 presents a summary of the results derived from the analysis presented in this IA. This table shows impacts across policy options, models and objectives.

⁶⁵ This analysis is presented in the Consultation Document, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/210724/bis-13-974-electricity-market-reform-consultation-eligibility-for-an-exemption-from-the-costs-of-contracts-for-difference.pdf

⁶⁶ Vivid Economics with Cambridge Econometrics, *The impact of exempting electro-intensive industries from Contracts for Difference support costs*, report prepared for DECC and BIS, February 2014 - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/358164/Vivid_Economics_Cambridge_Econometrics_-_Impact_of_exemptions_from_CfD.pdf

Table 7: Summary of Analytical Results

| Policy Options | Δ due to exemption | July 2013 Consultation | | | | | | Final eligibility option |
|---------------------------------------------|------------------------------------------------------------------|--------------------------------|----------|---------------------------|--------|--------------------------------|----------|--------------------------|
| | | 'Compensation Mirror' (~30TWh) | | 'Compensation +' (~40TWh) | | 'Compensation Narrow' (~20TWh) | | |
| | | 1a | 1b | 2a | 2b | 3a | 3b | |
| Electricity bill impacts 2020 (2012 prices) | Non-exempt Medium-sized business (£ (2012 prices), 2020) | 8,100 | 6,700 | 11,200 | 10,000 | 5,300 | 4,400 | 5,600 |
| | Households (£ (2012 prices), 2020) | 2.70 | 2.20 | 3.70 | 3.30 | 1.70 | 1.40 | 1.80 |
| | Increase in Domestic Production in sectors modelled*** | 2 – 18 | 1 - 15 | 0 – 3 | 0 – 2 | 6 – 50 | 5 – 41 | 1 - 53 |
| | - % , central scenario, 2020 | | | | | | | |
| | - Low to high estimates | | | | | | | |
| | Average Benefit-Cost Ratios across marginal sectors modelled**** | 1.70 | 1.72 | 1.59 | 1.59 | 1.70 | 1.73 | 1.70 |
| | - £ benefits : £ costs, 2020 | | | | | | | |
| | Partial Net Present Value estimates | 416 | 358 | 526 | 485 | 283 | 243 | 295 |
| | - £m, 2012 PV base year (2016-2020) | | | | | | | |
| | Increase in sector employment in sectors modelled | 20 - 410 | 10 - 340 | 0 - 20 | 0 - 10 | 30 - 760 | 20 - 640 | 0 - 810 |
| | - No. of employees, central scenario, 2020 | | | | | | | |
| | - Low to high estimates | | | | | | | |
| | Increase in UK carbon emissions in sectors modelled | 11 - 814 | 9 - 682 | 0 - 6 | 0 - 4 | 19 – 515 | 16 - 431 | 1 - 865 |
| | - Thousand tonnes CO ₂ , central scenario 2020) | | | | | | | |
| | - Low to high estimates | | | | | | | |
| | Decrease in non-EU carbon emissions in sectors modelled | 1 - 302 | 1 - 253 | 0 - 3 | 0 - 2 | 3 - 157 | 2 - 131 | 0 - 321 |
| | - Thousand tonnes CO ₂ , central scenario 2020) | | | | | | | |
| | - Low to high estimates | | | | | | | |
| | Change in GDP | - 0.01 | -0.01 | - 0.01 | - 0.01 | -0.01 | -0.01 | N/A |
| | - %, 2020 | | | | | | | |
| | Change in imports | - 0.01 | - 0.01 | - 0.01 | - 0.01 | 0 | 0 | N/A |
| | - %, 2020 | | | | | | | |
| | Change in exports | - 0.01 | - 0.01 | - 0.02 | - 0.02 | - 0.01 | - 0.01 | N/A |
| | - %, 2020 | | | | | | | |
| | Impact on consumer spending | - 0.01 | - 0.01 | - 0.01 | - 0.01 | - 0.01 | - 0.01 | N/A |
| | - %, 2020 | | | | | | | |
| | Change in UK employment | 0.02 | 0.02 | 0.03 | 0.03 | 0.02 | 0.02 | N/A |
| | - %, 2020 | | | | | | | |

Source: Vivid Economics and Cambridge Econometrics

* The aggregation of sectors under the final eligibility option considers many of the sectors covered by the July 2013 Consultation options, hence the range in the final eligibility option often reflects the maximum and minimum values across the three July 2013 Consultation options. The value of the upper bounds from the final eligibility option differs from the maximum value of the July 2013 options because of the increase in the exemption rate to 85% from 80%. The values of the lower bounds differ due to differences in the sectors covered by the different policy options.

