



Department for
Business, Energy
& Industrial Strategy

Evaluation of the second Climate Change Agreements scheme

Synthesis report

BEIS Research Paper Number 2020/014

April 2020



Acknowledgements

This report was prepared by CAG Consultants, in partnership with Winning Moves, University College London and Cambridge Econometrics, with Verco and Strategy Development Solutions as expert advisers. The research would not have been possible without the cooperation of all of those who participated in interviews, surveys and workshops.



© Crown copyright 2020

This publication is licensed under the terms of the Open Government Licence v3.0 except where otherwise stated. To view this licence, visit nationalarchives.gov.uk/doc/open-government-licence/version/3 or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email: psi@nationalarchives.gsi.gov.uk.

Where we have identified any third-party copyright information you will need to obtain permission from the copyright holders concerned.

Any enquiries regarding this publication should be sent to us at: enquiries@beis.gov.uk

Contents

Contents	3
Executive summary	4
Glossary	14
1. Introduction to the evaluation	17
2. Methodology	21
3. What were the outcomes of the second CCA scheme?	29
4. What contribution has the second CCA scheme made to energy efficiency?	37
5. What contribution has the second CCA scheme made to competitiveness?	49
6. Has the second CCA scheme delivered value for money?	63
7. How effective and efficient has delivery of the second CCA scheme been?	70
8. Views on future policy	77
9. Conclusions	84
Appendices	85
Appendix 1: Timeline for CCA scheme	86
Appendix 2: Theory of change	90
Appendix 3: Scheme data tables	106

Executive summary

Key findings from the CCA evaluation

The key findings about the second Climate Change Agreements (CCA) scheme were:

- The scheme has been popular with industry, with between 80-100% of businesses participating in most eligible sectors and covering an estimated 114 TWh of energy use in 2018 (compared to 264 TWh for all industry¹). The main motivation for joining the scheme was energy cost reductions (particularly Climate Change Levy (CCL) discount) and the main factors for leaving the scheme were if firms had gone out of business and the introduction of the mineralogical and metallurgical (min-met) exemption² from CCL.
- Slightly more than half of target units achieved their targets (for the first three target periods: TP1-TP3)³ with no use of buy-out or surplus, but the average level of underperformance was low. Almost all CCA participants had taken action on energy efficiency since the start of the scheme. Target performance was influenced not only by energy efficiency action but a wide range of other factors, including the tightness of targets and changes to production levels and product mix.
- Although the scheme was one of many drivers for energy efficiency, it did make a contribution, with electricity use on most CCA sites being at least 4% lower, on average, compared to similar sites outside the CCA scheme that paid full CCL⁴. A greater scale of impact (11% lower) was found for electricity use on CCA sites in sectors that were admitted to the CCA scheme because they met energy-intensity and trade-intensity criteria. The scheme has brought in an annual estimated energy saving of around 1.2-2.3 TWh per year, based on energy use reported in TP3.
- Econometric analysis also suggested that the second CCA scheme had more influence on energy savings than the first CCA scheme.
- A complex set of factors affected the degree of CCA influence on specific firms, with less influence on firms that were either very large/energy intensive or very small/non-energy intensive. The research suggested that the CCA tended to have more influence on: firms that had not previously taken a systematic approach to energy efficiency; those that faced challenging targets; those that had a culture of complying with targets; those that had strong board-level engagement with energy; those with keen energy managers; and those that ring-fenced CCL savings to fund energy measures.
- During TP3, the CCA scheme reduced energy prices by around 5% for those that would otherwise pay CCL (and more than 10% for those that would otherwise pay

¹ Based on figures converted from Thousand tonnes of oil equivalent to TWh. Energy Consumption in the UK, Table C1.

² The min-met exemption, introduced on 1st April 2014, exempted commodities used in mineralogical and metallurgical processes from paying CCL and also provided exemption from the CRC scheme.

³ TP1 covered the period 2013-2014; TP2 covered 2015-2016; TP3 covered 2017-18; TP4 covers 2019-2020.

⁴ For 2013-2016.

both CCL and CRC). Overall benefits for CCA participants (CCL and CRC savings and energy bill savings) appear to have significantly outweighed costs (CCA administration costs, buy-out cost and (where attributable to the CCA) costs of energy saving measures). The overall net benefit to participants was estimated to be in the approximate range £185-450 million per annum, based on TP3 energy use. As outlined in chapter 6 of the main report, the wide range for the net benefits reflects the uncertainty for each of the key sources used in the analysis (estimates of CCL and CRC avoided; savings on energy bills and spend on energy measures).

- The macro-economic and micro-econometric work both found a positive impact of the CCA scheme on growth: the macro-economic modelling found a 0.0-0.6% positive impact on Gross Value Added, while the micro-econometric analysis found a 5% positive impact on turnover. Cost-effectiveness analysis used the more conservative macro-economic estimate: possible reasons for the wide range of estimates are explored in the main report.
- The CCA scheme contributed to industrial competitiveness, (defined in terms of increased turnover or 'Gross Value Added') alongside a wide range of other factors. It had more influence on the competitiveness of firms facing greater international competition, including those owned by international companies, and those in highly energy-intensive sectors that were not already exempt from CCL under the min-met exemption (e.g. chemicals, plastics).
- Restricting the scheme to more energy- and trade-intensive sectors could possibly improve cost-effectiveness further. The contribution of any future similar policy to supporting clean growth will be strongly influenced by the tightness of the scheme's targets.
- Overall, the CCA is an established scheme, with effective systems in place to deliver it. It was viewed positively by the vast majority of research respondents, with 92% of CCA participants reporting that they were likely to continue in the scheme and participate in a future scheme, if there is one. The CCA scheme was seen by participants and sector associations as one of the few policies providing a positive incentive for energy efficiency. The shelter that the CCA provided from CCL and previously CRC supported the competitiveness of energy-intensive industries, including some that were subject to international competition.

Introduction to the evaluation

In the [Clean Growth Strategy \(CGS\)](#), the Government announced that it aims to support businesses to improve their energy efficiency by at least 20% by 2030 and has since legislated for the UK to reach net zero greenhouse gas emissions by 2050.⁵ An evaluation of the Climate Change Agreements scheme (CCA) was announced as part of the research and evaluation work to help deliver the improvement in business energy efficiency set out in the CGS. This evaluation was commissioned by the Department for Business, Energy and Industrial Strategy (BEIS) and led by CAG Consultants in partnership with University College London (UCL), Winning Moves and Cambridge Econometrics, and with Verco and Strategy Development Solutions as expert advisers.

The CCA scheme is a voluntary agreement (VA) scheme which aims to mitigate the effect of the Climate Change Levy (CCL) on energy- and trade-intensive industry. Firms in eligible sectors can choose to participate under sector-specific ‘umbrella’ CCA agreements, administered by sector associations. In addition to maintaining the competitiveness of such industry, the scheme aims to deliver significant energy efficiency improvements. It offers discounts on CCL (and until March 2019, certain exemptions from CRC allowances)⁶ in exchange for firms meeting targets for carbon or energy efficiency improvements. This evaluation focused on the second CCA scheme which started in 2013 and currently runs until the end of March 2023.

About the evaluation

This evaluation was theory based, with a strong quasi-experimental component. Contribution analysis⁷ was used as the overarching method for assessing the contribution of the second CCA scheme to its current, inter-linked objectives, as advised by BEIS during the scoping phase of the evaluation:

- To support the retention of energy-intensive industries in the UK by offering discounts on carbon taxes (CCL and, until April 2019, allowances for the CRC Energy Efficiency Scheme (CRC)). This can be seen as reducing ‘carbon leakage’.⁸
- To improve the efficiency of energy-intensive industry using energy and carbon targets.

Evidence from multiple workstreams (Table 1 below) has been collected and analysed.

⁵ <https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law>

⁶ Organisations qualifying for the CRC Energy Efficiency Scheme had to pay CRC allowances on eligible energy use from the start of the CRC scheme in April 2010 to the end of the scheme in March 2019. Organisations with CCAs were exempt from paying some CRC allowances.

⁷ Contribution analysis involves the development and progressive refinement of the scheme’s ‘contribution story’, summarising how it has contributed to observed outcomes and scheme objectives, whilst taking into account other external influences that could provide alternative explanations.

⁸ Carbon leakage occurs if businesses were to transfer production to other countries with lower energy costs or emission constraints. Whilst reducing emissions in one country, it increases emissions elsewhere.

Table 1: Summary of methods

Workstream	Summary of methods
1. Evaluation framework, theory of change	- Development of an evaluation framework and theory of change (ToC), informed by workshops with BEIS, the Environment Agency (EA) and CCA sector associations, - Literature review of international evidence relating to Voluntary Agreement schemes and carbon leakage
2. Analysis of scheme data	- Analysis of data held by the EA on CCA participants, including emissions and target performance at target unit (TU) level, and entry/exit dates at facility level.
3. Micro-econometric analysis and data matching	- Econometric analysis of energy consumption and economic variables using facility-level data, comparing changes in performance for CCA facilities to those at similar non-CCA facilities.
4. Macro-economic modelling	- Econometric analysis of the impact on energy consumption at the macro-level (at 2-digit SIC code level), pre- and post- implementation of the second CCA scheme. Industries in other EU Member States were used as the comparison group. - Macro-economic modelling using the E3ME model ⁹ to estimate the impact of CCL and CRC discounts, and energy demand savings, on economic variables.
5. Quantitative research	- Reanalysis of past survey findings from evaluations of other schemes, comparing the reported energy efficiency behaviour of CCA participants and non-participants. - A telephone and online survey of 387 CCA participants.
6. Qualitative research	-In-depth telephone interviews with sector associations, CCA participants, non-participants and energy consultancies. -Online survey of sector associations.

Findings

What outcomes have been observed during the second CCA scheme?

The CCA scheme is a voluntary scheme that has been popular with industry, with relatively stable participation during the scheme. In November 2018, 3,418 ‘Target Units’ (TUs) reported to the CCA scheme across 49 active sectors, comprising 9,187 sites or ‘facilities’. Data matching suggests that around 2,600 firms have at least one TU in the scheme. Sector associations reported that participation rates amongst eligible firms were 80-100% for most sectors. CCL reductions were reported to be the main motivation for firms joining the CCA scheme. In 2018, CCA participants reported around 114 TWh of energy use under the CCA scheme (compared to 264 TWh of energy consumption across all industry).¹⁰

The EA advised that there had been 1252 voluntary terminations of TUs up to June 2018. These were balanced by new entrants to the scheme, including a marked increase before the closure of the scheme to new entrants, with 439 TUs joining in 2018. The main factors behind firms leaving the scheme were if firms had gone out of business and the introduction of the

⁹ The E3ME model is an input-output model of the UK, Europe and global economy, developed by Cambridge Econometrics. It was selected, on the basis of a model review by Professor Paul Ekins in 2018, as the most appropriate model to assess CCA impacts on UK economic and environmental variables at macro-level.

¹⁰ Based on figures converted from Thousand tonnes of oil equivalent to TWh. [Energy Consumption in the UK, Table C1.](#)

min-met exemption during TP1.¹¹ Scheme data analysis found that firms that struggled to meet their targets, and therefore would have had to pay significant levels of buy-out, were more likely to leave the scheme. Business size was a key factor in firms choosing to leave and in eligible firms choosing not to join: sector associations suggested that smaller firms had less capacity to manage energy efficiency and that firms with lower energy use (due to size) would obtain less financial benefit from the CCA scheme relative to the administrative burden of participation.

Slightly more than half of TUs achieved their targets without using buy-out or banked surplus¹² in each target period (TP), with little variation between TPs. The average level of underperformance¹³ was low (4-6.5% of total emissions¹³ for the scheme). The level of overachievement¹⁴ of targets was greater (8.7%-13.5% of total emissions), exceeding the level of underperformance in each of the first three target periods.

There were wide variations in target performance between TUs, with some patterns observable at CCA sector level. Performance was influenced not only by energy efficiency action but also by: the tightness of targets in different sectors; changes in production levels and product mix that were not fully reflected in targets; site rationalisation in multi-site TUs (which affected the stringency of the target); and each TU's chosen target type and historic baseline.¹⁵ The majority (83%) of TUs had relative targets, specified in terms of energy per unit of production¹⁶, and they generally performed better than those who had chosen absolute targets, which were less able to account for changes in production.

Almost all (98%) CCA participants had taken some action on energy efficiency since the start of the second CCA scheme. Businesses both within and outside the CCA scheme gave examples of significant energy and carbon savings being made as a result of such action. Qualitative research findings suggested that barriers to further action included constrained capital budgets, shifts in consumer demand and regulations that required more energy-intensive products. Sector associations reported that large-scale investment in replacement plant was rarely implemented owing to long payback periods and potential disruption to production. Similar barriers have been reported in other energy efficiency studies.¹⁷

What contribution has the second CCA scheme made to energy efficiency?

Although the scheme was one of many drivers for energy efficiency, it did make a contribution, with electricity use on CCA sites being at least 4% lower than on similar sites outside the CCA scheme that paid full CCL¹⁸. A greater scale of impact (11% lower) was found for electricity use on CCA sites in sectors that were admitted to the CCA scheme because they met energy-

¹¹ The min-met exemption, introduced on 1st April 2014, exempted commodities used in mineralogical and metallurgical processes from paying CCL and also provided exemption from the CRC scheme.

¹² TUs can carry forward or 'bank' surplus accumulated by exceeding their targets in a previous target period.

¹³ Underperformance means the buy-out plus banked surplus that a TU needed to use to meet its target for a given TP, as a proportion of total reported emissions for the relevant TP.

¹⁴ Overperformance means the surplus generated by a TU relative to its target, as a proportion of total reported emissions for the relevant TP.

¹⁵ TUs were measured against their own baseline performance in 2008, the baseline year.

¹⁶ Scheme data analysis showed that the vast majority of TUs (83%) have Energy Relative targets, with the next most common types being Energy Novem (12% of TUs) and Energy Absolute (just over 5% of TUs), and the least common being Carbon Novem (less than 1% of TUs).

¹⁷ BEIS (2016). Building Energy Efficiency Survey (BEES) 2014-2015.

¹⁸ The econometric analysis covered the period 2011 to 2016 as more recent meter data was not available. The analysis excluded sites in TUs for which buy-out exceeded 20% of emissions, as these sites were deemed to be less influenced by the CCA scheme. This excluded around 15% of TUs from the analysis.

intensity and trade-intensity criteria. Gas use was also 13% lower for CCA sites in sectors that were admitted to the scheme on energy-intensity and trade-intensity criteria. Similarly, electricity use on CCA sites in min-met sectors was 4% lower over this period compared to min-met sites that left the scheme. Estimated savings in TP3 were around 1.2-2.3 TWh per year. This was consistent with findings from re-analysis of quantitative data from previous BEIS evaluations that found (on average) slightly more action on energy efficiency for CCA participants compared to similar non-participants in manufacturing sectors.

There were wide variations in the degree to which the scheme influenced different participants. The survey of CCA participants found that almost half (49%) of participants that took action on energy efficiency reported they would have taken all of the same actions (on the same scale and timeframe), if they had not participated in the second CCA scheme but had instead been fully exposed to CCL. The other half reported that the CCA scheme made some difference to their energy efficiency action: 6% stated that they would not have taken action on energy efficiency at all in the absence of the scheme, 24% stated that they would have undertaken some but not all of the actions, and a further 20% stated they would have taken all the same actions, but with different timing, or not to the same extent (e.g. on a reduced scale).

These levels of attribution are similar to those observed for other energy efficiency policies¹⁹. Findings from quantitative and qualitative research depended on respondents' recall since the start of the second CCA scheme in 2013 so they may understate CCA influence if, for example, personnel have changed or CCA activities have become part of 'normal' activities within firms.

Where CCA participants reported no influence on energy efficiency, this was primarily because they were already undertaking action in response to other drivers (e.g. highly energy intensive firms; larger firms subject to other energy policies and public-facing firms with strong Corporate Social Responsibility (CSR) drivers).

Where CCA participants did report CCA influence on energy efficiency, this acted in tandem with other drivers. A complex set of factors affected the degree of CCA influence on specific firms. There was less influence on firms that were very large/energy intensive (as these firms already faced many other drivers) and on very small/non-energy intensive firms (as CCL participation and energy efficiency action were less cost-effective). In between these two extremes, the research suggested that the CCA tended to have more influence on firms that:

- had not previously taken a systematic approach to energy efficiency;
- faced challenging targets;
- had a culture of complying with targets;
- had strong board-level engagement with energy;
- had keen energy managers; and
- that ring-fenced CCL savings to fund energy measures.

¹⁹ For example, an evaluation of Phase 1 of the CRC scheme found that around a third of CRC participants reported that energy efficiency action had been undertaken earlier or on a greater scale because of the CRC (Source: [BEIS \(2015\)](#)). Similarly, an early evaluation of the ESOS scheme found that a third (33%) of participants reported ESOS to have been influential in their decision to implement at least one energy efficiency improvement (Source: [BEIS \(2017\)](#)).

The evaluation evidence indicated that the scheme had more additionality where targets were more consistent, challenging and were supported by evidence agreed with the sector association. It also suggested that buy-out fees helped to motivate energy efficiency action for some participants. There was some evidence that targets were becoming harder to meet over time as targets tightened and as easier/lower cost measures were completed.

What contribution has the second CCA scheme made to competitiveness?

The CCA made some contribution to growth amongst CCA participants (see evidence below). In sectors facing international competition, it made a positive contribution to competitiveness and helped to protect energy-intensive industry. A wide range of other factors were also cited as affecting competitiveness, including energy costs and non-energy factors such as labour costs, raw material costs, location, productivity, regulation, exchange rates, tax rates, technological change, product quality, contractual arrangements and uncertainty about EU exit.

During TP3, participation in the CCA scheme reduced energy prices by around 5% for those that would otherwise pay CCL and by more than 10% for those that would pay both CCL and CRC. The benefit to participants from savings in CCL and CRC allowances was estimated to be in the approximate range £210-350 million per annum. The range arises from uncertainties about the proportion of CCA participants that would otherwise have been part of the CRC scheme, and about the proportion of CCA energy use in min-met sectors that would be exempt from CCL anyway under the min-met exemption. Insofar as the scheme encouraged more action on energy efficiency, participants also benefited from energy bill savings.

The CCL discounts were welcomed by participants but were described as being lower, and less valuable, than the min-met exemption and certain electricity levy exemptions available to Energy Intensive Industries (EII)²⁰. CCL discounts reduced the non-commodity element of energy costs and reduced the difference between energy costs in the UK and other countries.

Macro-economic modelling and micro-econometric analysis both found a positive impact of the CCA scheme on growth. Macro-economic modelling found a 0-0.6% positive impact on Gross Value Added (GVA) at 2-digit SIC sector level for CCA compared to non-CCA scenarios – this may be modest because the energy intensity of CCA firms was diluted at macro-sector level. The micro-econometric analysis found a 5% positive impact on turnover at CCA site level, when compared to non-CCA sites. Possible reasons for this difference are set out in the main report.

Sector associations saw the scheme as important for the competitiveness and viability of businesses in their sectors. They reported that CCA tax breaks (and improvements in energy efficiency) improved the profitability of participants and had some influence on investment and location decisions in some sectors.