** Domestic production, sector employment, UK and non-EU carbon emissions are given as ranges from the lowest to highest impact observed in additional sectors modelled under each option, in a central scenario in 2020.

*** This shows the lowest percentage increase in domestic production and the highest increase in domestic production in the incremental sectors covered by each policy option. For example, Option 1 consists of the additional sectors exempt under Option 1 but not Option 3. The same approach is used for sector employment, UK and non-EU carbon emissions, showing a central scenario in 2020.

**** Benefit-Cost Ratios for marginal sectors under each policy option have been weighted proportionately to provide indicative BCRs for the marginal sectors included under each policy option, in a central scenario in 2020. Vivid estimates for BCRs and NPVs have been weighted proportionately to provide indicative BCRs for each policy option. The sector-level BCRs reflect the average impact of the exemption across all firms within a sector, not only firms within a sector passing the business level test. As such, average BCR for whole sectors may not be representative of BCRs of individual firms. This is likely to vary across sectors, based on the proportion of firms within a sector that will be eligible for the exemption. Therefore, BCRs and NPV calculations as presented in this IA should be treated as indicative.

***** The final eligibility option was not specifically analysed by Cambridge Econometrics, but (based on the results above and the comparability of the level of the exemption) impacts are expected to be similarly small.

Note: Both Option 2 from the July 2013 Consultation and the final eligibility option would include the Petrochemicals sector as modelled by Vivid Economics. However, the size of the Petrochemicals sector, relative to the other sectors modelled means the petrochemicals sector has a disproportionate impact on the aggregated sector results. Removing this sector provides us with much clearer and comparable results, which is done for the table above, however the unadjusted outcomes (i.e. with petrochemicals included) are provided below for comparison:

| Δ due to exemption | Option 2a | Option 2b | Final eligibility option |
|----------------------------------------------------------------|-----------|-----------|--------------------------|
| Average BCR | 1.82 | 1.82 | 1.73 |
| Increase in UK carbon emissions | | | |
| - Thousand tonnes CO ₂ , central scenario, 2020 | 0 - 84 | 0 - 53 | 1 - 865 |
| - Low to high estimates | | | |
| Decrease in non-EU carbon emissions in sectors modelled | | | |
| - Thousand tonnes CO ₂ , central scenario 2020) | 0 - 25 | 0 - 40 | 0 - 321 |
| - Low to high estimates | | | |
| Increase in sectoral employment | | | |
| - No. of employees, 2020 | 0 - 820 | 0 - 510 | 0 - 870 |
| - Low to high estimates | | | |

118. To help summarise the quantitative and qualitative evidence, a Multi Criteria Analysis (MCA) has been used. As part of this MCA, all options are considered against the six objectives set out earlier in this IA. The objectives focus on both benefits and costs. Benefits of the proposed policy options are considered in objective 1 while the several dimensions of costs are considered in objectives 2 - 5 for a more comprehensive analysis. The aim is to achieve a balance between benefits and costs. Objective 6 considers the compatibility of each option against the revised EEAG and the likelihood of each option gaining state aid clearance.
119. To inform the selection of the preferred option at the time, each of the July 2013 Consultation options was ranked, in terms of how well it met each of the original 5 objectives presented in the July 2013 consultation, relative to the other policy options considered at the time. Therefore a score of 1 implied it was the best option for meeting that specific objective, and a score of 6 implied it was the worst option for meeting that objective. Where options were thought to be equivalent a tied ranking was used. These scores were reflective of the evidence base developed through the work undertaken by Vivid Economics and Cambridge Econometrics as well as DECC and BIS. The analysis and scores, as conducted at the time, are presented in Table 8 and illustrate the evidence which supported Option 1a as the preferred option at the time of the July 2013 consultation.
120. Following the publication of the criteria set out in the April 2014 revised Energy and Environmental Aid Guidelines, a new objective needed to be considered, aligning as closely as possible with the revised EEAG. The July 2013 policy options have been ranked (using the same methodology used previously), alongside the final eligibility option, relative to objective six (compatibility with revised EEAG). The final eligibility option is clearly the preferred option in aligning with EEAG, and although the previous options have been ranked relative to this criteria for presentational purposes, there would be significant risks to state aid approval if any of them were actively considered in reality. For this reason none of the July 2013 Consultation options could be actively considered as realistic options following the publication of EEAG. As a result, a new option which aligned with EEAG was developed and following consultation has been finalised.
121. To illustrate that the final eligibility option still meets the original 5 objectives set out in the July 2013 consultation, as well aligning with EEAG, it has been ranked relative to the July 2013 options for presentational purposes.⁶⁷
122. Table 8 presents the results. A summary of the justification for the rankings follows the table.

⁶⁷ Note, the ranking of the six July 2013 Consultation options has not been revised, for example to reflect a seventh option, this is to present the analysis which informed the decision on the preferred option at the time of the July 2013 consultation. Equally, only the ranking of the final eligibility option (rather than a new table presenting the ranking of all seven options considered together) is presented given the fact the July 2013 options are no longer under active consideration.

Table 8: Multi-Criteria Analysis

| Criteria | July 2013 Consultation | | | | | | Final eligibility option |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------|-----------|-----------|-----------|-----------|--------------------------|
| | Option 1a | Option 1b | Option 2a | Option 2b | Option 3a | Option 3b | Final eligibility option |
| Benefits | | | | | | | |
| 1. Targeted at companies whose competitiveness is at risk from rising electricity policy costs | 1 | 3 | 2 | 4 | 5 | 6 | 1 |
| Costs | | | | | | | |
| 2. Eligibility should be designed to minimise distortions within the UK economy | 3 | 1 | 6 | 5 | 3 | 1 | 3 |
| 3. Avoid creating perverse incentives around electricity use | 3 | 3 | 5 | 5 | 1 | 1 | 1 |
| 4. Minimise administrative burdens for all stakeholders: ELLs, electricity suppliers and Government | 1 | 1 | 5 | 5 | 1 | 1 | 5 |
| 5. Minimise the costs to consumers outside of the scope of the exemption (both business and household) whilst still meeting the policy objective | 4 | 3 | 6 | 5 | 2 | 1 | 2 |
| Other State Aid Compatibility | | | | | | | |
| 6. An exemption should align as closely as possible to the criteria set out in the April 2014 revised Energy and Environmental Aid Guidelines to give a legal basis for providing an exemption | 4 | 4 | 6 | 6 | 2 | 2 | 1 |

1. Targeted at companies whose competitiveness is at risk from rising electricity policy costs

123. In meeting this objective the policy options have been ranked based on their ability to provide a significant level of support to a group of sectors most at need. In this way we consider both the extent of the support and the relative benefits that support generates.

124. At the time of the July 2013 consultation, Option 1a was deemed to be the option most likely to achieve objective 1. Although Option 2 reflected the widest exemption pool, providing the most support to the most sectors, the expanded list of sectors were likely to include sectors whose competitiveness is not at risk to the same extent as the sectors covered under Option 1, and therefore was unlikely to be as well targeted.

125. Option 1b was deemed to be the third best option as although it targeted support at an ‘at risk’ group of sectors, the level of support it offered those sectors was smaller in comparison to the ‘A’ options.⁶⁸ In a similar vein to the preference for Option 1a over Option 2a, Option 2b was deemed to be slightly worse at meeting objective 1 in comparison to Option 1b.

126. Option 3 offered the smallest scope of support. Although the support it offered would be directed at sectors whose competitiveness was likely to be at risk, its narrower definition was likely to exclude vulnerable sectors. For failing to support these additional at risk sectors option 3 was ranked the lowest at meeting objective 1 (with option 3b being scored worse than option 3a given its lower level of support).

127. The final eligibility option is targeted at sectors on the European Commission’s revised list of sectors judged to be eligible for an exemption from energy and climate change policy costs. The list of eligible sectors set out in the final policy is likely to be broader than the options considered in the July 2013 consultation, and analysed by Vivid Economics and Cambridge Econometrics as presented in this IA (although eligibility also depends on passing a more stringent company-level test). Given the option provides support for a broad range of sectors, some of which are covered by the July 2013 Consultation options, while ensuring support is targeted at firms most in need of support through a company level test, it is judged that final eligibility option is ranked as the best of all options at meeting objective 1.