Qualitative research indicated that the CCA impact on competitiveness was higher for firms in sectors facing international competition (including those owned by international companies) and for those in highly energy-intensive sectors (except where firms were already exempt from CCL). In these sectors, the CCA scheme slightly reduced the risk of firms or investment

²⁰ The EII schemes offer firms in specific sectors exemptions or compensation for certain non-commodity elements of electricity costs, provided that the firms can demonstrate that they meet specified electricity intensity criteria. While EII exemptions potentially offer larger benefits than the CCA scheme, the schemes have stricter eligibility criteria. A few hundred firms obtained EII exemptions in 2016-17 compared to an estimated 2,600 in the CCA scheme.

moving outside the UK. In other sectors, CCA participants were UK-focused and were relatively unaffected by international trade. The quantitative survey found that nearly 17% of participants had relocated sites since 2013 or were considering doing so at the time of the research. Of those firms that had relocated or considered relocation, 62% had done so in the UK, while 35% had looked at sites in Europe and beyond²¹. Rising energy costs were cited as an influence on relocation decisions by just over a quarter (27%) of those firms relocating or considering relocation.

Has the second CCA scheme delivered value for money?

The evaluation considered whether the second CCA scheme has delivered value for money for CCA participants, Government and wider society, compared to the counterfactual of firms paying full CCL and, where relevant, CRC. This was based on high-level estimates of costs and benefits to different parties, using evidence from the various evaluation workstreams. Caveats about these estimates are presented in the Technical Report.

Overall benefits for CCA participants appear to have outweighed costs significantly. Estimated CCL and CRC savings and energy bill savings outweighed the estimated costs of CCA administration costs, buy-out cost and (where attributable to the CCA) costs of energy saving measures. Excluding the benefits of increased turnover arising from increased competitiveness, which are considered under benefits to wider society below, the overall estimated impact was in the range £185-450 million per year. The range of net benefits arose from combining high and low estimates for various costs and benefits.

The cost to Government of CCL and CRC forgone, net of buy-out payments, was estimated to be in the range £200-340 million per year.

The cost effectiveness analysis indicated that the main benefits of the CCA scheme to wider society were the contribution to industrial competitiveness and energy savings, together with a reduction in carbon emissions and associated benefits such as air quality. The GVA benefits and energy and carbon saving benefits outweighed the estimated administrative costs and costs of compliance for participants²². Sector-level analysis (based on scheme data and micro-econometric findings) indicated that the energy savings attributable to the CCA scheme were estimated to be 1.2-2.3 TWh per year, and carbon savings were estimated to be 0.3-0.7 million tonnes of CO₂ equivalent per year, compared to the counterfactual scenario²³. The monetary value of turnover benefits and energy bill savings were estimated to be significantly greater in scale than the monetary value of carbon savings, at the carbon values currently projected by Government²⁴.

As noted above, the scheme included some sectors with no or limited direct exposure to international competition and some with relatively low energy intensity. It is possible that the value to society could have been increased by targeting the scheme more narrowly at sectors

²¹ This is based on a multiple response question, so firms may have considered sites within and beyond the UK.

²² The GVA benefits were calculated from macro-economic modelling evidence. Energy and carbon saving benefits were based on micro-econometric findings. The estimated administrative costs and costs of compliance for participants are based on quantitative survey evidence.

²³ The counterfactual scenario was full CCL and no CCA targets for non-min-met sectors; and no CCL or CCA targets for min-met sectors.

²⁴ The short-term traded value of carbon of £12.76/tCO₂e was assumed to be 2018, rising to £80/tonne by 2030 (2018 prices). ((BEIS, 2018) [Updated short-term traded carbon values – used for UK public policy appraisal](#))

that were at risk from international competition, as they were more at risk of carbon leakage, and at sectors with higher energy intensity, which showed greater CCA impact²⁵.

Sector associations commented that non-CCA participants in eligible sectors would pay higher CCL rates than competitors who were CCA participants, and that this would put them at a competitive disadvantage. This concerned them because the CCA scheme closed to new entrants in November 2018, with the implication that firms and sites starting eligible activities after this date would be excluded from the scheme. BEIS and the EA advised that the timing of the closure had been set at the start of the scheme and was designed to protect the scheme's value for money to Government, by ensuring that participants had enough time to take action on energy efficiency during the final stages of the scheme.

How effective and efficient has delivery of the CCA scheme been?

Participants and sector associations were generally familiar with the scheme and had developed systems to meet its relatively complex requirements. Longstanding participants did not therefore perceive the scheme as burdensome. The most onerous aspects of the scheme were reported to be scheme entry applications and variations, demonstration of compliance with the 70/30 rule²⁶ and target stringency tests. The baseline year of 2008 was seen as dated and anomalies in baseline year production were reported to result in some targets being overly relaxed or stringent. Eligibility rules (based on Environmental Permitting Regulations (EPR) and on energy- and trade-intensity criteria) were also found to be dated. Some sectors qualifying on EPR grounds were not particularly energy or trade intensive, meaning that their inclusion might therefore not be entirely consistent with the scheme's current objectives.

In a survey of sector association representatives, nearly half had reservations about the effectiveness of the CCA audit and enforcement processes, describing them as 'somewhat effective'²⁷. In interviews, some sector associations called for them to be strengthened. The EA reported that audit rates were lower for the voluntary CCA scheme than for other mandatory schemes (e.g. CRC), on the grounds that onerous audits and enforcement might discourage firms from participating in a voluntary scheme.

Some sector associations and participants would have preferred the target-setting process²⁸ with Government at the start of the second CCA scheme to have been more collaborative and transparent. There were mixed views on the tightness of resulting targets. Sector associations reported that their sector targets were very, or reasonably, challenging and reported some TUs leaving the scheme as a result of tight targets. In the quantitative survey, targets being tough to meet was the most commonly cited factor behind participants missing targets. But, in qualitative research, other participants reported having easy to achieve targets (e.g. due to activity levels in their baseline year). Energy consultancies suggested that variations in performance were partly due to variations in the tightness of targets between sectors, as well as differences in circumstances or baselines between CCA participants.

²⁵ The micro-econometric analysis found a greater scale of impact on energy use by sites in sectors that were admitted to the CCA scheme because they met energy-intensity and trade-intensity criteria, than for sites in sectors that were admitted because they were covered by Environmental Permitting Regulations (EPR).

²⁶ The 70/30 rule allows CCA participants to report energy use for non-eligible activities, and claim CCL reductions on this energy use, provided it comprises no more than 30% of site energy use. The burdensome aspect of this rule was demonstration of compliance, particularly for sites close to the 70/30 limit.

²⁷ There were five response options ranging from 'not at all effective' to 'extremely effective' with 'somewhat effective' being the central response.

²⁸ The target-setting process is outlined in chapter 7 of the main report.

Whilst there were wide variations in the approach taken by sector associations to their management of the CCA scheme, most (88%) CCA participants thought that their management was efficient or very efficient.

Overall perspectives on the CCA scheme

The CCA policy was viewed positively by the vast majority of research respondents, with 92% of CCA participants reporting that they were likely to continue in the scheme and participate in a future scheme, if there is one.

Qualitative research found that some CCA participants and sector associations saw the CCA as one of the few policies providing a positive incentive for energy efficiency. There was evidence from a range of sources (including CCA participants, sector associations and the micro-econometric and macro-modelling workstreams) that the CCL (and, formerly, CRC) shelter provided by the CCA scheme supported the competitiveness of energy-intensive industries, including some that were subject to international competition. Whilst CCL discounts relieved only one part of the cumulative burden of non-commodity energy costs, most CCA participants and sector associations reported that any removal of the CCL discounts would be interpreted by industry as a negative signal from Government. Furthermore, CCL discounts were reported to have become more important with the introduction of new, higher CCL rates in April 2019 and the scheme was viewed as increasingly relevant to UK Government's new commitment to reach zero carbon emissions by 2050.

The CCA is an established scheme, with effective systems in place to deliver it. It is also a cost-effective scheme for both participants and wider society. The benefits of the scheme appear to outweigh the costs, but it is possible that restricting the scheme to more energy- and trade-intensive sectors could further improve its cost-effectiveness. The contribution of any future similar policy to supporting clean growth will be strongly influenced by the tightness of the targets set for participants.

Glossary

Term	Definition
Absolute target	A target expressed in absolute terms, e.g. reduction in kWh or tonnes of carbon. In the Climate Change Agreements scheme (CCA), the performance of each Target unit (TU) was measured relative to its own baseline, usually 2008.
Bubbling	Multiple facilities being included within a single TU.
Buy-out	Buy-out is a fee a TU may pay to retain certification in the CCA scheme. It is payable at the end of a target period (TP) if the target unit has failed to meet the target stated in its underlying agreement. The buy-out fee is calculated by multiplying the amount by which the target unit has failed to meet its target, expressed in terms of tonnes of carbon dioxide equivalent (tCO _{2e}), by £12 per tonne for TP1 and TP2, and by £14 per tonne for TP3 and TP4.
Carbon leakage	Carbon leakage occurs if businesses were to transfer production to other countries with lower energy costs or emission constraints. Whilst reducing emissions in one country, it increases emissions elsewhere.
Certification period	The period of validity of a certificate issued as part of the CCA, stating that the facilities listed in it are eligible for the Climate Change Levy (CCL) discount. Certification periods generally last for two years and are specified in the facility's underlying agreement.
CHPQA	The Combined Heat & Power Quality Assurance programme is a government initiative for assessing CHP schemes throughout the UK. Participation in the CHPQA programme is voluntary but grants eligibility to a range of benefits, including CCL exemption (in respect of electricity directly supplied).
Climate Change Agreements scheme (CCA)	The scheme under which eligible facilities can receive a discount on the rate of CCL, in return for achieving energy or carbon efficiency targets. CCA facilities were exempt from buying CRC allowances. The second CCA scheme, which is the focus of this evaluation, runs from 1 January 2013 to 31 December 2020, followed by a certification period running to 31 March 2023.
Climate Change Levy (CCL)	A tax on energy delivered to non-domestic users in the UK.

CRC Energy Efficiency scheme (CRC)	A mandatory UK scheme, now closed, in which qualifying energy users had to buy allowances for every tonne of carbon they emitted.
EDR	Organisations received financial support for implementing energy efficiency projects through the Electricity Demand Reduction pilot (EDR) if they delivered electricity savings at peak times. The second, and final, phase of the EDR pilot concluded in December 2018.
EII	Energy Intensive Industry exemptions, which offer firms in certain sectors compensation or exemption for some non-commodity elements of electricity prices, provided that they meet specific energy intensity criteria.
EPR	The Environmental Permitting (England and Wales) Regulations: At the start of the first CCA scheme, 44 CCA sectors were admitted on the grounds that they were covered by Environmental Permitting Regulations (EPR). From January 2006, new sectors were permitted to join the scheme provided they met specified energy- and trade-intensity criteria. The original sectors admitted on EPR grounds did not necessarily meet these criteria.
ESOS	The Energy Savings Opportunity Scheme: a mandatory energy assessment scheme for large organisations in the UK. Organisations that qualify for ESOS must carry out ESOS assessments at least every 4 years. These assessments are audits of the energy used by their buildings, industrial processes and transport to identify cost-effective energy saving measures.
EU ETS	The European Union Emissions Trading System. A mandatory greenhouse gas emissions trading system affecting more than 1,000 power stations and large industrial plants in the UK.
Facility	An installation, site or part of site which is eligible to be covered by a Climate Change Agreement.
Min-met exemption	CCL (and formerly CRC) exemption provisions introduced for those in the mineralogical and metallurgical sectors.
Novem target	A Novem target is used by TUs which produce two or more products whose throughput is measured in different units (for example, litres and m ²) or which have significantly different energy intensities of manufacture. The target is stated as a ratio of the target energy consumption to the reference energy. The reference energy is the energy that would have been consumed in the base year for the same level of throughput and product mix as the target period.

	In the CCA, the performance of each TU was measured relative to its own baseline, usually 2008.
Relative target	A target expressed in relative terms, e.g. kWh or tonnes of carbon per unit of production. In the CCA, the performance of each TU was measured relative to its own baseline, usually 2008.
Surplus	The amount by which the emissions have fallen below the target for any target period. Surplus can be used in future target periods to offset a buy-out fee.
Target period (TP)	The period over which the energy consumption of participating TUs is measured and reported. A target period lasts for 24 months. The second CCA target periods are: TP1 - 1 January 2013 to 31 December 2014 TP2 - 1 January 2015 to 31 December 2016 TP3 - 1 January 2017 to 31 December 2018 TP4 - 1 January 2019 to 31 December 2020
Target Unit (TU)	The target facility or group of target facilities that join together for the purposes of CCA target setting and reporting. A facility or group of facilities becomes a TU once it has signed its underlying agreement.
Theory of Change (ToC)	A tool for policy/scheme design and evaluation which aims to provide a description of how the desired change is expected to happen. It outlines the causal linkages, i.e., its shorter-term, intermediate, and longer-term outcomes, as well as the assumptions which lie beneath the expected transition from one to the next.
Umbrella agreement	An agreement between a sector association and the Environment Agency that governs the obligations of both parties within the CCA scheme.
Voluntary Agreement scheme (VA)	According to the IEA (1997) VAs are: 'essentially a contract between the government and industry or negotiated targets with commitments and time schedules on the part of all participating parties'.

1. Introduction to the evaluation

This report presents findings from the evaluation of the second Climate Change Agreements (CCA) scheme. In the [Clean Growth Strategy \(CGS\)](#), the Government announced that it aims to support businesses to improve their energy efficiency by at least 20 per cent by 2030 and has since legislated for the UK to reach net zero greenhouse gas emissions by 2050²⁹. An evaluation of the CCA scheme was announced as part of the research and evaluation work to help deliver the improvement in energy efficiency set out in the CGS. This evaluation was commissioned by the Department for Business, Energy and Industrial Strategy (BEIS) and led by CAG Consultants in partnership with University College London (UCL), Winning Moves and Cambridge Econometrics, and with Verco and Strategy Development Solutions as expert advisers. It builds on an earlier scoping study³⁰ undertaken for the Department of Energy and Climate Change (predecessor to BEIS) during 2015.

What is the CCA scheme?

The CCA scheme is a voluntary agreement (VA) scheme³¹ which aims to mitigate the effect of the Climate Change Levy (CCL) on energy- and trade-intensive industry. Firms in eligible sectors can choose to participate under sector-specific ‘umbrella’ CCA agreements, administered by sector associations. In addition to maintaining the competitiveness of such industry, it aims to deliver significant energy efficiency improvements. The scheme offers discounts on CCL in exchange for firms meeting scheme requirements related to targets for carbon or energy efficiency improvements. Until March 2019, the CCA scheme also offered participants certain exemptions from the CRC Energy Efficiency Scheme³².

The CCA scheme aims to contribute to clean growth by promoting energy efficiency while protecting the competitiveness of energy- and trade-intensive industry. It seeks to retain jobs, Gross Value Added (GVA) and investment in these industries in the UK, reducing so called ‘carbon leakage’, i.e. the relocation of energy-intensive businesses to other countries that have lower energy costs. This rationale is summarised in Figure 1.1 below.



Figure 1.1: Summary of rationale for the second CCA scheme

²⁹ <https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law>

³⁰ CAG Consultants, Databuild, Carbon Trust and Imperial College Business School (2015) Scoping and evaluation of the CCA scheme, for the Department for Energy and Climate Change, unpublished.

³¹ According to the IEA (1997) VAs are: “essentially a contract between the government and industry, or negotiated targets with commitments and time schedules on the part of all participating parties”

³² Organisations qualifying for the CRC Energy Efficiency Scheme had to pay CRC allowances on emissions from eligible energy use from the start of the CRC scheme in April 2010 to the end of the scheme in March 2019. Organisations with CCAs were exempt from paying some CRC allowances.

This evaluation focuses on the second CCA scheme which started in January 2013. The first CCA scheme ran from January 2001 to March 2013 and comprised five target periods (TPs) at two-yearly intervals³³, followed by a final certification period. Meeting scheme requirements for a given TP allowed participants to qualify for CCL discounts in the subsequent certification period. The second CCA scheme involves four two-year TPs running from 2013-2014 through to 2019-2020, with five certification periods as shown in Figure 1.2 below. Three TPs have been completed so far in the second CCA scheme and TP4 is now underway.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Target Period (TP)	TP1: 1 Jan 2013 to 31 Dec 2014		TP2: 1 Jan 2015 to 31 Dec 2016		TP3: 1 Jan 2017 to 31 Dec 2018		TP4: 1 Jan 2019 to 31 Dec 2020				
Certification period (CP)	CP1: 1 Apr 2013 to 30 Jun 2015		CP2: 1 Jul 2015 to 30 Jun 2017		CP3: 1 Jul 2017 to 30 Jun 2019		CP4: 1 Jul 2019 to 30 Jun 2021		CP5: 1 Jul 2021 to 31 Mar 2023		

Figure 1.2: Target periods and certification periods for the second CCA scheme

At the start of the first CCA scheme, 44 CCA sectors were admitted on the grounds that they were covered by Environmental Permitting Regulations (EPR)³⁴. From January 2006, new sectors were permitted to join the scheme provided they met specified energy- and trade-intensity criteria³⁵. The original sectors admitted on EPR grounds did not necessarily meet these criteria. There have been various changes to sector participation and there are now 53 sectors (as listed in Appendix 3). At the end of TP3, 3,418 ‘Target Units’ (TUs – organisations or parts of organisations) reported to the CCA scheme across 49 active sectors, comprising 9,187 sites or ‘facilities’³⁶.

Under the second CCA scheme, a nominated ‘sector association’ established an [‘umbrella agreement’ for one or more sectors](#) with the Environment Agency (EA), the organisation that administers the scheme on behalf of BEIS. The umbrella agreement specified the types of activities that were eligible for the CCA within a given sector, the percentage improvement required in each TP, relative to a baseline (usually 2008), and the currency of the improvement target (i.e. energy or carbon). TUs that operated eligible processes within the sector could then choose to enter an ‘underlying agreement’ with the EA to improve the performance of its eligible sites (known as ‘facilities’). This agreement commits the TU to meet improvement targets agreed with the sector association, which tighten in each successive TP. The sector association set the TU targets so that they add up to the overall improvements specified in their umbrella agreement. Each TU can choose whether to specify their target in absolute terms (e.g. in kWh or tonnes of carbon) or in relative terms (e.g. kWh per unit of production, using a metric of their choice; or using a weighted average of multiple products, known as a ‘Novem’ target). The performance of each TU is measured relative to its own baseline (usually 2008), in terms of its chosen target metric.

³³ In the first CCA scheme, participants only reported emissions and had to meet targets in alternate years. In the second scheme, reported emissions cover both years within the relevant TP.

³⁴ Pollution Prevention and Control regulations (2000), which were superseded by the Environmental Permitting (England and Wales) regulations (2007, 2010 and 2016)

³⁵ The Climate Change Agreements (Eligible Facilities) Regulations 2006 specify that the qualifying criteria will be met where (a) predicted energy costs amount to 10% or more of the production value of the installation, site or business sector OR (b) predicted energy costs amount to 3% or more, but less than 10%, of the production value of the installation, site or business sector so long as there is an ‘import penetration ratio’ of at least 50%. The ‘import penetration ratio’ is defined in the regulations as being the value of imports as a percentage of the value of total sales in the UK (the latter to include the value of exports). So the trade intensity criteria will be met where the majority of sales of a given product in the UK are sourced from imports.

³⁶ There may be minor differences between figures quoted in this report and those presented in the EA’s Biennial report for TP3, because the analysis was undertaken ahead of the Biennial report being published.

Participants receive initial CCL discounts when they first join the scheme; thereafter, meeting targets in a given TP entitles a TU to CCL discounts in the subsequent 2-year certification period. In the second CCA scheme, firms potentially qualifying for Phase 2 of the CRC Energy Efficiency Scheme were also exempted from CRC in relation to their CCA sites, until the end of the CRC scheme in April 2019. If a TU fails to meet its target for a given TP and cannot fill the gap between actual performance and target performance with previously banked surplus³⁷, it has the option of paying a buy-out fee instead to retain its CCA certification. The buy-out fee for TP1 and TP2 was £12/tonne of CO₂ equivalent, and following a [review in 2016](#) was increased for TP3 and TP4 to £14/tonne of CO₂ equivalent. This is payable on excess carbon emissions above the target level. The value of buy-out payments is generally less than the CCL discount, because buy-out is not payable on the total amount of emissions eligible for the CCL discount but on excess carbon emissions above the target level, after taking account of any banked surplus from previous target periods.

A timeline summarising key points in the development and implementation of the first and second CCA schemes, and its relationship with other policies, is presented in Appendix 1.

How important are CCL discounts and CRC exemptions?

The main benefit of CCA participation is that it offers firms significant discounts on CCL payments (and prior to April 2019, exemption from CRC allowances for some organisations). As explained in chapter 5, these discounts typically represented between 5-10% of total energy prices.

But the CCA scheme is not the only potential source of CCL discounts. Organisations consuming less than a 'de minimis' level of energy do not pay CCL³⁸. Also, from April 2014, activities in the mineralogical and metallurgical sectors have been exempt from both CCL and CRC, even if not covered by a CCA agreement (referred to hereafter as [the min-met exemption](#)). Some other types of energy use are also exempt from CCL, including: use of electricity for electrolysis; use of gas as a chemical feedstock; and energy consumed by Combined Heat and Power plants (CHP) that are accredited under the CHP Quality Assurance scheme (CHPQA). Electricity generated from off-site renewable sources was initially exempt from CCL but became liable for CCL from the start of August 2015, while electricity generated from onsite renewables is still exempt from CCL.

Again, the CCA scheme was not the only potential source of CRC exemptions. Only those organisations using more than 6,000 MWh of qualifying electricity from half-hourly meters in the CRC qualifying year were required to register for Phase 2 of the CRC scheme. Energy consumption liable for the EU Emissions Trading System (EU ETS) was also exempt from the CRC scheme. The CRC scheme did not require allowances to be paid for energy supplied after March 2019, and CCL rates were increased in April 2019 to compensate for this.

These other exemptions have been taken into account in the evaluation research. The importance of CCL discounts and CRC exemptions for energy costs is discussed further in chapter 5.

³⁷ TUs can carry forward or 'bank' surplus accumulated by exceeding their targets in a previous target period.

³⁸ The 'de minimis' threshold is 1,000 kWh of electricity per month or 4,397 kWh of gas per month. [Further details about CCL exemptions](#)

High-level research questions

BEIS set the following High-Level research Questions (HLQs) for this evaluation to address:

1. What have been the outcomes observed during the second CCA scheme?
2. What has been the impact of the CCA scheme, and can any identified energy/carbon savings or increased competitiveness be attributed to the CCA? How did the CCA generate any attributed effects?
3. Is the CCA scheme offering value for money for Government, TUs and society?
4. How effective and efficient has the delivery of the CCA scheme been?
5. What can we learn for any potential future iterations of the CCA scheme and future policy?

This report

The remainder of this report is structured as follows:

- Chapter 2 – Methodology
- Chapter 3 – What were the outcomes of the second CCA scheme?
- Chapter 4 – What contribution has the second CCA scheme made to energy efficiency?
- Chapter 5 – What contribution has the second CCA scheme made to competitiveness?
- Chapter 6 – Has the second CCA scheme delivered value for money?
- Chapter 7 – How effective and efficient has delivery of the second CCA scheme been?
- Chapter 8 – Views on future policy
- Chapter 9 – Conclusions

2. Methodology

Overall approach to the evaluation

This evaluation explores the complex and inter-related influences of CCAs on both business energy efficiency practice and competitiveness. The theory of change (ToC) presented in Appendix 2 sets out how the scheme was intended to work, distinguishing between the influence of the CCA targets, which vary between CCA sectors and between TPs, and the influence of the discounts that CCAs provide on the costs of CCL (and, where relevant, CRC). A theory-based approach has been used to distinguish between the impacts of the CCA scheme and the impacts of external factors such as economic activity, energy prices, technological change and the influence of other policies (including CCL, CRC, EU ETS and the first CCA scheme). The theory-based approach drew strongly on quasi-experimental research by micro-econometric analysis and macro-economic modelling workstreams, which examined the influence of the CCA compared to external factors.

Contribution analysis was the central method used to refine the ToC as the evaluation proceeded, and to develop contribution stories for different groups and types of CCA participants. Contribution analysis³⁹, involves the exploration of alternative causal explanations for observed outcomes, and the assembly of evidence to test plausible, reasonable explanations about whether and how the scheme has contributed to these outcomes. The contribution analysis drew on evidence across all the workstreams, including micro-econometric analysis and macro-economic modelling evidence.

Other approaches to the evaluation were considered but rejected:

- A wholly experimental approach to evaluating the CCA was not considered feasible. Such an approach would have involved exclusion of some firms from the scheme on a randomised basis, to create an ideal counterfactual, which could be viewed as unfair because the CCA offers significant advantages to participating businesses in the form of discounts on CCL and exemptions from CRC. While the evaluation has used comparison groups as partial counterfactuals, they have some limitations in terms of the degree of similarity between CCA and non-CCA firms in terms of sector, size and other characteristics.
- A solely analytical (e.g. econometric) approach to the evaluation was also not considered appropriate, owing to the complexity of the influences that would need to be deduced from available data and the limited number of years for which data is available, particularly for the second CCA scheme. This complexity arises from the dual nature of the CCA's objectives, the lack of a straightforward counterfactual, and the need to disentangle complex developments for different sectors over time. Our approach involves multiple, partial counterfactuals that could not readily be interpreted without the support of a theoretical framework.
- A full 'realist' approach for this evaluation was also considered but rejected because BEIS was interested in researching the overall impact of the CCA scheme on energy efficiency and competitiveness. A realist evaluation focuses on how and why a scheme

³⁹ Further information about contribution analysis and its application can be found at: www.betterevaluation.org.

works in particular contexts. Nevertheless, the evaluation has distinguished between impacts on different types of CCA participant, as far as practicable.

Use of comparison groups

No single comparison group could be identified that would provide a full answer to the question of how firms would have behaved in the absence of the second CCA scheme. However, consideration of different comparison groups provided valuable insights and evidence for contribution analysis. The contribution analysis drew on two partial, conceptual counterfactuals to the CCA scheme:

Counterfactual 1: no discounts (i.e. pay full) CCL and/or CRC, with no targets

Counterfactual 2: full discounts on CCL and/or CRC, with no targets

Four comparison groups were identified that embodied these partial counterfactuals.

1. Units (e.g. sites, TUs or firms) using fuels that were subject to CCL/CRC and that were similar in energy intensity or energy efficiency to CCA units but ineligible for CCA – providing evidence of Counterfactual 1.
2. Units in sectors that had recently become eligible for CCA which were compared to their past performance when liable for full CCL and CRC – providing evidence of Counterfactual 1.
3. Units in the relevant CCA sector that had not signed up to a CCA (identified through detailed SIC code analysis) – providing evidence of Counterfactual 1.
4. Units in the min-met sector that were previously part of a CCA but chose to opt out because they were now fully exempt from CCL and CRC – providing evidence of Counterfactual 2.

A fifth comparison group was considered that would have provided further evidence in relation to Counterfactual 1 but could not be developed within the resources and time available for this evaluation:

5. Units using fuels that are subject to CCL (and where relevant CRC) in sectors that were slightly less trade-intensive than those eligible for CCA, insofar as these can be identified by available data.

Details of how these comparison groups were used in each workstream are set out in Table 2.1. Research evidence relating to these multiple, partial counterfactuals were interpreted with the support of the theoretical framework.

Development of a theory of change

As outlined above, the evaluation used contribution analysis to assess the contribution of the CCA scheme to its objectives. This was centred around development, testing and refinement of an overall ToC for the second CCA scheme. An initial ToC was developed participatively

through a workshop with BEIS, a follow-up workshop with a wider range of stakeholders in BEIS and the EA, and a workshop with CCA sector associations.

The initial ToC set out the rationale for the second CCA scheme and described the logic behind how the policy was expected to work. The ToC also identified a set of assumptions that were implicit in the policy design and a number of external factors that would affect successful implementation of the policy.

In the early stages of the evaluation, the evaluation team identified evidence gaps where the ToC was less well supported. A programme of evaluation research was designed to fill these evidence gaps. This is summarised in the next sub-section. A revised version of the ToC, informed by the synthesis of evidence from evaluation research, is presented in Appendix 2.

Evaluation research

Owing to the dual aims of the CCA scheme and the wide-ranging nature of the evaluation questions, multiple research workstreams were used to address gaps in the evidence base for this evaluation. The methodology for each of these workstreams is summarised in Table 2.1 below, with further detail provided in the supporting reports (presented as separate volumes).

Table 2.1: Summary of methods

Workstream	Purpose	Summary
1. Evaluation framework, theory of change and evidence review	Develop understanding of how the scheme was intended to work; review existing evidence and design evaluation research to fill gaps in the evidence base about how the scheme works in practice.	<ul style="list-style-type: none"> - Development of an evaluation framework and ToC, informed by workshops with BEIS, EA and CCA sector associations. - Literature review of international evidence relating to VA schemes and carbon leakage, to inform ToC development.
2. Analysis of scheme data	Characterise the performance of different types of TUs and the contribution of different sectors. Develop estimates of the value of CCL and CRC discounts.	<ul style="list-style-type: none"> - Analysis of data held by the EA on CCA participants, including emissions and target performance at TU level, and entry/exit dates at facility level. - Scheme data provided insights into the characteristics of min-met leavers (comparison group 4)
3. Micro-econometric analysis and data matching	Research whether there are any statistical differences in energy and economic performance between CCA and similar non-CCA sites that are attributable to the second CCA scheme.	<ul style="list-style-type: none"> - Matching of BEIS meter data to CCA facilities using postcode and address matching. Matching of facilities with entries in economic databases (the Inter-Departmental Business Register (IDBR)) to access economic data for these sites and related firms (including turnover and employment). - Econometric analysis of energy consumption and economic variables using facility-level data, comparing changes in performance at CCA facilities to changes in performance at similar facilities that were not eligible for the CCA (identified by SIC code or through the list of CRC information Declarers⁴⁰). This used a 'difference in

⁴⁰ Information declarers were organisations with settled half-hourly electricity meters that were obliged to report their electricity consumption in 2008 but were below the 6,000 MWh threshold for the CRC scheme.

Evaluation of second Climate Change Agreements scheme

		<p>difference' approach with instrumental variables to flag eligibility in the CCA scheme⁴¹.</p> <p>-This analysis compared CCA sites to those in comparison groups 1 and 4 (i.e. non-eligible sites and sites that left the CCA scheme as a result of the min-met exemption).</p>
4. Macro-economic modelling	<p>Estimate CCA impacts on energy demand at macro-level by comparing energy performance in the UK with other European countries.</p> <p>Use well-evidenced assumptions on economic relationships to estimate the impact of the CCA on industrial costs, industrial prices and growth.</p>	<p>- Econometric analysis of the impact on energy consumption, by applying difference in difference methods to macro-level data (at 2-digit SIC code level), pre- and post- implementation of the second CCA scheme. Industries in other EU Member States were used as the comparison group. This provided some insights into comparison group 1 (non-eligible sectors), subject to the caveat that some countries had similar policies.</p> <p>- Macro-economic modelling using the E3ME model⁴² to estimate the impact of CCL and CRC discounts, and energy demand savings, on economic variables. The macro-economic modelling tested sensitivities for the impact of CCAs on energy demand, based on statistically robust findings from the micro-econometric and macro-level econometric analysis. This analysis provided insights into comparison group 1 (non-eligible sectors).</p>
5. Quantitative research	<p>Use data from past surveys undertaken for other evaluations to assess differences between reported behaviour and attitudes of CCA and non-CCA firms, given that it was not feasible to survey large numbers of non-CCA firms within this evaluation⁴³.</p> <p>Collect and analyse statistical evidence about the reported behaviour and attitudes of CCA participants, including energy efficiency actions, relocation decisions, experiences of the CCA scheme, perceptions about CCA influence and costs of CCA participation.</p>	<p>- Reanalysis of findings from past surveys comparing the reported energy efficiency behaviour of CCA participants and non-participants, including findings from the CRC, Electricity Demand Reduction (EDR) and Energy Savings Opportunity Scheme (ESOS) evaluations for BEIS. This analysis involved a mix firms in comparison groups 1 and 3 (i.e. ineligible and non-joining firms) together with other manufacturing firms that may not be comparable to CCA firms in terms of energy intensity.</p> <p>- A combined telephone and online survey with 387 CCA participants, across 11 sector groups⁴⁴, weighted by sector group to reflect the CCA population as a whole.</p> <p>-While the quantitative survey primarily provided evidence about CCA participants, the survey analysis tested for differences in behaviour between longstanding participants and firms that joined the scheme recently (comparison group 2). Only statistically significant differences are presented in this report.</p>

⁴¹ The 'difference in difference' approach compared changes in the performance of CCA facilities to changes in similar non-CCA facilities, over the period 2011 to 2016. Tests were applied to ensure that the non-CCA facilities were similar to CCA facilities in their observed behaviour prior to the second scheme. The instrumental variable was set to 1 or 0 according to whether a facility was eligible to take part into CCA.

⁴² The E3ME model is an input-output model of the UK, Europe and global economy, developed by Cambridge Econometrics. It was selected, as the most appropriate model to assess CCA impacts on UK economic and environmental variables at macro-level.

⁴³ Surveying large numbers of non-CCA firms was considered but was judged not cost-effective because of lack of contact details for these firms under GDPR requirements, high costs of cold calling and expected low response rates by firms that did not see the CCA scheme as relevant. This was borne out by low response rates from non-participants in the qualitative research.

⁴⁴ The 49 active CCA sectors were divided into 11 sector groups for the purposes of sampling for the quantitative survey. The groupings were informed by the nature and size of each sector: Agriculture, Meat, Plastics, Printing, Chemicals, Food and drink (FDF1), Min-met, Non-industry, Other food and drink, Other industry and Paper/pulp. Further details are presented in the Technical Report.

<p>6. Qualitative research</p>	<p>In-depth insights from CCA stakeholders about the ways in which different elements of the CCA scheme have influenced behaviour on energy efficiency and competitiveness, relative to other influences, and about their experiences of and perspectives on the CCA scheme.</p>	<p>- Reanalysis of findings from past qualitative research with CCA participants that was undertaken as part of the CRC evaluation.</p> <p>-In-depth telephone interviews with 19 sector associations, 23 CCA participants, 9 non-participants and 3 energy consultancies. Energy consultancies were included to provide insights into participation decisions, because response rates from non-participants were low.</p> <p>- The non-participants covered a mix of comparison groups 1, 3 and 4: firms that had left the CCA scheme, firms that were eligible but had not joined the scheme and firms that understood themselves to be non-eligible. The non-eligible firms were selected from matched data provided by the micro-econometric workstream, within SIC codes with relatively high energy intensity but low CCA participation.</p> <p>-Online survey of 53 sector associations, generating responses that provided both qualitative and quantitative evidence for 39 sectors.</p>
--------------------------------	--	---

Further detail on the methodology used in each workstream is presented in the Technical Report.

Additional analysis

The evidence collected across these evaluation workstreams was analysed using a number of different methods:

- Quantitative and thematic analysis of responses to the online survey of sector associations, which included both qualitative and quantitative responses.
- Thematic analysis of transcripts from in-depth qualitative research interviews, supported by review of scheme data for the relevant company.
- Case by case analysis of CCA contribution towards energy efficiency and competitiveness, to support development of contribution stories for different participant groups.
- High-level cost effectiveness analysis using evidence from all the workstreams on the overall costs and benefits of the CCA scheme to CCA participants, Government and society. As explained in the Technical Report, this was not a full cost-benefit analysis but a high-level assessment focusing on the main costs and benefits of the scheme.
- Overarching contribution analysis, involving assessment of CCA contribution in relation to the ToC. This process is described further below.

Synthesis using contribution analysis

As explained above, contribution analysis involves the exploration of alternative causal explanations for observed outcomes, and the assembly of evidence to test plausible, reasonable explanations about whether and how the scheme has contributed to these outcomes. The initial ToC summarised the causal explanations the evaluation team sought to test.

The evaluation team reviewed emerging evidence across all the workstreams on a quarterly basis throughout the evaluation, through a series of cross-team telephone meetings and face-to-face synthesis workshops. Initial synthesis workshops were structured around the emerging findings from each workstream and were latterly structured around the evaluation questions and key points in the ToC. These workshops were also used to cross-check findings between workstreams and to identify areas where further analysis was needed to strengthen the emerging contribution story. The workshops also identified opportunities for using evidence from one workstream to strengthen the work of another. A technical expert from Verco and an evaluation expert from Strategy Development Solutions were also involved as peer reviewers throughout the evaluation, providing advice on ways to strengthen the analysis.

An interim assessment of the workstream evidence against the ToC was made in July 2019, based on emerging findings from each workstream. A fuller assessment of the validity of assumptions in the ToC was undertaken during the final synthesis process, as presented in the Technical Report.

Assessment of the ToC provides an overview of the 'overall' impact of the CCA policy. Contribution stories were also developed for different types of CCA participants, to provide understanding of the types of participant for which the CCA policy contributed more or less to energy efficiency and competitiveness relative to other policies and external influences. These stories were based on case by case analysis of qualitative interviews with different types of CCA participants, supported by evidence from the quantitative survey and scheme data analysis. The contribution stories are presented in chapters 4 and 5 of this report.

The emerging findings from the synthesis process, including the contribution stories, were tested with BEIS, the EA and with sector association representatives at workshops during November 2019. The report findings have been adjusted where necessary to capture additional insights from these workshops.

Limitations

There are a number of limitations to the evidence presented in this evaluation report. The full list of limitations and the ways in which they have been mitigated are included in the Technical Report, with further details of workstream specific limitations in the micro and macro reports. Key limitations for the evaluation are set out below.

Distinguishing between the impacts of the first and second CCA schemes

It was not possible to gather evidence about the period prior to the first CCA scheme, as this was more than 20 years ago so access to data was limited, interviewee recall was likely to be unreliable, and changes were likely in technologies, industry structures and external factors.