2. Eligibility should be designed to minimise distortions within the UK economy

128. The MDM-E3 modelling suggests that the impact of the exemption on GDP may be slightly negative. Across all July 2013 Consultation options the reductions are considered to be negligibly small, and considering the potential for wider impacts not included in MDM-E3 modelling, for example regional spillover effects, there is still the potential for output to be positive overall. However, the conclusion drawn from the macroeconomic analysis is that broadly the positive and negative effects on the UK economy offset each other, with the likelihood that broader exemptions will have larger impacts on the wider economy.

129. The Cambridge Econometrics results suggest that there would be a negligible to small change in overall UK employment as a result of the exemption. The IMMs illustrate the possible employment gains across sectors benefiting from the exemption. The IMMs are also able to consider the potential geographical distribution of these employment gains. At least some of the employment gains for the exempt sectors will accrue to areas where the exempt sectors are the region’s dominant employer and where there may be few alternative employment opportunities.

130. With these results in mind, Option 1 and 3 were considered to be the July 2013 Consultation options most likely to meet this objective. Although Option 3 resulted in a

⁶⁸ The analysis suggests that the VfM ratios for individual sectors are larger under ‘b’ options, in comparison to ‘a’ options. This is a modelling result reflecting certain assumptions e.g. the use of a linear demand curve. The intuition is straightforward: additional marginal expenditure providing electricity price discounts shows diminishing marginal returns. In reality firms are unlikely to respond to absolute levels of support in the same way due to non-linearities and threshold effects, for example, the response to £10/MWh of support may be different to the response to £0.01/MWh of support. These impacts should be considered when interpreting the results.

narrower exemption pool than Option 1, potentially minimising adverse impacts on the wider UK economy, as suggested by the MDM-E3 modelling, it also reduced the scope for employment benefits and the potential economic geography benefits of sustaining employment in areas where alternative employment opportunities may be limited. In both cases 'B' options are scored more highly than 'A' options as a lower level of direct support was assumed to reduce the risk of distortions (although once again lower support levels does limit the potential of positive distortions such as wider employment and economic geography benefits).

131. Option 2 was considered to perform relatively poorly in meeting this objective. Although it broadened the exemption, and therefore had the potential to provide wider employment opportunities to the additional sectors, these sectors were considered less at risk than the targeted group, and employment impacts are likely to be disaggregated across more geographic areas. In addition, consistent with the Cambridge Econometrics results, these options had the largest impact on the wider UK economy.
132. The final eligibility option was not specifically analysed by Cambridge Econometrics, but (based on the results above and the comparability of the level of the exemption) impacts are expected to be similarly small. In addition, the final eligibility option allows a broad range of sectors to be eligible for the exemption whilst targeting support at firms through a company-level test. As such, it will minimise distortions elsewhere in the economy by focusing support on where it is most needed, and creating opportunities for supply chain and spillover benefits in firms most likely to respond to support. For these reasons the final eligibility option has been ranked as the third best option at meeting Objective 2, behind Options 1b and 3b.

3. Avoid creating perverse incentives around electricity use

133. The exemption results in lower electricity prices for exempt sectors and higher electricity prices for non-exempt sectors, and correspondingly we may expect an increase in electricity demand from exempt sectors and a reduction from non-exempt sectors. Equivalently, the larger the electricity price change the larger the potential change in demand. The MDM-E3 considers the net impact of the increase and decrease in electricity consumption and finds that across all July 2013 Consultation options total electricity demand is broadly unchanged.
134. Option 3 minimised price increases to non-exempt consumers, and targeted the smallest group of sectors for price reductions, therefore minimising the change in electricity demand across consumers. As a result Option 3 was deemed most likely to meet this objective (recognising that it also offered the least potential to minimise carbon leakage). In contrast, Option 1 broadened the scope of eligible sectors, imposed higher costs on non-exempt consumers and resulted in potentially larger electricity consumption changes. Option 1 was therefore scored next highest. Given the wider range of sectors eligible for an exemption under Option 2 and the broadest price impacts (accepting the potential for largest carbon leakage avoidance), there is a relatively strong perverse incentive around electricity use for sectors covered under Option 2, and it was therefore scored lowest.
135. Total electricity consumption eligible for exemption under the final eligibility option is similar to electricity consumption under Option 3 of the July 2013 Consultation options,

around 20 TWh.⁶⁹ Under the final eligibility option, the broadening of the sector coverage and targeting at firms may result in targeting more responsive firms, in terms of their electricity consumption, and hence a larger aggregate electricity consumption change, relative to Option 3. This option will also provide greater opportunities for minimising carbon leakage risks. However the level of support under the final eligibility option is slightly larger than the level proposed under the July 2013 Consultation options. For these reasons it is scored as highly as Option 3 was previously.

4. Minimise administrative burdens for all stakeholders: EIs, electricity suppliers and Government

136. It was expected that the administrative burden of Options 1 and 3 would be relatively small, reflecting their alignment with the requirements put in place for the EU ETS compensation scheme. In contrast, reflecting the widening of scope of the exemption, Option 2 was scored poorly.

137. Relative to the administrative costs associated with the July 2013 Consultation options, administrative costs for the final eligibility option are expected to be marginally higher, and therefore the option is ranked poorly. Although some alignment with existing compensation schemes will be possible, some additional costs are expected to be incurred in order to align eligibility to the EEAG. As such, comparing the administrative costs of the final eligibility option to the administrative costs of the July 2013 Consultation options is a little misleading, as a significant driver of the increased administrative costs is the fact the July 2013 options could no longer be implemented following EEAG. Reflecting the desire to minimise administrative costs, Government has proposed to align eligibility as closely as possible with other EI compensation schemes.

5. Minimise the costs to consumers outside of the scope of the exemption (both business and household) whilst still meeting the policy objective

138. There is a positive relationship between the scope and value of the exemption and non-exempt consumer bill impacts (the larger the exemption, the larger the consumer bill impact). Therefore, Options 1b, 2b and 3b impose lower costs than Options 1a, 2a and 3a respectively. Reflecting differences in the scope of the exemption, Option 3 imposes the least cost on non-exempt consumers, followed by Option 1, and finally Option 2 imposes the highest cost on non-exempt consumers.

139. In addition to its direct effect, when scoring the options, consideration is also given to the fact that higher absolute costs result in magnified distributional consequences of the exemption. Effects on income distribution and fuel poverty (as shown in the July 2013 consultation) are small.

140. Reflecting these considerations, Option 3b received the highest score in meeting Objective 5, with option 3a second. Option 1 was scored next highest, reflecting its slightly larger impact relative to Option 3. Option 2 was scored the lowest reflecting the fact it imposed the highest costs on non-exempt consumers.

⁶⁹ This is the same assumption as made about the July 2014 Consultation option as presented in the September 2014 consultation IA. Changes made to the final policy design do not materially change the overall level of exempt consumption which is still assumed to be around 20TWh per annum.

141. The final eligibility option is ranked as highly as option 3a, as average domestic bill impacts up to 2020 are similar across the two options (costs under the final eligibility option are slightly higher than for Option 3a, reflecting the 85% exemption rate, see Annex A). These two options result in the second lowest costs to non-exempt consumers, with Option 3b resulting in the lowest impact on non-exempt consumers.

6. An exemption should align as closely as possible to the criteria set out in the April 2014 revised Energy and Environmental Aid Guidelines to give a legal basis for providing an exemption

142. Given the incompatibility of the July 2013 Consultation options with the revised EEAG, in reality none could be actively considered. However, for presentational purposes they have been ranked following the same methodology as used for the other objectives.⁷⁰ All July 2013 Consultation options would be ranked below the final eligibility option, and have been ranked in accordance with the extent of their scope (and hence likely compatibility with EEAG). The final eligibility option has been set in line with the revised EEAG and therefore is deemed the more likely to be compliant with state aid requirements and best meet objective 6.

8. Conclusion

143. This IA provides a broad spectrum of evidence on which to form a policy decision on the eligibility, and extent of, an exemption from a proportion of the costs of CfDs for EILs. Results derived from research and modelling performed by Vivid Economics and Cambridge Econometrics has formed the basis of this, and have been considered against the six key criteria underpinning eligibility for the CfD exemption using an MCA. Results of this analysis were initially presented in a Consultation IA in September 2014. This IA has updated that analysis to reflect DECC's latest policy cost modelling, and align the results with the final eligibility.

144. A policy to provide EILs with an exemption from CfD support costs is a redistributive policy. It generates winners and losers, with the alternative policy options changing the size of these groups. For example, widening the exemption expands the pool of 'winners', but places increased costs on a narrower pool of 'losers'. Given its redistributive nature, the broad conclusion of the macroeconomic analysis that all exemption options have a broadly negligible impact on GDP is not unexpected.