The micro-econometric and macro-economic analysis therefore assessed the impact of the second CCA scheme relative to the first, since they compared differences in the observed behaviour of CCA units before and during the second scheme to differences in behaviour of non-CCA units before and during this scheme. The period 'before' the second CCA scheme was itself influenced by the first CCA scheme, so this approach will tend to underestimate the benefits of the second CCA scheme. The qualitative and quantitative survey workstreams focused on the impact of the second CCA scheme, but explicitly captured some comments about the first CCA scheme.

Recall about influence of second CCA scheme

Findings from the qualitative and quantitative workstreams depended on respondents' recall since the start of the second CCA scheme in 2013. They may understate CCA influence insofar as personnel have changed or CCA activities have become part of 'normal' activities within firms since 2013.

Infeasible to undertake large-scale survey work with non-participants

A large-scale quantitative survey of non-CCA firms was considered but was judged not cost-effective because of lack of contact details for these firms under GDPR requirements, the cost of cold-calling and expected low response rates by firms that did not see the CCA scheme as relevant. This concern was borne out by low response rates from non-participants in the qualitative research. This issue was mitigated through re-analysis of previous quantitative surveys⁴⁵ for BEIS that allowed identification of CCA participants and comparison of their responses to those from non-CCA firms in manufacturing sectors.

Recruitment of non-participants for in-depth interviews was challenging, despite the small numbers of interviews sought. It was mitigated by undertaking interviews with energy consultants and sector associations involved with the CCA scheme and asking them about their understanding as to why firms did or did not participate in the CCA scheme. Given these mitigation strategies, and the extensive work with comparison groups undertaken by the micro-econometric workstream, the evaluation evidence about non-participants appears reliable.

Data matching issues

Data matching rates between scheme data, economic data sets and meter point data constrained some elements of the evaluation research. Economic variables were matched to electricity meter point consumption data and CCA scheme data for 43% of the facilities in the CCA scheme. CCA sites were then matched to similar non-CCA sites outside the scheme, in non-eligible sectors with similar levels of energy intensity. The matching rates were sufficient to provide robust micro-econometric results for electricity consumption and to allow use of matched data to sample non-participants for qualitative research. However, the matching was insufficiently complete to allow use of the matched dataset to enrich analysis of quantitative survey responses.

Matching of gas meters was more problematic (13%)⁴⁶, leading to smaller sample sizes for the micro-econometric analysis. It was also problematic to compare gas meter data with CCA

⁴⁵ Datasets were reanalysed from BEIS evaluations of CRC Phase 1, ESOS and the [Electricity Demand Reduction \(EDR\) pilot](#).

⁴⁶ The matching rate for gas meters (i.e. matched facilities divided by facilities with a gas meter) is difficult to establish as not all facilities have gas meters. The percentages above refer to matched facilities divided by facilities participating in the CCA scheme and as such they do not represent a precise definition of matching rates.

scheme data from EU ETS sites because gas consumption on joint EU ETS/CCA sites is not reported for CCA purposes. This limited the cross-checks that could be made between scheme data and matched gas meter data. These two factors may explain why there were fewer statistically significant findings in the micro-econometric analysis of gas consumption, compared to electricity consumption.

Potential positive bias in industry interviews

There was a risk that industry representatives would provide overly optimistic perspectives of the scheme in qualitative and quantitative research because they wanted the evaluation to provide a positive assessment, in the hope that Government would continue with a CCA-style policy in future. Care was taken to triangulate the subjective views of sector associations, CCA participants and energy consultants, who might be expected to support continuation of the CCA scheme, with more objective sources of evidence from the micro-econometric workstream, macro-economic modelling and scheme data, as well as the review of evidence on VA schemes in other countries. Through doing this, the evaluation has aimed to reach a balanced perspective on the scheme.

3. What were the outcomes of the second CCA scheme?

Summary

The CCA scheme is a voluntary scheme that has been popular with industry, with relatively stable participation during the scheme. In November 2018, 3,418 'Target Units' (TUs) reported to the CCA scheme across 49 active sectors, comprising 9,187 sites or 'facilities'. Data matching suggests that around 2,600 firms have at least one TU in the scheme. Sector associations reported that participation rates amongst eligible firms were 80-100% for most sectors. CCL reductions were reported to be the main motivation for firms joining the CCA scheme. In 2018, CCA participants reported around 114 TWh of energy use under the CCA scheme (compared to 264 TWh of energy consumption across all industry)⁴⁷

The EA advised that there were 1252 voluntary terminations of TUs up to June 2018. These were balanced by new entrants to the scheme, including a marked increase before the closure of the scheme to new entrants, with 439 TUs joining in 2018. The main factors behind firms leaving the scheme were if firms had gone out of business and the introduction of the min-met exemption during TP1⁴⁸. Scheme data analysis found that firms that struggled to meet their targets, and who therefore would have had to pay significant levels of buy-out, were more likely to leave the scheme. Business size was a key factor in firms choosing to leave and in eligible firms choosing not to join: sector associations suggested that smaller firms had less capacity to manage energy efficiency and that firms with lower energy use (due to size) would obtain less financial benefit from the CCA scheme relative to the administrative burden of participation.

Slightly more than half of TUs achieved their targets without using buy-out or banked surplus⁴⁹ in each target period (TP), with little variation between TPs. The average level of underperformance⁵⁰ was low (4-6.5% of total emissions for the scheme). The level of overachievement⁵¹ of targets was greater (8.7%-13.5% of total emissions), exceeding the level of underperformance in each of the first three target periods.

There were wide variations in target performance between TUs, with some patterns observable at CCA sector level. Performance was influenced not only by energy efficiency action but also by: the tightness of targets in different sectors; changes in production levels and product mix that were not fully reflected in targets; site rationalisation in multi-site TUs (which affected the stringency of the target); and each

⁴⁷ Based on figures converted from thousand tonnes of oil equivalent to TWh. [Energy Consumption in the UK, Table C1](#).

⁴⁸ The min-met exemption, introduced on 1st April 2014, exempted commodities used in mineralogical and metallurgical processes from paying CCL and also provided exemption from the CRC scheme.

⁴⁹ TUs can carry forward or 'bank' surplus accumulated by exceeding their targets in a previous target period.

⁵⁰ Underperformance means the buy-out plus banked surplus that a TU needed to use to meet its target for a given TP, as a proportion of total reported emissions for the relevant TP.

⁵¹ Overperformance means the surplus generated by a TU relative to its target, as a proportion of total reported emissions for the relevant TP.

TU's chosen target type and historic baseline⁵². The majority (83%) of TUs had relative targets, specified in terms of energy per unit of production, and they generally performed better than those who had chosen absolute targets, which were less able to account for changes in production.

Almost all (98%) CCA participants had taken some action on energy efficiency since the start of the second CCA scheme. Businesses both within and outside the CCA scheme gave examples of significant energy and carbon savings being made as a result of such action. Qualitative research findings suggested that barriers to further action included constrained capital budgets, shifts in consumer demand and regulations that required more energy-intensive products. Sector associations reported that large-scale investment in replacement plant was rarely implemented owing to long payback periods and potential disruption to production. Similar barriers have been reported in other energy efficiency studies⁵³.

CCA scheme participation

Participation

CCA participation dropped slightly between TP1 and TP2 but then increased again in TP3, with a number of TUs and facilities joining and leaving the scheme over this period. At the end of TP3, 3,418 TUs submitted reports to the scheme, covering 9,187 facilities across 49 CCA sectors. There was a marked increase in the number of facilities in the scheme during TP3 owing partly to a few TUs with large numbers of facilities joining the scheme. There was also a wave of new joiners before the scheme closed to new entrants on 1st November 2018, with 439 TUs joining during 2018. Figure 3.1 shows the total number of TUs and facilities reporting at the end of each TP.

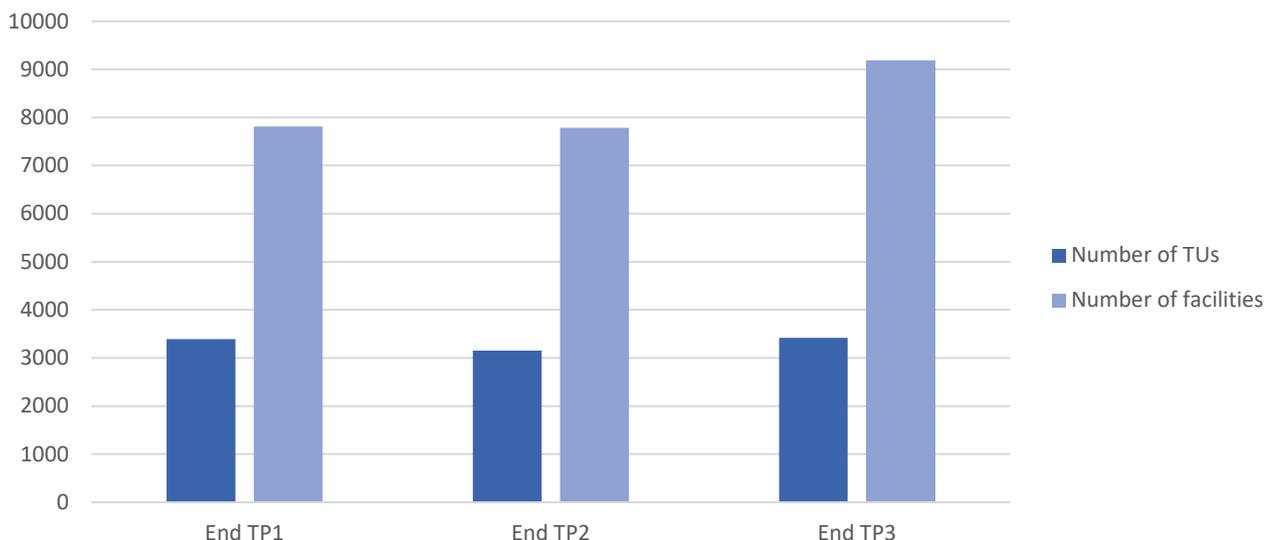


Figure 3.1: Number of TUs and facilities reporting in the second CCA scheme

(Source: EA Biennial reports for TP1 and TP2; EA communication for end TP3)

⁵² TUs were measured against their own baseline performance in 2008, the baseline year.

⁵³ BEIS (2016). [Building Energy Efficiency Survey \(BEES\) 2014-2015](#).

In 2018, the CCA scheme covered an estimated 114 TWh of energy use (compared to 264 TWh for all industry⁵⁴). Participation rates reported by sector associations (through the online survey) were typically 80-100% of eligible sites. Lower participation rates were reported in sectors eligible for the min-met exemption (0-60%) and in those with large numbers of smaller firms (e.g. one sector reported participation rates below 10%).

Figure 3.2 highlights that a number of factors were important motivations for participating in the CCA scheme. The top three, where more than half of businesses responding to the quantitative survey identified it as important, were:

- Reduction in the CCL (82% 'high or 'very high' importance)
- Likelihood of meeting the sector's energy reduction target (60%), i.e. they felt the target was achievable
- Demonstrating green credentials (58%).

In the qualitative research, sector associations confirmed that securing financial benefit and maintaining competitiveness with other firms benefiting from the CCA were the principal reasons for joining the scheme.

...the reasons are that it does give them a financial benefit, it's something they can do to reduce their energy costs. They'll find out that a lot of their competitors are part of the Climate Change Agreement scheme, so are getting a discount, so they need to have a Climate Change Agreement to maintain that level of competitiveness.

(Sector association)

It was seen, in many cases, to be a simple financial cost-benefit analysis on the part of potential participants. This was substantiated by the participant responses in the qualitative research, some of whom described carrying out such analysis at the start of the scheme and at various points during the scheme.

⁵⁴ See footnote 46.

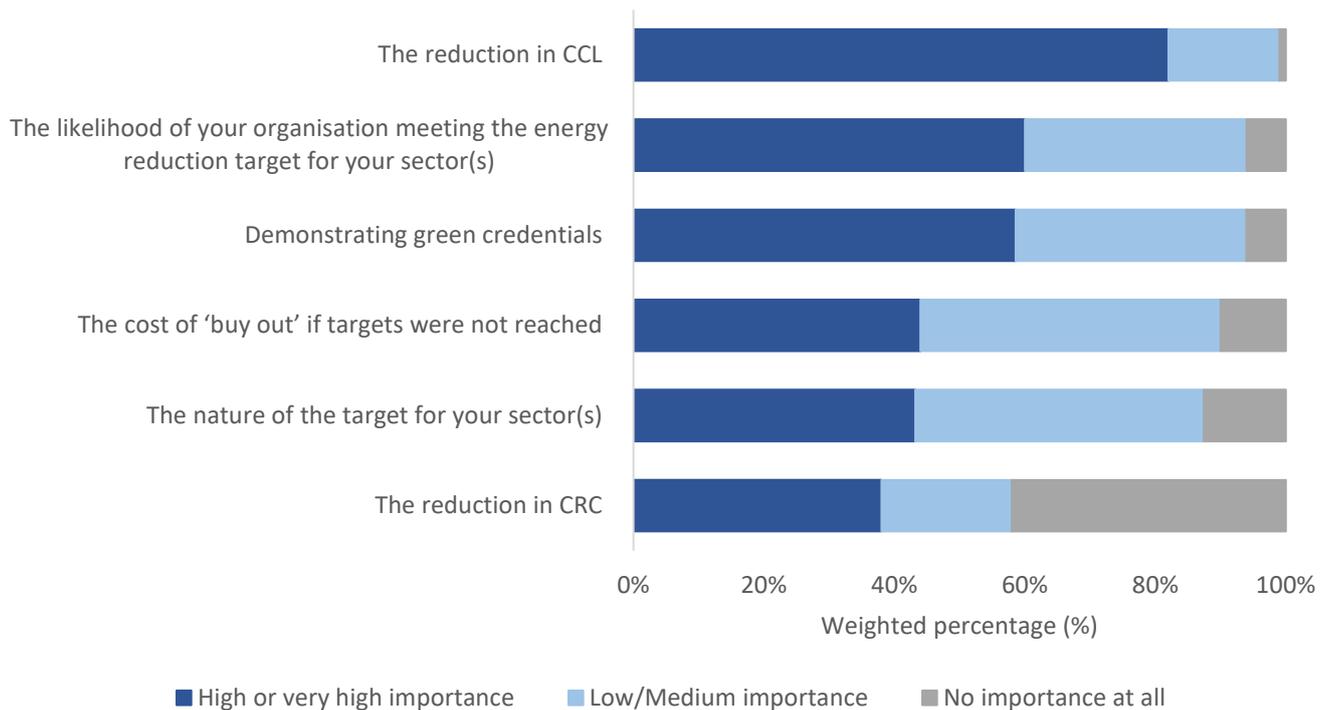


Figure 3.2: Importance of factors in decision to participate in CCA

(Source: Quantitative survey. Bases varied across individual questions: 358 to 376 (unweighted))

Leaving the CCA scheme

Findings from the qualitative research suggest that firms going out of business and the introduction of the min-met exemption were important factors behind firms leaving the scheme. The EA advised that 319 firms left the scheme as a result of the min-met exemption during TP1, representing 25% of 1252 voluntary terminations between January 2013 and June 2018.

It was also suggested by sector associations that it can become uneconomic for firms to remain in the scheme if their targets are not met. Analysis of TP2 scheme data found that, for most sectors, for TUs leaving the scheme, buy-out per TU was higher than average for the scheme and the surplus gained was lower than average. This confirms that the TUs which struggled to meet targets were more likely to leave, even though buy-out costs were generally less than the value of CCL discounts. The impact of the baseline year and subsequent changes in production levels and/or product mix were cited by sector associations in the qualitative research as key factors in these situations. Most targets (even if measured against production metrics) did not fully reflect the relationship between production levels and energy consumption as energy use typically had both fixed and variable elements.

Analysis of the TP2 scheme data found that, for most sectors, total emissions reported for TUs that left the scheme were much lower than the average emissions per TU for all TUs in that sector. This suggests that, generally, smaller TUs (with lower emissions) were more likely to leave. This was consistent with evidence from qualitative research with sector associations.

Not joining the CCA scheme

In the qualitative research and sector association survey, it was suggested that business size was also a key factor behind why some eligible firms did not join the CCA. This was due to

smaller firms having more limited capacity for managing energy efficiency and because firms with lower energy use (due to size) would obtain less financial benefit from the CCA scheme relative to the administrative burden of participation.

Further factors reported by energy consultancies (in the qualitative research) as affecting participation were a lack of awareness, particularly among smaller firms, and some firms being nervous about joining if they thought the targets for their sector were unachievable. This could be the case even if participation would still have been cost-effective, due to concern about possible reputational damage from failing to meet targets.

There was some limited evidence in the qualitative research that the CHPQA acted as an alternative to CCA participation for some non-joiners that had eligible CHP processes.

Action on energy efficiency

Target performance

Scheme data shows that slightly more than 50% of TUs achieved or exceeded their targets in each TP, with very little variation in this overall figure between the target periods. The average level of underperformance⁵⁵ by TUs that missed their targets was low (4-6.5% of total emissions for the scheme). Most TUs that missed their targets used their banked surplus, where available, and paid buy-out fees, where needed, to remain certified and retain CCL discounts in the subsequent certification period. The average level of surplus generated or overperformance⁵⁶ by TUs that exceeded their targets was higher (8.7%-13.5% of total emissions), exceeding underperformance in each of the first three target periods, as shown in Figure 3.3. TUs that used 'bubbling'⁵⁷ performed slightly better against their targets because bubbling enabled them to balance out over/under performance on different sites

Analysis of TP3 scheme data for those responding to the quantitative survey indicated that:

- Businesses in min-met sectors were more likely to have generated a surplus in at least one TU (70% for min-met vs 48% for all CCA participants).
- Businesses in the plastics (BPF) and non-industry sector groups were also more likely to have generated a surplus (57% vs 48% for all CCA participants).
- Businesses in the Food and Drink sector (FDF1) and Paper sector (CPI) were more likely to have missed targets for at least one TU (72% and 48% respectively, compared to 38% for all CCA participants).

⁵⁵ Underperformance means the buy-out plus banked surplus that a TU needed to use to meet its target for a given TP, as a proportion of total reported emissions for the relevant TP.

⁵⁶ Overperformance means the surplus generated by a TU relative to its target, as a proportion of total reported emissions for the relevant TP.

⁵⁷ The term 'bubbling' refers to multiple facilities being included within a single TU.

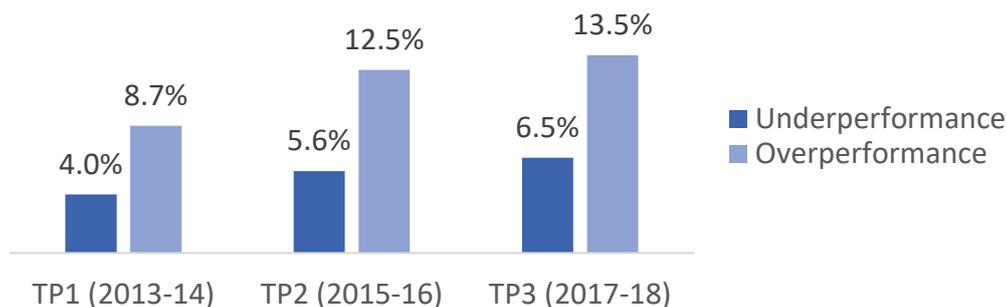


Figure 3.3: Under and overperformance (as % of total reported emissions)

(Source: EA scheme data. Underperformance is calculated as buy-out plus banked surplus used from previous TPs. Overperformance is surplus generated during the TP.)

The majority of TUs were close to their targets, with net overperformance (i.e. surplus less buy-out and less banked surplus) being slightly above or below zero as a percentage of total emissions, as shown in Figure 3.4 for TP3. The chart shows that there were more TUs with high overperformance (>40%) than with high underperformance.

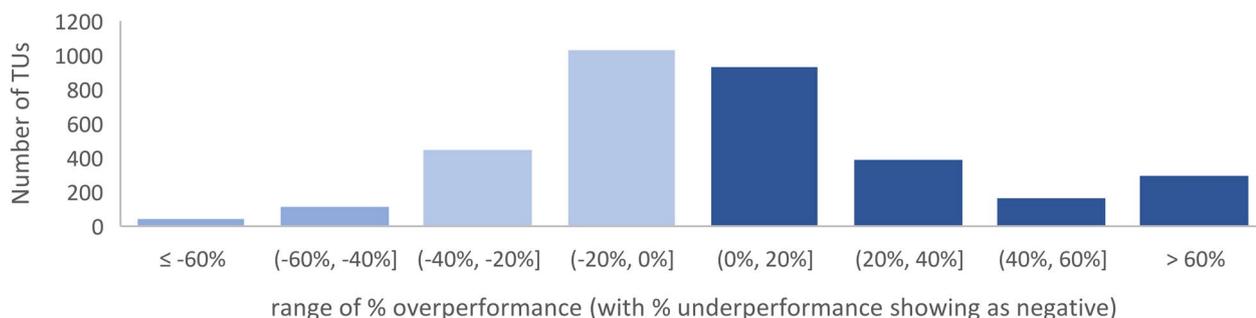


Figure 3.4: Distribution of net over/underperformance at TP3 (as % of total reported emissions)

(Source: EA scheme data)

The qualitative research provided further insights on the reasons for variations in target performance. Reasons cited included: target levels, with a wide variation in the stringency of targets between different sectors; changes in production levels or product mix that were not reflected in targets; and site rationalisation in multi-site TUs which was similarly not fully reflected in targets.

Target types (absolute, relative or Novem) affected the relationship between target performance and changes in production. Scheme data analysis showed that the vast majority of TUs (83%) have Energy Relative targets, with the next most common types being Energy Novem (12% of TUs) and Energy Absolute (just over 5% of TUs), and the least common being Carbon Novem (less than 1% of TUs). Slight production decreases could be beneficial for those with absolute targets (although, under CCA rules, absolute targets are adjusted downwards if production is reduced by 10% or more). Production decreases were challenging (and production increases advantageous) for those with relative or Novem targets because some elements of energy consumption were fixed irrespective of production levels.

Analysis of scheme data confirmed the influence of target type on target performance. In TP3, TUs with absolute targets performed worst (7.5% overperformance; 10.7% underperformance), while those with relative targets performed better (12.5% overperformance; 6.0% underperformance). There was a wide spread of performance for those with energy Novem targets (19.4% overperformance but 7.9% underperformance). Only 17 TUs had Carbon

Novem targets so it is difficult to draw conclusions on these, although underperformance appeared low (9.4% overperformance; 0.8% underperformance).

Sectors identified as having relatively high energy-intensity and trade-intensity, broadly equivalent to the criteria that were applied to new sectors seeking to enter the second CCA scheme, represented 56% of total scheme emissions in TP2 and TP3. TUs in these sectors also performed slightly better than average (e.g. overperformance 14.5% compared to scheme average of 13.5%; underperformance 5.8% compared to scheme average of 6.5%).

Energy efficiency actions

The quantitative survey found that nearly all CCA participants (98%) reported that they had taken some action to improve energy efficiency since 2013 (2% had not). As shown in Figure 3.5, nearly all (94%) participants reported that they had taken some action to improve the energy efficiency of core processes and 87% reported taking some action to improve the energy efficiency of auxiliary processes. Forty five percent of participants had undertaken a major site upgrade or rationalisation/closure while 36% had made changes in the fuel used in their core or auxiliary processes (including switching to renewables). The other energy efficiency improvements most frequently reported were improvements to the energy efficiency of a space or building (70%) and installation of additional metering (53%).

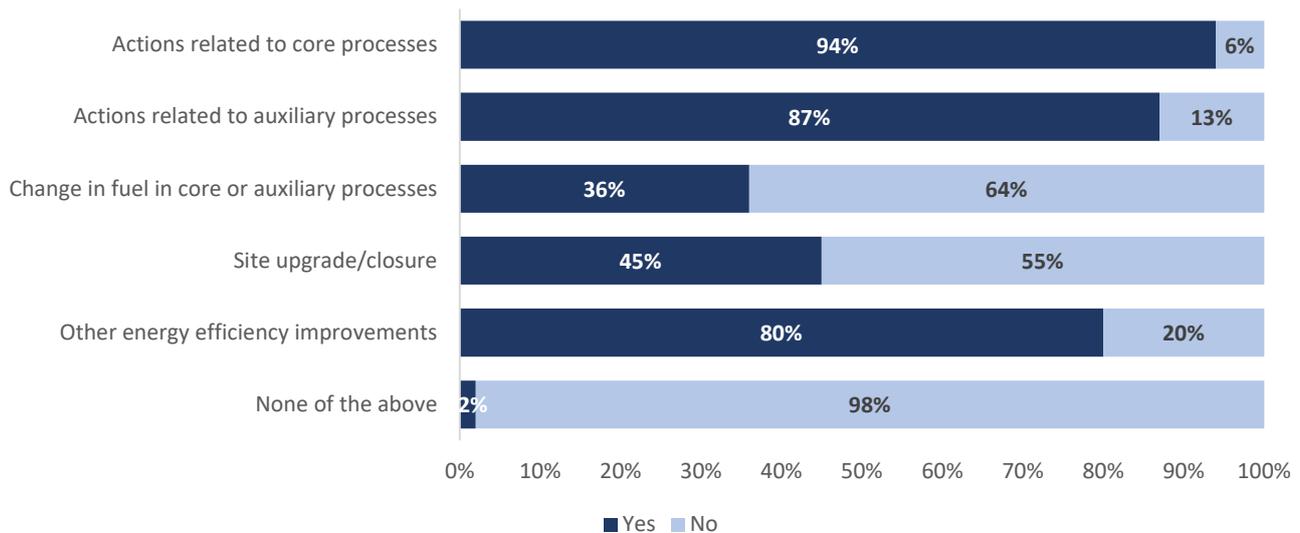


Figure 3.5: Percentage of participants taking actions to improve energy efficiency⁵⁸, since 2013

(Source: Quantitative survey. Bases varied across individual questions: 367 to 380 (unweighted).)

Sector associations reported that replacement plant and replacement boilers were less commonly implemented under the second CCA scheme than lighting upgrades, variable speed drives, high efficiency motors, improved controls, scheduling optimization, upgrades to air compressors, insulation and heat recovery.

Some participants indicated that maximum payback periods were required for all energy efficiency investments, ranging from as low as one to two years to as high as six years or more. Higher paybacks were also considered where investments were fulfilling wider

⁵⁸ Fuel switching is unlikely to be an energy efficiency action but was mentioned by respondents as a related action (e.g. investment in renewable energy, which may improve carbon efficiency but not energy efficiency).

objectives (e.g. replacing end-of-life equipment, improving safety, increasing production efficiency or delivering wider environmental objectives). Other participants, including both large and small firms, indicated that they adopted more flexible approaches to payback, addressing it on a project-by-project basis.

Respondents, including businesses inside and outside of the CCA scheme, gave examples of significant energy and carbon savings made as a result of energy efficiency measures. Not all were able to quantify these savings, however, mainly due to the absence of sub-metering or other energy monitoring systems. Wider changes in the business also made it complicated to pinpoint the contribution which individual energy efficiency measures had made to overall energy or carbon savings. Some respondents pointed out that the financial savings stemming from energy savings were countered by rises in energy prices.

Relationship between energy efficiency actions and target performance

The quantitative survey indicated that scheme participants who had generated a surplus were slightly more likely, than those who had missed targets, to have improved production and process equipment (91% compared with 83%) and to have optimised controls and how they used existing production and process equipment (90% compared with 79%). These differences were statistically significant (as were the other differences cited in this report).

As noted above, a range of factors were found to affect target performance, but this analysis indicates that action on energy efficiency was one of those factors, i.e. target performance was not wholly determined by wider business/economic factors and the nature of the target.

Barriers to energy efficiency action

The quantitative survey found that 2% of participants reported taking no action on energy efficiency. Qualitative research suggested a number of barriers to further action, including constrained capital budgets, shifts in consumer demand and regulations that required more energy-intensive products. Both the qualitative research and sector association survey found that large-scale investment in replacement plant was rarely implemented because of the level of capital investment required, the intended lifespan of some plant equipment, the long payback periods for such investment and potential disruption to production. Similar barriers have been reported in other energy efficiency studies⁵⁹.

Sector associations also suggested that on-site renewables (electricity or heat) were rarely implemented as a result of the CCA scheme, with the absence of any benefit under the CCA scheme being a factor in this⁶⁰.

⁵⁹ BEIS (2016). Building Energy Efficiency Survey (BEES) 2014-2015.

⁶⁰ While some CCA targets are specified in terms of carbon, conversion factors for electricity are based on the average carbon content of grid electricity at the start of the second CCA scheme (to avoid TUs meeting their targets solely through decarbonisation of the grid, without taking any action on energy efficiency). Also, onsite renewable energy is included in electricity consumption reported to the EA for CCA target purposes.

4. What contribution has the second CCA scheme made to energy efficiency?

Summary

Although the scheme was one of many drivers for energy efficiency, it did make a contribution, with electricity use on CCA sites being at least 4% lower than on similar sites outside the CCA scheme that paid full CCL⁶¹. A greater scale of impact (11% lower) was found for electricity use on CCA sites in sectors that were admitted to the CCA scheme because they met energy-intensity and trade-intensity criteria. Gas use was also 13% lower for CCA sites in sectors that were admitted to the scheme on energy-intensity and trade-intensity criteria. Similarly, electricity use on CCA sites in min-met sectors was 4% lower over this period compared to min-met sites that left the scheme. Estimated savings in TP3 were around 1.2-2.3 TWh per year. This was consistent with findings from re-analysis of quantitative data from previous BEIS evaluations that found (on average) slightly more action on energy efficiency for CCA participants compared to similar non-participants in manufacturing sectors.

There were wide variations in the degree to which the scheme influenced different participants. The survey of CCA participants found that almost half (49%) of participants that took action on energy efficiency reported they would have taken all of the same actions (on the same scale and timeframe), if they had not participated in the second CCA scheme but had instead been fully exposed to CCL. The other half reported that the CCA scheme made some difference to their energy efficiency action: 6% stated that they would not have taken action on energy efficiency at all in the absence of the scheme, 24% stated that they would have undertaken some but not all of the actions, and a further 20% stated they would have taken all the same actions, but with different timing, or not to the same extent (e.g. on a reduced scale). These levels of attribution are similar to those observed for other energy efficiency policies⁶². Findings from quantitative and qualitative research depended on respondents' recall since the start of the second CCA scheme in 2013 so they may understate CCA influence if, for example, personnel have changed or CCA activities have become part of 'normal' activities within firms.

Where CCA participants reported no influence on energy efficiency, this was primarily because they were already undertaking action in response to other drivers (e.g. highly energy intensive firms; larger firms subject to other energy policies and public-facing firms with strong Corporate Social Responsibility (CSR) drivers).

Where CCA participants did report CCA influence on energy efficiency, this acted in tandem with other drivers. A complex set of factors affected the degree of CCA influence

⁶¹ The econometric analysis covered the period 2011 to 2016 as more recent meter data was not available. The analysis excluded sites in TUs for which buy-out exceeded 20% of emissions, as these sites were deemed to be less influenced by the CCA scheme. This excluded around 15% of TUs from the analysis.

⁶² For example, an evaluation of Phase 1 of the CRC scheme found that around a third of CRC participants reported that energy efficiency action had been undertaken earlier or on a greater scale because of the CRC (Source: BEIS (2015)). Similarly, an early evaluation of the ESOS scheme found that a third (33%) of participants reported ESOS to have been influential in their decision to implement at least one energy efficiency improvement (Source: BEIS (2017)).

on specific firms. There was less influence on firms that were very large/energy intensive (as these firms already faced many other drivers) and on very small/non-energy intensive firms (as CCL participation and energy efficiency action were less cost-effective). In between these two extremes, the research suggested that the CCA tended to have more influence on firms that: had not previously taken a systematic approach to energy efficiency; faced challenging targets; had a culture of complying with targets; had strong board-level engagement with energy; had keen energy managers; and that ring-fenced CCL savings to fund energy measures.

The evaluation evidence indicated that the scheme had more additionality where targets were more consistent, challenging and were supported by evidence agreed with the sector association. It also suggested that buy-out fees helped to motivate energy efficiency action for some participants. There was some evidence that targets were becoming harder to meet over time as targets tightened and as easier/lower cost measures were completed.

CCA relative to other influences on energy efficiency

The evaluation considered the influence of the CCA scheme in the context of other influences on energy efficiency. The quantitative and qualitative research identified the primary drivers of energy efficiency as being:

- Energy costs - cost reductions were the main driver of action on energy efficiency, particularly in energy-intensive industries and particularly given increases in energy prices in recent years.
- Process improvements, equipment replacement and refurbishment – energy efficiency improvements were often the result of wider investments. The general view of both sector associations and participants was that major investment in new production equipment was highly unlikely to be driven by the CCA alone.
- Environmental drivers and CSR – the second CCA scheme occurred in the context of growing public and customer awareness of climate change and other environmental issues.
- Energy management systems – uptake of environmental management systems such as ISO14001 and – less commonly – the energy management system ISO50001 were also reported to drive action, with uptake of ISO50001 in some cases being linked to the requirements of ESOS.
- CCA and other energy policies – the evaluation considered the influence of the CCA scheme in the context of other policies such as CCL, ESOS, EU ETS, the CRC Energy Efficiency Scheme and carbon reporting requirements.

CCA influence on energy savings

As explained in chapter 1, the aim of the second CCA scheme was to limit any potential detrimental effect of CCL on the competitiveness of energy intensive industries while delivering significant energy efficiency improvements. The evaluation therefore tested whether the CCA

scheme was associated with an increase or decrease in energy efficiency compared to firms that paid full CCL.

Analysis of meter data at site level

Micro-econometric analysis of meter data found that, for most CCA sectors, CCA sites⁶³ showed lower electricity consumption during the CCA scheme than similar comparison sites outside the scheme⁶⁴. Findings for three separate groups of CCA sites are summarised in Table 4.1 below. Details of the analysis are presented in the micro-econometric report.

In CCA sectors that had been admitted to the first CCA scheme because they were covered by EPR, the micro-econometric analysis found statistically significant evidence that electricity consumption during the CCA scheme was 4% lower than similar non-CCA sites that were not eligible under EPR. For these CCA sectors and sites, the analysis also found that electricity intensity (i.e. electricity use relative to turnover) was 4% lower than comparison non-CCA sites. No statistically significant effect was found for gas consumption or gas intensity, possibly because of uncertainties in gas meter data⁶⁵. These results are not shown in Table 4.1.

A greater impact (11% reduction) was found for electricity use on CCA sites in sectors that were admitted to the CCA scheme because they met energy-intensity and trade-intensity criteria, compared to non-CCA sites with equivalent energy-intensity. For these sectors, the analysis also found that gas consumption on CCA sites was 13% lower than similar non-CCA sites over the CCA period, but no statistically significant effect was found on electricity or gas intensity.

The micro-econometric analysis also found that electricity consumption on min-met sites that left the CCA scheme was 4% higher than on sites remaining in the CCA scheme (across all sectors). This effect was not statistically significant for gas use. The min-met sites were fully exempt from CCL and were not subject to CCA targets, so this again suggests that the CCA scheme had an effect in reducing electricity consumption relative to non-CCA sites. The fact that the difference between min-met leavers and CCA participants was not bigger than the EPR and EI effects (despite the min-met leavers being exempt from both CCL and targets, unlike the EPR and EI comparison groups which paid full CCL) suggests that the CCA scheme may have had some persistent effect in reducing the energy consumption of min-met leavers.

⁶³ Sites in TUs for which buy-out exceeded 20% of total emissions were excluded from the analysis, on the grounds that CCA influence was lower on these sites. These represented 14% of TUs and 15% of sites in TP2.

⁶⁴ The micro-econometric analysis checked that the CCA and comparison sites showed similar behaviour prior to the second CCA scheme (2011-2012).

⁶⁵ See chapter 2 for discussion of uncertainties in gas meter data.

Table 4.1: Summary of findings from micro-econometric analysis on energy efficiency

CCA group	Comparison group	Variable	Average 'difference in difference' over 2013-2016
CCA sites in EPR sectors (excluding min-met sectors)	Non-CCA sites subject to full CCL	Electricity consumption	4.1%* lower than comparison sites
		Electricity intensity	4.0% lower than comparison sites
CCA sites in sectors admitted on energy-intensity and trade-intensity grounds (excluding min-met sectors)	Non-CCA sites subject to full CCL	Electricity consumption	11.4% lower than comparison sites
		Gas consumption	12.6%* lower than comparison sites
CCA sites remaining in the scheme (across all sectors)	Sites that left the CCA scheme as a result of the min-met exemption	Electricity consumption	Consumption by leavers was 3.9%* higher than CCA sites

(Source: Micro-econometric analysis). Results marked * are significant at 1% level, while others are significant at the 5% level. Non-significant results are not shown.

Caveats

The electricity consumption meter data used in this analysis does not include electricity generated from onsite renewables. Theoretically, the observed reduction in electricity consumption could be explained by faster take-up of renewable fuels by CCA sites compared to non-CCA sites during the CCA scheme. But this appears unlikely because the CCA scheme did not provide additional incentives for renewable electricity (as renewable electricity had to be reported as electricity consumption for CCA purposes). This is consistent with sector associations reporting that onsite renewables were rarely implemented as a result of the CCA scheme, as noted in chapter 4. So, while onsite renewable electricity may have been installed on CCA sites, take-up of renewables was unlikely to have been faster than on non-CCA sites.

Similarly, the reduction in electricity consumption could theoretically be explained by faster take-up of unmetered fuels for CCA sites, if this was faster than for non-CCA sites. Again, this does not appear to be the case: the qualitative research identified a disincentive for CCA sites with energy targets (the most common type) to switch to unmetered biomass fuels because this generally resulted in higher energy usage (even if carbon emissions were reduced). So take-up of unmetered fuels would be expected to be slower on CCA than on non-CCA sites, not faster.