145. However, there are clearly significant impacts on those who stand to gain or lose as a result of the exemption options. As such, an assessment of impact of the alternative exemption options should take into consideration distributional consequences, as well as the overall net impact of the policy.

146. Although the macroeconomic modelling is helpful in providing a headline impact on the UK economy as a result of an exemption, it is invalid to draw a policy conclusion based on the evidence of this model alone. Sector level analysis allows us to assess responses of individual sectors to an exemption and is useful in drawing a conclusion on the value for

⁷⁰ This objective was not considered when developing Government's preferred option for the July 2013 consultation.

money of exemption; similarly not by themselves but in conjunction with macroeconomic results.

147. Using this holistic approach, considering all available evidence, the research report concluded that there is a Value for Money case for exempting some, but not all, electro-intensive sectors from a proportion of CfD support costs.
148. This IA has presented the sectoral, macroeconomic and wider impacts of the alternative exemption options considered in the original July 2013 Consultation and the final eligibility option. The analysis suggests that there is value for money in a small, targeted exemption for EILs from some of the costs of CfDs. Following publication of the European Commission's EEAG guidelines, the Government's July 2014 consultation put forward an eligibility proposal to implement a targeted exemption, consistent with this aim. This has been refined following feedback from the consultation process.
149. The MCA analysis conducted on the July 2013 policy options, and presented in the previous section, supported the Government's preferred option (Option 1a) before the publication of revised EEAG, on the basis that it targeted support at sectors whose competitiveness was most at risk, minimised administrative costs, and had a relatively (compared to other policy options considered) limited impact on non-exempt consumers.
150. The MCA analysis has been updated in light of the final eligibility option. The conclusions from the MCA presented in the previous section are supportive of implementing the final eligibility option, in terms of its ability to meet the exemption's policy objectives. An exemption based on the final eligibility option is found to be the best option for targeting support at sectors whose competitiveness is most at risk, as well as having relatively small impacts on other areas of the economy as well as non-exempt consumer bills. Although the final eligibility option is likely to incur more administrative costs relative to the July 2013 policy options, this reflects its alignment to the revised EEAG. Therefore this option is deemed the most likely to be compliant with state aid.
151. Therefore, an exemption based on the final eligibility option mitigates negative impacts on other sections of the economy and consumers whilst still effectively targeting support at sectors most exposed to competitiveness risks. This option is also deemed the most likely to be compliant with state aid. For these reasons the analysis presented in this IA is broadly supportive of an exemption based on the final eligibility option.

Annex A

152. Table 9 provides average price and bills impacts over the period 2015 - 2020. Table 10 provides annual impacts over the same period.

Table 9: Impact of options in pounds and percentage change, average for 2015 - 2020

| | Average price impact in £ per MWh 2015-2020 (excl. VAT) vs. no EMR | Average electricity bill impact 2015-2020 in pounds and as a percentage of final bill | | | |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------|--------------------|--------------------------------|
| | | Domestic consumer (incl. VAT) | Medium-sized business user | Eligible company | Company eligible for the taper |
| EMR support cost (without exemption, excluding Capacity Market and CfD administrative costs) | £4.00 | £13.80 (2%) | £41,000 (3%) | £377,800 (4%) | |
| | Average price impact in £ per MWh 2015-2020 (excl. VAT) | Average additional electricity bill impact 2015 - 2020 in pounds and as a percentage change | | | |
| July 2013 Consultation Options | | | | | |
| Option 1a: Compensation mirror (upper bound) | £0.40 | £1.30 0.2% | £3,700 0.3% | -£295,400 -3.2% | N/A |
| Option 1b: Reduced exemption rate | £0.30 | £1.00 0.2% | £3,100 0.3% | -£243,800 -2.6% | N/A |
| Option 2a: Compensation + | £0.50 | £1.70 0.3% | £5,100 0.4% | -£292,900 -3.2% | N/A |
| Option 2b: Compensation + Taper | £0.40 | £1.50 0.3% | £4,600 0.4% | -£293,800 -3.2% | -£167,800 -1.8% |
| Option 3a: Compensation Mirror (lower bound) | £0.20 | £0.80 0.1% | £2,400 0.2% | -£297,800 -3.2% | N/A |
| Option 3b: Reduced exemption rate | £0.20 | £0.70 0.1% | £2,000 0.2% | -£247,100 -2.7% | N/A |
| Final eligibility option | | | | | |
| Final eligibility option | £0.20 | £0.90 0.2% | £2,600 0.2% | -£317,600 -3.4% | N/A |