Analysis of high-level industrial sector data

During Phase 1 of the evaluation, the micro-econometric results were cross-checked against econometric analysis undertaken at a macro-sector level (i.e. 2-digit SIC code level) for the period 2005 to 2016. The macro-level analysis examined changes in energy use over time within high-level industrial sectors⁶⁶ in the UK that were subject to the second CCA scheme, compared to equivalent sectors in selected European countries. European countries were chosen as the comparison group because, like the UK, they were often subject to the EU ETS

⁶⁶ These were industrial sectors defined at 2-digit SIC code level, as explained in the macro-economic report.

scheme, so EU ETS influence would not bias the analysis. The analysis controlled for variations in energy prices and GVA.

Although this Phase 1 macro-level analysis showed no statistically significant impacts, the general direction of the macro results for non-min-met sectors were in line with the results from the micro-econometric analysis, presented above. The macro-level econometric analysis is presented in the macro-economic report.

A limitation of the macro-level analysis was that it was not able to distinguish the effect of the second CCA scheme from changes to other energy policies in the UK (such as the CRC Energy Efficiency Scheme or changes in the carbon price) nor to control for the influence of VA schemes in other European countries. The literature review found that most European countries had some form of VA scheme, offering tax reductions or other incentives in return for commitments to energy efficiency improvements. However, many countries had not implemented such schemes as fully as the UK and, in several countries, the incentives in place had not changed over the period of interest.

Overview of evidence on energy savings

These results provide objective evidence that, on average, the CCA scheme contributed to reductions in electricity use compared to non-CCA sites and that – in some CCA sectors – it also contributed to reductions in gas consumption and electricity intensity. The scale of reduction was similar to those found in other evaluations for the CRC Energy Efficiency Scheme (3-5%) and ESOS (around 3%)⁶⁷. It should be noted that the main counterfactual for these other evaluations was ‘no policy’, while the main counterfactual for the CCA scheme was ‘full CCL’ (i.e. an alternative policy that might also be expected to reduce energy consumption). This makes the observed results for CCA more significant. The micro-econometric analysis also suggests that the second CCA scheme had more influence on energy savings than the first CCA scheme, because the analysis compared changes over the first CCA scheme (2011-2012) to changes in the first two TPs of the second scheme (2013-2016). Further detail on the micro-econometric findings are presented in the micro-econometric report.

CCA influence on energy efficiency action

The econometric evidence above describes the average effect of the CCA scheme on energy consumption and energy intensity. This was broadly consistent with evidence from reanalysis of quantitative survey data from previous BEIS evaluations of the CRC, ESOS and EDR schemes, which found evidence of slight differences in energy management and energy efficiency action between CCA and non-CCA participants in manufacturing sectors:

- Reanalysis of survey data for manufacturing sectors from the CRC Phase 1 evaluation found that CCA participants were more likely than non-CCA firms to forecast their energy usage and to report increased action on energy efficiency in 2014, compared to 2010, but no other differences in reported behaviour.
- Reanalysis of survey data from manufacturing organisations surveyed for the EDR wider population survey (focusing on firms with more than 250 employees and energy

⁶⁷ BEIS (2015) CRC Energy Efficiency Scheme Evaluation; BEIS (2017) Evaluation of ESOS interim process and early impact report.

bills exceeding £100 million) found that firms holding at least one CCA were more likely than non-CCA firms to be concerned about their energy costs and to have installed some types of measures (i.e. more efficient motors or more efficient refrigeration equipment).

- Reanalysis of survey data from the interim ESOS evaluation, focusing on 'large undertakings' that were not necessarily energy intensive, found more differences in behaviour between CCA and non-CCA firms. Firms with at least one CCA were more likely to have: set goals to reduce energy use; prioritised energy efficiency at board level at early 2015; changed process equipment since 2015; spent more on energy efficiency measures in 2015; prioritised energy efficiency in 2015 and had a training plan for staff in reducing energy consumption. But these differences may have been driven by differences in energy intensity as well as by the CCA scheme.

The quantitative survey in this evaluation assessed CCA influence by asking participants about their energy efficiency actions and then asking whether they would have undertaken the same action, at the same time and to the same scale, in the absence of the scheme.

The responses to this survey question were evenly split, as shown in Figure 4.1. Almost half (49%) of CCA participants that took action on energy efficiency reported they would have taken all of the same actions (on the same scale and timeframe), if they had not participated in the second CCA scheme but had instead been fully exposed to CCL. The other half reported that the CCA scheme made some difference to their energy efficiency action: 6% of those that took action stated that they would not have taken action on energy efficiency at all in the absence of the scheme, 24% stated that they would have undertaken some but not all of the actions, and a further 20% stated they would have taken all the same actions, but with different timing, or not to the same extent (e.g. on a reduced scale).

While these levels of attribution are modest, they were assessed relative to the counterfactual of 'full CCL', which would itself have provided some incentive for energy efficiency, and they are similar to those observed for other energy efficiency policies⁶⁸.

⁶⁸ For example, an early evaluation of the ESOS scheme found that a third (33%) of participants reported ESOS to have been influential in their decision to implement at least one energy efficiency improvement. (Source: BEIS (2017) [Evaluation of ESOS interim process and early impact report](#).)

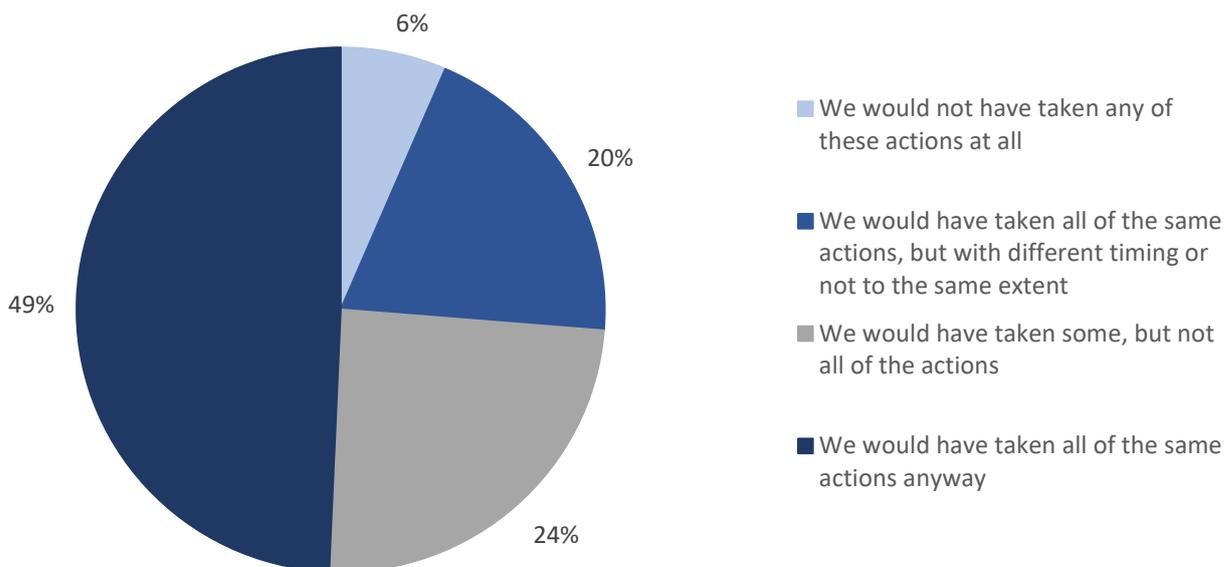


Figure 4.1: Proportion of CCA participants that would have undertaken energy efficiency actions without the CCA scheme

(Source: Quantitative survey, Base (unweighted): 378).

For the half of firms (49%) that reported that they would have taken all the same actions in the absence of the CCA scheme, the drivers most frequently cited were rising energy prices (both actual and forecast), the need to upgrade facilities anyway to improve productivity, corporate commitment to carbon and energy targets (irrespective of the CCA scheme) and replacement of ageing or inefficient equipment.

For the 24% of firms that reported that they would have undertaken some but not all actions, the most common actions that would not have been undertaken in the absence of the CCA scheme were: installation of additional metering, improvements to auxiliary equipment supporting core processes, replacement of auxiliary equipment, optimising controls to reduce auxiliary energy use, site closure/rationalisation and improving the energy efficiency of a building or space.

Among the 20% of participants that reported they would have taken the same actions but on a different timing and/or scale, most stated they would have taken longer while some reported they would have implemented actions to a different (smaller) scale. For the small sample of businesses that said they would have taken longer, almost 1 in 3 of these businesses (31%) estimated that their actions would have taken between 1 and 2 years longer to implement. This compared with 15% who estimated their actions could have taken a minimum of an additional five years, and 17% who thought between 3 and 5 additional years might have been needed.

The quantitative survey was undertaken in early summer 2019, just over six years after the start of the second CCA scheme. Findings from the quantitative survey depended on respondents' recall since the start of the second CCA scheme in 2013: they may understate CCA influence insofar as personnel have changed or CCA activities have become part of 'normal' activities within firms.

Characterisation of firms where the CCA scheme had more and less influence on energy efficiency

Wide variations in the degree of CCA influence on energy efficiency were also identified in the qualitative research. Table 4.2 shows factors that were identified as affecting the level of CCA influence on energy efficiency within different firms, gleaned through qualitative research.

The relationship between the size of CCA firms and their level of energy use or energy intensity was complex and mixed. Analysis of CCA scheme data alongside quantitative survey responses found that firms reporting they would have undertaken some but not all of the same energy efficiency actions tended to have above average energy consumption. However, below average energy consumption was observed both for firms reporting no CCA influence and for the small sample of firms reporting high levels of influence (i.e. firms stating that they would not have undertaken any energy efficiency actions in the absence of the scheme). Distributional analysis by the micro-econometric workstream found that the CCA's influence on electricity consumption was greater (in absolute terms) for CCA facilities with higher electricity consumption (above 40th percentile). While this appears inconsistent with the qualitative findings for large firms in the table below, the micro-econometric finding relates to absolute changes for sites with high consumption and does not necessarily mean that these sites showed a greater percentage change in consumption nor that these sites were owned by large firms. Table 4.2 presents a synthesis of the evidence, interpreted in the light of in-depth insights from qualitative research.

Table 4.2: Factors affecting the level of CCA influence on energy efficiency

Factors	More CCA influence on energy efficiency	Less CCA influence on energy efficiency
Size of firm	Smaller firms with limited capacity who may not have previously taken a systematic approach to energy efficiency	Firms at the extremes of size: large firms may already be doing a lot on energy efficiency; CCA participation may not be cost-effective for very small firms
Energy intensity	Moderately energy intensive companies that have some motivation to improve but have not taken significant action to date	Firms at the extremes of energy intensity: highly energy intensive companies already doing a lot; BUT non-energy intensive companies see energy as less of a priority
Energy policy coverage	Firms not covered by ESOS, EU ETS that have fewer other drivers for energy efficiency (primarily smaller firms)	Firms already covered by ESOS, EU ETS and carbon reporting so CCA brings less additionality (primarily large firms)
CSR commitments	Firms that see climate commitments as important but have not taken significant action to date	Firms with strong drivers for energy efficiency already (e.g. public-facing brands)
Compliance culture	Firms that do not want to be seen to fail targets; firms that take a systematic approach to improvement	Firms where targets may be important, but energy concerns are subordinate to higher priority commercial considerations
Stringency of targets	Firms with more stringent targets, with motivation to avoid or reduce buy-out costs	Firms with targets that (to date) have been easy to reach without additional action
Clarity of targets	Firms with meaningful targets, where metrics make sense to the firm	Firms with complex, obscure targets where metrics no longer make sense
Economic context	Firms able to fund investment	Firms with very tight margins or cash-strapped/liquidity issues

Factors	More CCA influence on energy efficiency	Less CCA influence on energy efficiency
Leadership	Firms with board level interest in CCA; or where the energy manager acts as a champion	Firms with weaker leadership on energy matters

(Source: Analysis of qualitative evidence and synthesis of findings from other workstreams)

Combining these factors, the types of contribution that the CCA scheme made to energy efficiency can be characterised as shown in Figure 4.2. The types of firm are ranked in terms of the perceived influence of the CCA scheme on their activities, rather than the overall scale of energy savings attributable to each group of firms. The types are described further below.

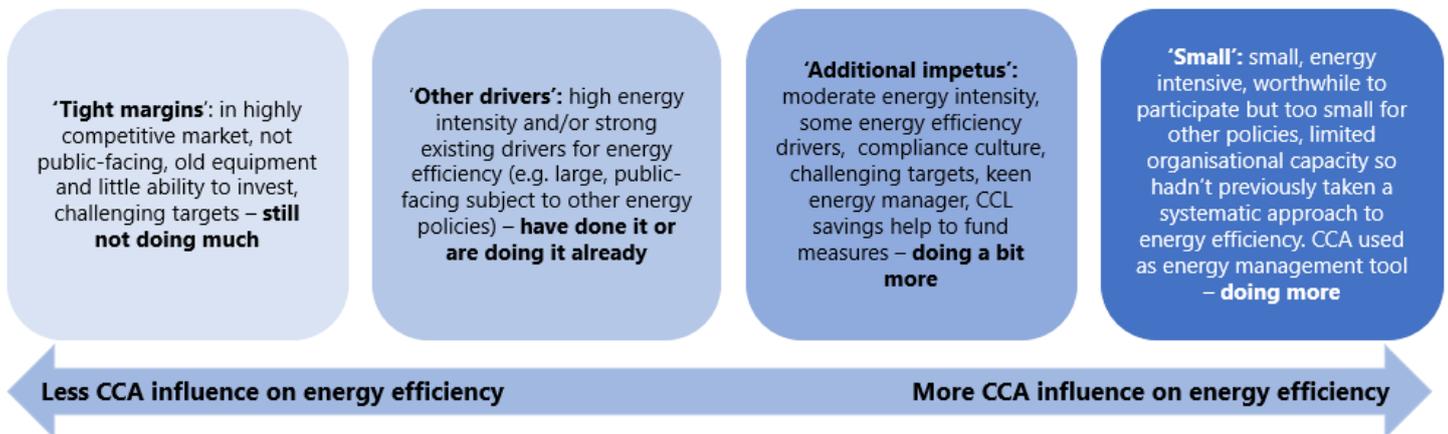


Figure 4.2: Characterisation of firms where the CCA scheme had more or less influence on energy efficiency

(Source: Contribution analysis)

No action by those with very tight margins:

Qualitative research found firms that were not engaged with energy efficiency tended to be in highly competitive markets with tight margins that were not ‘public-facing’. They tended to have old equipment, poor access to capital and little ability to invest. Where they needed to pay buy-out, because of challenging targets, they saw this as cost-effective because of the higher value of the CCL discount. The quantitative survey finding that only 2% of firms had taken no action on energy efficiency suggests that very few firms fell into this category. But the existence of some participants of this type is consistent with the policy context for the CCA scheme, which was partly designed to support firms in internationally competitive industries.

I don't believe that climate change [CCA] has influenced our energy process at all. [...] Unless somebody's prepared to invest a huge amount of capital in this business, I don't think that's, in the short term, going to happen. Certainly not over the period the Climate Change Agreements targets have been up.

(CCA participant)

No additional action by those with other strong drivers for energy efficiency:

Other firms reporting no influence from the CCA scheme were those that were already active on energy efficiency, but for other reasons. The quantitative survey shows 49% of participants reported no influence from the scheme on their energy efficiency action. Qualitative research

found that firms in this category tended to have strong existing drivers for energy efficiency. For example, this category included highly energy intensive firms, larger firms (subject to other energy policies such as ESOS or EU ETS) and public-facing firms with strong CSR drivers.

To be honest, I would have to say no [additional influence]. Because as I've already said, we've chased higher targets and pursued what was right for the business. Remember, when I say we've improved 25% in the last four or five years, we've already done that before. So we were already higher up the curve than most people, in our industry. So we were already more efficient.

(CCA participant)

Additional impetus for those with some existing drivers for energy efficiency

More CCA influence was reported by CCA participants that were at neither extreme in terms of size and energy efficiency, and that had some – but possibly fewer – existing drivers for energy efficiency. Quantitative research found firms reporting that they would not have undertaken some actions without the CCA scheme had higher energy use than the CCA average (based on CCA reported emissions) but were not necessarily very energy intensive. The qualitative research found that influence was stronger for those firms that had challenging targets, a culture of compliance with targets, board-level engagement with the CCA scheme and/or a committed energy manager. For these firms, CCA targets and metrics helped to focus energy management, while the motivation to reduce or avoid buy-out contributed to action.

I think it made it quicker and it made it easier, because when you talk to people and you say, "Look, we're part of a climate change agreement scheme, and this is the reason why," people will buy into it.

(CCA participant)

More additional action by smaller firms with less systematic approach to energy management prior to the CCA scheme

The qualitative research found some examples of smaller firms reporting more CCA influence because they had not previously taken a systematic approach to energy management prior to joining the CCA scheme. In these cases, the CCA metrics, targets and financial incentives provided by the CCA scheme contributed to improved energy management and more action on energy efficiency.

Well, it's [the CCA scheme] massive for us because it gives us clear data at the end of every year, so we can see we're on the right track. Over the last three years that I've looked at it, there's been a reduction in energy usage. That is pounds and pence to a company like this and once they see they're saving money, it's put more emphasis on them to do more. They can see where they're making savings, especially with their CO₂ and everything that is output.

(CCA participant)

Ways in which the CCA influenced energy efficiency

Where the CCA did influence energy efficiency, the qualitative research found that the ways in which the scheme influenced firms' behaviour were:

- Some firms were motivated to meet or exceed their CCA targets, particularly where the firm or individuals did not want to be seen to miss targets; where targets were meaningful (i.e. related directly to current operational considerations); and where targets were challenging or were becoming more challenging over time. Striving to meet targets was therefore reported to contribute to action, although targets were not necessarily the main driver for energy efficiency.

This year it has focused people's minds into what we need to do to meet the targets. It does force the company to look at their energy, but again, as I said, it's not our main driver.

(CCA participant)

- The motivation to reduce or avoid buy-out costs also contributed to energy efficiency action, particularly when buy-out was relatively unexpected within the organisation and had not been accrued in accounts. Some participants reported that anticipated buy-out helped energy managers to make the case for energy efficiency investments that would reduce buy-out costs.

That's where, of course, the bigger price is where the boardroom will be going, "Well, wow, you've told us we've got to pay £90,000. What can we do about it?" It gives them more of an argument.

(Sector association)

- Being part of the scheme was reported to raise awareness of energy efficiency in itself, with firms being aware that they were obtaining a discount on CCL in exchange for agreeing to improve their energy efficiency.

I think the CCA is definitely a useful tool to raise awareness on energy efficiency. Obviously, there's the material difference on the cost of energy, so I think that's very useful.

(CCA participant)

- Some firms reported that they used CCA metrics and results to drive energy management practice. For example, there were some reports of energy management using CCA metrics, of the employment of energy managers being linked to the scheme, and to individual performance targets being linked to achievement of CCA targets.

I think that's been a contributory factor in the decision to employ our own energy manager. It's a contributory factor in getting ops managers to [take action]- it goes through into their individual targets, which determine the bonus the guys get at the end of the year.

(CCA participant)

- While some CCA respondents in the qualitative research accepted that CCL discounts tended to increase the payback period slightly for energy-specific investments (because they effectively reduced energy costs if targets were met), they were generally reported to increase the funds available for investment. In some cases, the CCL discounts were seen as supporting general investment in the business, which had potential spin-offs for energy efficiency (e.g. through replacement of old equipment with more efficient models). In a few cases, CCL discounts were reported to be ring-fenced and reinvested in energy efficiency.

It does help to drive the energy efficiency agenda because it's considered part of that pot. If that pot wasn't there, yes, it would've made things more difficult for us.

(CCA participant)

There was some indication from qualitative research that targets were becoming harder to meet over time as targets tightened and as easier and lower cost measures were completed. This may mean that the influence of the CCA scheme may reduce over time.

We realised there were low-hanging fruit early on and picked it up. Possibly in the TP1, say, where we did very well in terms of meeting the targets, and even beyond. So that was a phase where we realised the target itself over the four reporting periods would be quite substantial to achieve.

(Sector association)

Influence of CCA relative to other energy policies

CCA participants were asked about the influence of the CCA scheme relative to other energy policies, including the CRC Energy Efficiency Scheme, EU ETS and ESOS:

- Some respondents reported that the CCA was better at driving energy efficiency improvements than the CRC scheme because it increased rather than decreased the funds available for energy efficiency improvements, whilst also penalising poor performance.
- Where firms were subject to ESOS, some CCA participants reported that ESOS had some influence on their organisation, in addition to CCA. The policies were reported to have a cumulative effect.
- In the largest and most energy-intensive sites, EU ETS was reported to have become a significant driver of energy costs and energy efficiency in the last two to three years, as there has been an increase in the cost of allowances.

5. What contribution has the second CCA scheme made to competitiveness?

Summary

The CCA made some contribution to growth amongst CCA participants (see evidence below). In sectors facing international competition, it made a positive contribution to competitiveness and helped to protect energy-intensive industry. A wide range of other factors were also cited as affecting competitiveness, including energy costs and non-energy factors such as labour costs, raw material costs, location, productivity, regulation, exchange rates, tax rates, technological change, product quality, contractual arrangements and uncertainty about EU exit.

During TP3, participation in the CCA scheme reduced energy prices by around 5% for those that would otherwise pay CCL and by more than 10% for those that would pay both CCL and CRC. The benefit to participants from savings in CCL and CRC allowances was estimated to be in the range £210-350 million per annum. The range arises from uncertainties about the proportion of CCA participants that would otherwise have been part of the CRC scheme, and about the proportion of CCA energy use in min-met sectors that would be exempt from CCL anyway under the min-met exemption. Insofar as the scheme encouraged more action on energy efficiency, participants also benefited from energy bill savings.

The CCL discounts were welcomed by participants but were described as being lower, and less valuable, than the min-met exemption and certain electricity levy exemptions available to Energy Intensive Industries (EII)⁶⁹. CCL discounts reduced the non-commodity element of energy costs and reduced the difference between energy costs in the UK and other countries.

Macro-economic modelling and micro-econometric analysis both found a positive impact of the CCA scheme on growth. Macro-economic modelling found a 0-0.6% positive impact on Gross Value Added (GVA) at 2-digit SIC sector level for CCA compared to non-CCA scenarios – this may be modest because the energy intensity of CCA firms was diluted at macro-sector level. The micro-econometric analysis found a 5% positive impact on turnover at CCA site level, when compared to non-CCA sites. Possible reasons for this difference are set out in the main report.

Sector associations saw the scheme as important for the competitiveness and viability of businesses in their sectors. They reported that CCA tax breaks (and improvements in energy efficiency) improved the profitability of participants and had some influence on investment and location decisions in some sectors.

⁶⁹ The EII schemes offer firms in specific sectors exemptions or compensation for certain non-commodity elements of electricity costs, provided that the firms can demonstrate that they meet specified electricity intensity criteria. While EII exemptions potentially offer larger benefits than the CCA scheme, the schemes have stricter eligibility criteria. A few hundred firms obtained EII exemptions in 2016-17 compared to an estimated 2,600 in the CCA scheme.

Qualitative research indicated that the CCA impact on competitiveness was higher for firms in sectors facing international competition (including those owned by international companies) and for those in highly energy-intensive sectors (except where firms were already exempt from CCL). In these sectors, the CCA scheme slightly reduced the risk of firms or investment moving outside the UK. In other sectors, CCA participants were UK-focused and were relatively unaffected by international trade. The quantitative survey found that nearly 17% of participants had relocated sites since 2013 or were considering doing so at the time of the research. Of those firms that had relocated or considered relocation, 62% had done so in the UK, while 35% had looked at sites in Europe and beyond⁷⁰. Rising energy costs were cited as an influence on relocation decisions by just over a quarter (27%) of those firms relocating or considering relocation.

The evaluation considered various aspects of industrial competitiveness:

- Competition within UK markets, between imports and goods produced by UK industry.
- Competition in overseas markets, between UK exports and produce from other countries.
- Competition for investment, and potential relocation, between the UK and other countries.
- The profitability, viability and growth of firms within the UK, irrespective of international trade.

This chapter therefore considers CCA influence on costs and growth within the UK, as well as influence on international competitiveness.

CCA relative to other influences on competitiveness

The influence of the CCA scheme was considered in the context of other influences on competitiveness. The qualitative research found considerable concern amongst CCA participants and sector associations that energy-intensive industries faced higher energy costs in the UK than in other countries, including other European countries. Many non-energy factors were also cited as being important for the competitiveness of firms in CCA sectors. These included:

- Labour and raw material costs. There was some mention of the recent increase in the minimum wage raising the cost base in the UK.
- Location vis a vis access to raw materials, access to customers and logistical considerations.

We have moved certain operations of some component manufacturing overseas but that's by and large as a result of really making production closer to the customer. We've also seen manufacturing of other components come back into the UK. [...] It's just a restructuring and getting closer to the customer really and ensuring our logistics network is aligned with needs really, in the market.

(Non-participant)

⁷⁰ This is based on a multiple response question, so firms may have considered sites within and beyond the UK.

- Other non-cost factors including productivity, labour laws and regulation.

Again, people who choose not to invest in the UK might not be just doing it because of high costs. There might be other things as well, perhaps employment, productivity, perhaps flexibility of labour law...

(Sector association)

- Exchange rate fluctuations which affect the relative cost of production in different countries.
- Tax rules including enhanced capital allowances, tax credits for research and development, and business rates.
- Technological change (e.g. the age of equipment and processes in the UK compared to other countries).
- Production quality considerations, with higher quality sometimes justifying higher production costs in the UK.
- Contractual factors affecting whether increased costs could be passed on to customers (e.g. long-term fixed price contracts with customers).

Uncertainty about the UK's exit from the EU was also mentioned as affecting current and future competitiveness of industry in the UK, owing to the timing of the research during the period April to June in 2019. While some CCA participants and sector associations reported that they were relaxed about EU exit, others were concerned that it would affect their ability to export or that it would mean their products would compete with cheaper imports in future.

Impact of CCL discount on energy prices

There was considerable comment from CCA participants and sector associations that electricity prices in the UK are higher than in other countries, both within and beyond Europe, particularly for medium and large electricity consumers. This is supported by Government analysis of electricity prices, as shown in Figure 5.1. In contrast, gas prices in the UK are generally the lowest in the EU⁷¹. Analysis of energy prices undertaken for the evaluation by Verco in March 2019 suggested that non-commodity costs represented around 30% of electricity prices and 10% of gas prices in the UK, with non-commodity costs including (in decreasing order of scale) transmission and distribution charges, levies for energy policies, CRC allowances and the CCL.

⁷¹ [International industrial energy prices](#) (November 2019)

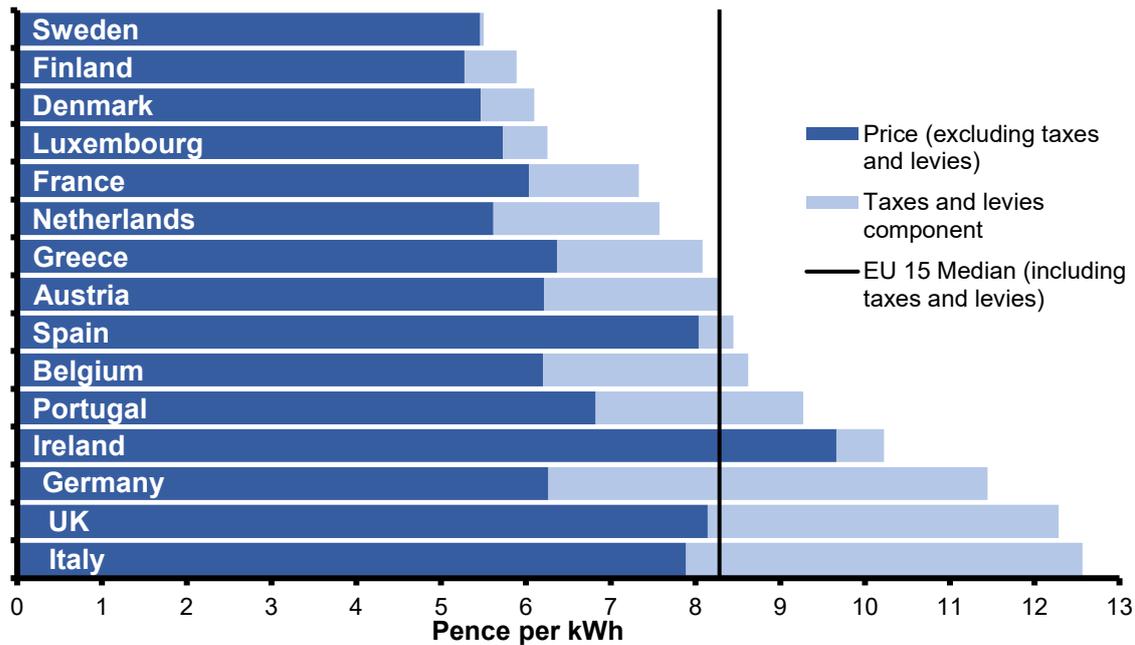


Figure 5.1: Average industrial electricity prices in 15 EU countries for medium consumers
 (Source: [International industrial energy prices](#) (November 2019))

The CCA scheme offered participants discounts on CCL and, for firms covered by the CRC scheme, exemptions from CRC allowances. These discounts represented around five per cent savings on electricity and gas costs for those paying CCL only, and more than ten per cent on electricity and gas costs for those liable for CRC allowances⁷². The CRC Energy Efficiency Scheme allowances no longer applied to emissions from gas and electricity after April 2019, but both CCL rates and CCL discounts were increased, so the value of CCL discounts increased to represent around ten per cent of electricity and gas costs (approximately 1 p/kWh for electricity). The historic impact of CCL and CRC on energy prices is shown in Figure 5.2.

⁷² Until April 2019 the CCA offered a 90% discount on CCL for electricity (which averaged 0.5725p/kWh from in 2017/2018), while it offered a 65% discount on CCL for other fuels (e.g. CCL on gas consumption, which averaged 0.1995 p/kWh in 2017/2018). So the value of the discount during TP3 was around 0.52 p/kWh for electricity and 0.13 p/kWh for gas for firms paying CCL. The effective discounts were higher for those firms that qualified for the CRC Energy Efficiency Scheme, as they potentially saved a further 0.58 p/kWh for grid electricity and 0.32 p/kWh for gas, bringing the potential total discount to just over 1 p/kWh for electricity and nearly 0.5 p/kWh for gas. Further details of CCL rates and discounts over time are presented in the Technical Report.

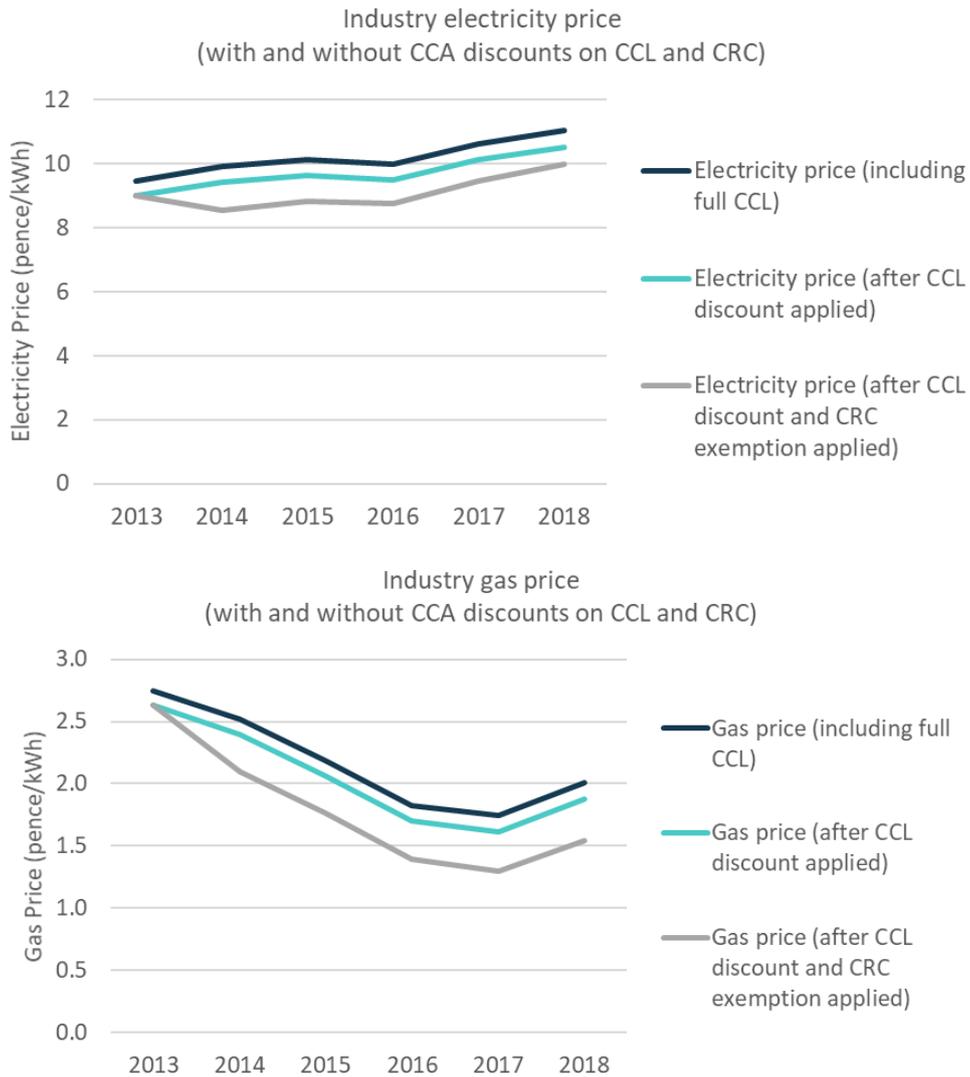


Figure 5.2: Electricity and gas prices paid by large industrial customers

(Source: Prices including full CCL are from BEIS published data, as reported for a large electricity consumer, with annual electricity consumption of 20 GWh - 70 GWh; prices are exclusive of VAT. Discounts were calculated by Cambridge Econometrics, as inputs to the E3ME model. The pale blue line indicates the price discount for those industries that are only subject to the CCL discount; the grey line indicates the price discount for those industries that would have otherwise been subject to both the CRC and the CCL.)

The total value of CCL and CRC discounts offered by the CCA scheme was estimated to be in the range £210-350 million annually, depending on the proportion of CCA participants that would otherwise have been part of the CRC scheme and the proportion of CCA energy use in min-met sectors that would be exempt from CCL anyway under the min-met exemption. While the net benefits from CCA participation were reduced slightly for firms that paid buy-out, buy-out was not payable on total emissions but on the amount by which they missed their targets. The cost of buy-out payments was considerably smaller than the value of CCL discounts (see chapter 6 below).

Impact of CCA scheme on growth

The macro-economic modelling and micro-econometric estimation both found a positive impact of the CCA scheme on growth, although the scale of the impact widely differed.

The macro-economic modelling estimated that CCL discounts would increase Gross Value Added (GVA) for CCA sectors by 0.0-0.6%, owing to the energy cost reductions set out above. For most model sectors, the share of energy costs in total production costs was quite small (<10%) and the CCL discount and potential energy savings from the CCA scheme only affected energy costs by a small amount. Therefore, the model calculated the effects of applying a small saving to energy costs, which represented a small share of total industry costs, leading to a small impact on GVA and gross output benefit.

The macro-economic analysis used published industry data (supported by findings from the quantitative surveys) about the share of energy costs in total costs of production. Parameters based on econometric evidence were also used for the extent to which changes in industry costs would be passed through to industry prices in different sectors, and the extent to which lower prices would stimulate demand for different products, within and beyond the UK. This is detailed in the macro-economic report. CCA influence was modelled in terms of reductions in energy prices (attributable to CCL discounts and CRC exemptions) and – in some scenarios - reductions in energy demand (based on estimates of energy savings from the micro-econometric analysis). For those parts of sectors covered by the CCA scheme, the CCA was estimated to reduce overall industry costs by 1-2% and industry sales prices by 0.5-1%, depending on the extent to which different sectors were trading international commodities. The model estimated the effect of these cost and price changes on GVA.

The modelled impact on GVA by sector (for those parts of the sector in the CCA scheme) is shown in Figure 5.3. Impacts were modelled for four scenarios ranging from Scenario 1 (CCL discounts only) to Scenario 2 (CCL discounts plus energy savings), Scenario 1a (CCL and CRC discounts) and Scenario 2a (all benefits – CCL discounts, CRC exemptions and energy savings). Impacts of around 0.0-0.2% were found across different sectors in Scenarios 1 and 1a (where no savings in energy demand were assumed), but impacts of around 0.2-0.6% were observed in Scenarios 2 and 2a (which assumed savings in energy demand in line with the micro-econometric analysis presented in chapter 4).

The results for min-met sectors are blanked out because few members of these sectors had remained in the scheme after the introduction of the min-met exemption. Energy savings and CRC exemptions contributed considerably to the modelled benefits of the CCA scheme. Estimated impacts were highest for the textiles and leather sectors, which faced strong international competition, despite these not being the most energy intensive sectors.