Table 10: Annual impact of options in pounds and percentage change, price per megawatt hour and domestic bill impact for 2015-2020

| | Option 1a: Compensation mirror (upper bound) | | Option 1b: Reduced exemption rate | | Option 2a: Compensation + Taper | | Option 2b: Compensation + Taper | | Option 3a: Compensation Narrow (lower bound) | | Option 3b: Reduced exemption rate | | Final eligibility option | |
|---------------------|-------------------------------------------------|-------------------------------------------|---------------------------------------|-------------------------------------------|---------------------------------------|-------------------------------------------|---------------------------------------|-------------------------------------------|-------------------------------------------------|-------------------------------------------|---------------------------------------|-------------------------------------------|---------------------------------------|-------------------------------------------|
| | Price impact per MWh 2020 (excl. VAT) | Bill impact & % of final bill (incl. VAT) | Price impact per MWh 2020 (excl. VAT) | Bill impact & % of final bill (incl. VAT) | Price impact per MWh 2020 (excl. VAT) | Bill impact & % of final bill (incl. VAT) | Price impact per MWh 2020 (excl. VAT) | Bill impact & % of final bill (incl. VAT) | Price impact per MWh 2020 (excl. VAT) | Bill impact & % of final bill (incl. VAT) | Price impact per MWh 2020 (excl. VAT) | Bill impact & % of final bill (incl. VAT) | Price impact per MWh 2020 (excl. VAT) | Bill impact & % of final bill (incl. VAT) |
| 2015 | £0.03 | £0.10 | £0.02 | £0.10 | £0.04 | £0.20 | £0.04 | £0.10 | £0.02 | £0.10 | £0.02 | £0.10 | £0.02 | £0.10 |
| | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2016 | £0.10 | £0.40 | £0.10 | £0.30 | £0.10 | £0.50 | £0.10 | £0.50 | £0.10 | £0.30 | £0.10 | £0.20 | £0.10 | £0.30 |
| | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| 2017 | £0.20 | £0.80 | £0.20 | £0.70 | £0.30 | £1.10 | £0.30 | £1.00 | £0.10 | £0.50 | £0.10 | £0.40 | £0.20 | £0.60 |
| | 0.1% | 0.1% | 0.1% | 0.1% | 0.2% | 0.2% | 0.2% | 0.2% | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |
| 2018 | £0.40 | £1.50 | £0.30 | £1.20 | £0.60 | £2.00 | £0.50 | £1.80 | £0.30 | £1.00 | £0.20 | £0.80 | £0.30 | £1.00 |
| | 0.2% | 0.3% | 0.2% | 0.2% | 0.3% | 0.4% | 0.3% | 0.3% | 0.2% | 0.2% | 0.1% | 0.1% | 0.2% | 0.2% |
| 2019 | £0.60 | £2.00 | £0.50 | £1.70 | £0.80 | £2.80 | £0.70 | £2.50 | £0.40 | £1.30 | £0.30 | £1.10 | £0.40 | £1.40 |
| | 0.3% | 0.3% | 0.3% | 0.3% | 0.4% | 0.5% | 0.4% | 0.4% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% |
| 2020 | £0.80 | £2.70 | £0.70 | £2.20 | £1.10 | £3.70 | £1.00 | £3.30 | £0.50 | £1.70 | £0.40 | £1.40 | £0.50 | £1.80 |
| | 0.4% | 0.5% | 0.4% | 0.4% | 0.6% | 0.6% | 0.5% | 0.6% | 0.3% | 0.3% | 0.2% | 0.2% | 0.3% | 0.3% |
| 2015 - 2020 average | £0.40 | £1.30 | £0.30 | £1.00 | £0.50 | £1.70 | £0.4 | £1.50 | £0.20 | £0.80 | £0.20 | £0.70 | £0.20 | £0.90 |
| | 0.2% | 0.2% | 0.2% | 0.2% | 0.3% | 0.3% | 0.3% | 0.3% | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% | 0.2% |