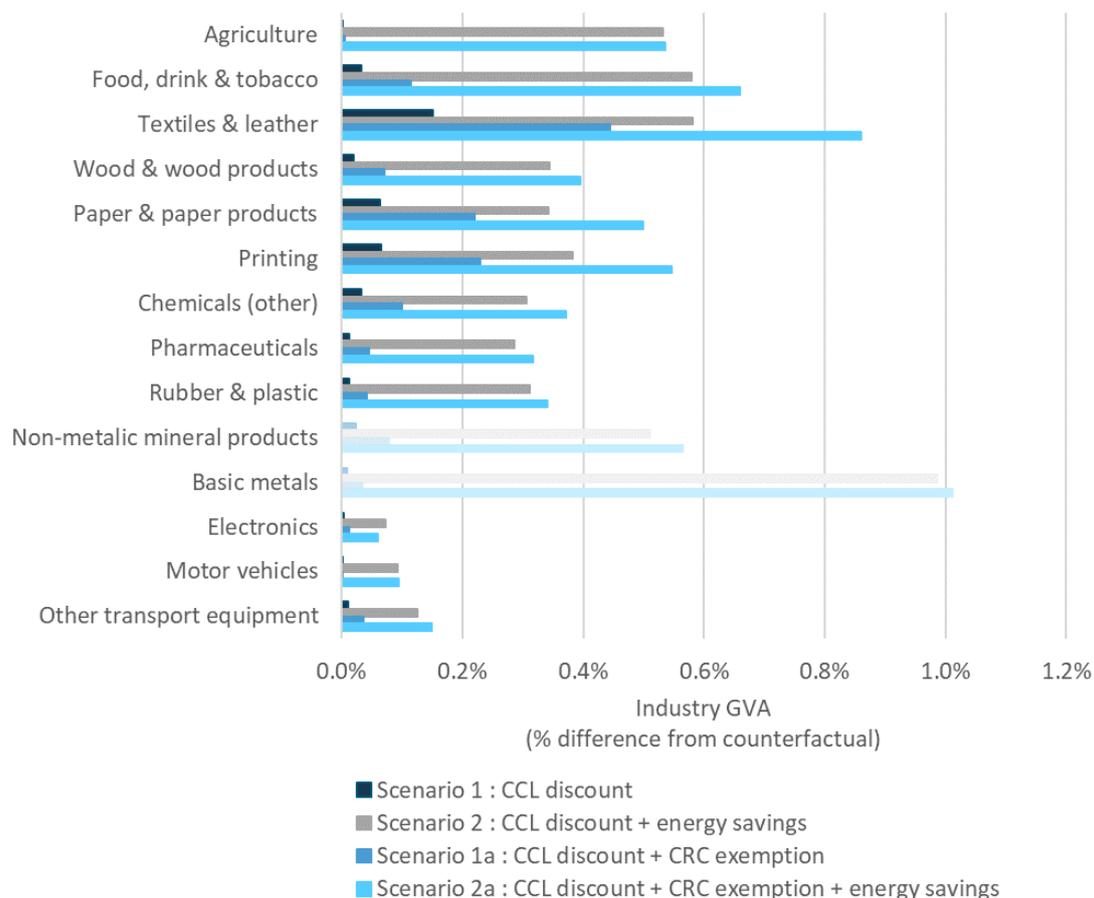


Figure 5.3: Estimated impact of CCAs on Gross Value Added (average 2014-2017)

(Source: E3ME, Cambridge Econometrics. Note: Results are presented at a broad industry sector level but should be interpreted as the impact of CCAs on those facilities that belong to each broad industry sector. Most firms classified within Non-metallic Minerals and Basic Metals qualified for automatic CCL exemptions from 2014 and therefore had little incentive to stay signed up to a CCA after this date. Only a portion of firms that had a CCA would have otherwise been subject to the CRC scheme as well as the CCL.)

The micro-econometric analysis directly compared turnover for CCA sites to turnover on similar non-CCA sites⁷³. This analysis found that turnover was 5% higher on CCA sites⁷⁴, over the period 2013-2016, compared to similar non-CCA sites. Sites that left the CCA owing to the min-met exemption had 8% higher turnover during the CCA period, relative to CCA sites that stayed in the scheme (across all sectors). This was presumably because the min-met exemption gave them full CCL discounts without having to comply with CCA targets. These estimates were greater in scale than those found by the macro-economic modelling, despite the fact that impact on turnover would normally be expected to be less marked than impact on GVA (as GVA is smaller than turnover, being net of industry costs). There are various possible explanations: it is possible that energy costs represented a higher proportion of industry costs for CCA sites than was assumed in the macro-economic modelling, so the impact of the CCA was greater on these firms. It is also possible that small reductions in energy costs for CCA sites had a disproportionately large impact on their sales and turnover, possibly owing to competitive advantage relative to non-CCA sites. The latter is consistent with suggestions from qualitative research with some sector associations and non-participants. The micro findings are

⁷³ Turnover data was available at firm level but was scaled down to site level, pro-rated according to employment numbers on different sites.

⁷⁴ Sites in TUs for which buy-out exceeded 20% of total emissions were excluded from the analysis, on the grounds that CCA influence was lower on these sites. These represented 14% of TUs and 15% of sites in TP2.

summarised in Table 5.1, while details of the analysis are presented in the micro-econometric report.

Table 5.1: Summary of findings from micro-econometric analysis on turnover

CCA group	Comparison group	Variable	Average 'difference in difference' over 2013-2016
CCA sites in EPR sectors (excluding min-met sectors)	Non-CCA sites subject to full CCL	Turnover	CCA sites were 5.1%* higher than comparison sites
CCA sites in sectors admitted in energy-intensity and trade-intensity grounds (excluding min-met sectors)	Non-CCA sites subject to full CCL	Turnover	CCA sites were 5.5% higher than comparison sites
CCA sites remaining in the scheme (all sectors)	Sites that left the CCA scheme as a result of the min-met exemption	Turnover	Leavers were 7.7% higher than sites remaining in the CCA scheme

(Source: Micro-econometric analysis). Results marked * are significant at 1% level, while others are significant at the 5% level.

The qualitative research found that CCA participants valued the tax breaks offered by the scheme, except for a few cases where they were already exempt from CCL for other reasons (e.g. the min-met exemption or CHPQA). Sector associations saw the scheme as important for the competitiveness and viability of businesses in their sectors. They reported that CCA tax breaks improved the profitability of participants and had some influence on investment and location decisions in some sectors.

Some sector associations and non-participants reported firms that were excluded from the scheme (e.g. because of scheme closure to new entrants in November 2018 or not having an eligible process) were at a competitive disadvantage. This was because their energy costs per unit were nearly 10% higher⁷⁵ than those of CCA participants operating in similar sectors, before taking account of any differences in the age and efficiency of equipment on different sites.

We do have some issues with new sites in the UK, because there are sites moves now that the way the Climate Change Agreement rules are, it's not going to get a Climate Change Agreement. So, its energy costs are instantly 10% higher than its competitors. Because they're no longer allowed a Climate Change Agreement.

(Sector association)

Impact of CCA scheme on international competitiveness

Qualitative research indicated that the CCA impact on competitiveness was higher for firms in sectors facing international competition (including those owned by international companies) and for those in highly energy-intensive sectors (except where firms were already exempt from

⁷⁵ The impact of CCL discounts on energy costs has increased to around 10% since CCL rates rose in April 2019.

CCL). In these sectors, the CCA scheme slightly reduced the risk of firms or investment moving outside the UK.

Qualitative research and trade data indicated that other sectors were UK-focused and were relatively unaffected by international trade. Furthermore, the CCA scheme includes some sectors that are not included in the list of ‘sectors at risk of carbon leakage’ developed by the EU ETS⁷⁶. In particular, some of the sectors that joined the first CCA scheme because of coverage by Environmental Protection Regulations may not meet the current entry criteria for new CCA sectors, in terms of energy intensity and import penetration.

The qualitative research found that nearly 17% of CCA participants had relocated or considered relocating since 2013, either within or beyond the UK. Of the firms that had relocated or considered relocation, 62% had done so in the UK, while 35% had looked at sites in Europe and beyond⁷⁷.

As shown in Figure 5.4, for many businesses, the decision to relocate or consider relocating was driven by the possibility of increasing profitability (41% reported this). However, for others, the major catalyst was poor market conditions characterised by rising energy costs (27%), and increases in other costs, such as raw materials and labour (22%). Thirty-two per cent of businesses also stated other issues, including: difficulties recruiting staff, locational costs (including taxes), less environmental regulation, customers expecting the firm to reduce energy costs, the site being old or not fit for purpose; and factors related to EU exit.

Energy is our biggest cost. If we have to pay more tax on energy it makes it more attractive to go somewhere where they are not taxing us as much

(CCA participant)

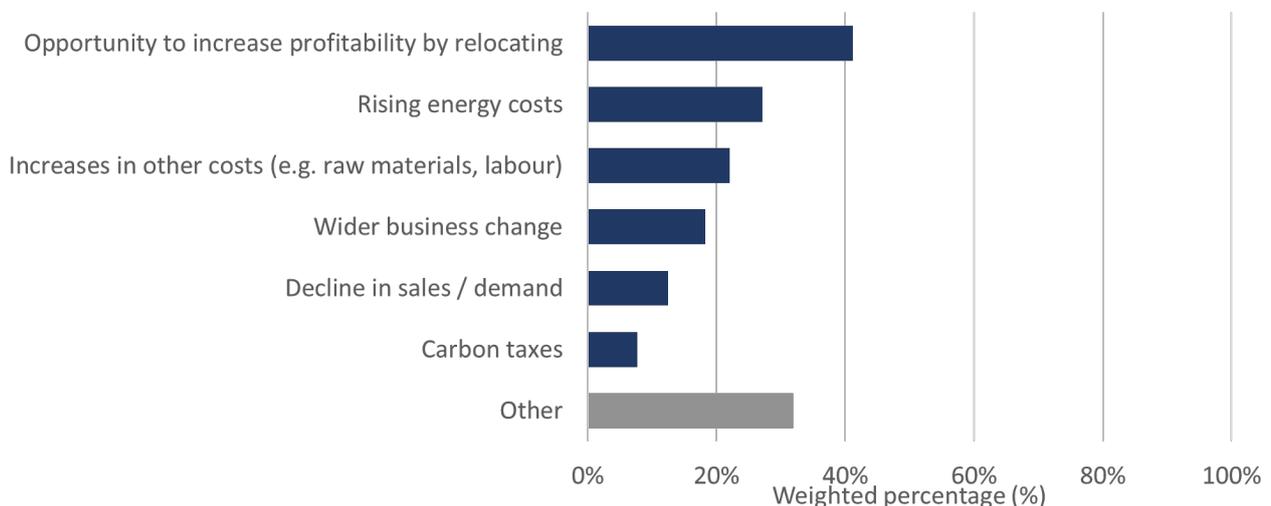


Figure 5.4: Reasons for possible relocation of energy intensive activities

(Source: Quantitative survey. Base (unweighted): 66)

⁷⁶ [Sectors identified as being at risk of carbon leakage for EU ETS purposes in the period 2015 to 2020](#)

⁷⁷ Multiple responses were allowed, so firms may have looked at relocation both within the UK and beyond.

Characterisation of firms where the CCA scheme had more and less influence on competitiveness

The qualitative research found wide variation in the reported influence of the CCA scheme on competitiveness, with some firms reporting no influence. Table 5.2 shows the factors that were identified as affecting the level of CCA influence on international competitiveness.

Table 5.2: Factors affecting the level of CCA influence on international competitiveness

Factors	More CCA influence on international competitiveness	Less CCA influence on international competitiveness
International trade	Products compete with imports and/or products exported	Products and services not traded internationally and/or not dependent on imported raw materials
Locational factors	Business not tied to UK location	UK-specific location, because of transport costs, access to raw materials or customers or simply because of the aspiration of the business.
International ownership	Competition between country sites within an international firm	UK-owned firm with UK sites only
Min-met exemption and CHPQA exemption	No exemption from CCL for some/all energy consumption	Qualify for min-met exemption and/or CHPQA exemptions from CCL
Energy intensity	High energy intensity, so energy costs significant	Low energy intensity, so energy costs less significant
Economic context	Very tight margins – CCL discounts matter	More buoyant industry – CCL discounts less important
Economic context	Able to fund investment	Very tight margins, poor access to capital, cash-strapped/liquidity issues

(Source: Analysis of qualitative evidence)

Combining these factors, the types of contribution that the CCA scheme made to competitiveness can be characterised as shown in Figure 5.5. These types are described further below.



Figure 5.5: Characterisation of firms where the CCA scheme had more or less influence on competitiveness

(Source: Contribution analysis)

No impact on competitiveness for firms already fully exempt from CCL/CRC

The CCA scheme did not reduce costs or increase competitiveness for firms that had already obtained full exemptions from CCL (and where relevant CRC) as a result of the min-met exemption or being part of the CHPQA scheme. The qualitative research found that some firms in min-met sectors remained part of the CCA scheme because they had some sites (or some activities on their sites) that were still liable to CCL or because they wanted to access support from the sector association.

Less impact on competitiveness for firms that were less energy-intensive

Firms and sectors with relatively low energy costs reported that the CCA had little impact on their competitiveness because CCL discounts were low relative to other elements of production costs. For these firms, other factors would have more effect on location and investment decisions than CCL discounts available via the CCA scheme.

The key cost for our businesses tends to be human resources. I don't have an exact [figure] to back this up but I would imagine that CCAs wouldn't feature particularly highly on an investment decision as to whether we were going to open up a plant here or somewhere else around the world.

(Sector association)

Less impact on competitiveness for firms that were less trade-intensive

Where firms were not directly affected by international trade, were not part of an international group or were purely UK-focused, the CCA did not directly affect the location of plants. However, the scheme still affected profit margins for these firms, particularly if they could not pass energy cost increases on to their consumers. Factors mentioned as restricting firms' ability to pass on CCL costs to customers – other than international competition - included firms offering 'value' brands and potential competition from firms within the CCA scheme.

If we hadn't got that and our competitors had, we would lose volume, I've no doubt about it. We'd lose volume or we'd have to absorb it in our profit. It's one or the other. We wouldn't be able to pass that onto our customers.

(CCA participant)

More impact on firms that were both energy and trade intensive

Where firms were more affected by international competition and had high energy intensity, reductions in energy costs arising from the CCL/CRC discount and from action on energy efficiency were reported to be contributory factors in location decisions, amongst many other factors.

it's probably very difficult to pin it down exactly on CCA and CCL but I think if the relief wasn't there it would add to the burdens on the sites in the UK and the costs in the UK and would ultimately add to their costs, which would influence the decision by those boards where it is international investment, whether to invest in the UK or elsewhere.

(Sector association)

A few examples were cited of the CCA making a significant difference to marginal investment decisions, in favour of the UK.

The client was totting up between Frankfurt and London, and London won by a whisker because the energy costs were going to be lower. That was purely attributable to the CCA.

(Sector association)

Higher impact on UK sites within multi-national firms

The contribution of the CCA scheme to competitiveness appeared to be highest for firms that were part of multi-national groups. CCA participants reported that they were competing with other international sites within their group and that production volume would be moved between sites, depending on the relative profitability of operations in the UK and elsewhere.

[Without the CCA scheme...] we would have been less competitive. In the end, if the Group can make more money in another plant than they can here, then they're going to move it to another plant to make more money. That's just the reality of the business.

(CCA participant)

Unintended impacts on some firms

Qualitative research identified two types of firms where competitiveness was adversely affected by the CCA scheme. These were:

- Sites or companies competing with CCA firms but remaining outside the scheme (e.g. because the scheme was closed to new entrants). Energy consultancies reported that some firms were not aware of the benefits of participation or were too small for participation to be cost-effective. Qualitative research with non-participants suggested that some firms were unsure whether they met CCA eligibility criteria. Non-participants faced energy costs that were up to 10% higher than their competitors in the scheme, because they had to pay full CCL (and, where relevant, CRC).
- Cashflow issues for small firms in industries with tight margins, when faced with large, unanticipated buy-out payments. In a few instances, there was evidence of buy-out contributing to firm closure.

Ways in which the CCA scheme affected competitiveness

Where the CCA scheme had a positive effect on competitiveness, qualitative research found that the main effects included:

- CCL discounts helping to improve profit margins, particularly for energy intensive firms.

[if] we were to add another £500,000 of cost onto our energy [because of losing the CCL discount], that would have a significant impact on our competitiveness as a plant.

(CCA participant)

- CCA targets and the threat of buy-out payments helping to encourage action on energy efficiency and thereby helping to keep energy costs in check.

it'll mean [...] you're probably monitoring your energy tighter and looking at ways you can keep that in check and not have the buyout to pay. So, it will aid competitiveness and anything that reduces the costs for a business, will obviously impact it.

(Sector association)

- Lower energy costs attributable to the CCA scheme contributing to bringing forward industrial investments or retaining them in the UK.

[There was] an instance recently of a company going, "Right, we're investing, I want the levy reduction," because this is a huge plant, and the levy reduction is going to mean a significant amount.[...] given it came on the cusp of when it was closing, it was an influencing factor about when he made his decision, because he wanted to get it in before so he didn't lose the discount.

(Sector association)

- The CCA scheme helping to demonstrate environmental credentials, and thereby contributing to retaining or winning clients.

We have a lot of customer audits. They will ask about your environmental targets and your safety because they have their own corporate image to show out there and they want to be making sure that anyone that's supplying them is on the same wavelength when it comes to quality, health and safety and the environment.

(CCA participant)

Comparison to other influences on competitiveness

While the CCA scheme was found to have a positive impact on competitiveness, the scale of Energy-Intensive Industry (EII) exemptions/compensation and min-met exemptions from CCL were reported to be more significant than CCA discounts and potentially more important for competitiveness.

We've been discussing about the relief that the Climate Change Levy brings us when we're actually meeting that Climate Change Agreement. [...] Obviously, it's actually relatively small in terms of the taxation we've got from other sources. As I said, the [exemption from the] Renewables Obligation, the Feed-in Tariff [...] is actually significantly bigger than the CCA would've been.

(CCA participant)

Most clients would have left the climate change agreement and adopted the Min-Met levy exemption, because you can get a higher discount and you have no targets.

(Sector association⁷⁸)

The CCL discount available through the CCA scheme was reported not to be large enough to put UK energy costs onto an equivalent footing with other countries. Nevertheless, some participants and sector associations commented that loss of the discount would send a negative message to investors.

if you were to withdraw the CCL discount, it's sending a signal to the parent company that the UK is not a business-friendly place to invest in.

(Sector association)

⁷⁸ Firms qualifying for the min-met exemption received full exemption on CCL for eligible consumption (i.e. 100% discount). They had the option of remaining in the CCA scheme in parallel with having the min-met exemption. Qualitative research showed that some participants remained in the scheme to obtain CCL discounts on energy consumption at CCA sites that did not qualify for the min-met exemption.

6. Has the second CCA scheme delivered value for money?

Summary

The evaluation considered whether the second CCA scheme has delivered value for money for CCA participants, Government and wider society, compared to the counterfactual of firms paying full CCL and, where relevant, CRC. This was based on high-level estimates of costs and benefits to different parties, using evidence from the various evaluation workstreams. Caveats about these estimates are presented in the Technical Report.

Overall benefits for CCA participants appear to have outweighed costs significantly. Estimated CCL and CRC savings and energy bill savings outweighed the estimated costs of CCA administration costs, buy-out cost and (where attributable to the CCA) costs of energy saving measures. Excluding the benefits of increased turnover arising from increased competitiveness, which are considered under benefits to wider society below, the overall estimated impact was in the approximate range £185-450 million per year. The wide range for the net benefits reflects the uncertainty for each of the key sources used in the analysis (i.e. estimates of CCL and CRC avoided, savings on energy bills and spend on energy measures).

The cost to Government of CCL and CRC forgone, net of buy-out payments, was estimated to be in the range £200-340 million per year.

The cost effectiveness analysis indicated that the main benefits of the CCA scheme to wider society were the contribution to industrial competitiveness and energy savings, together with a reduction in carbon emissions and associated benefits such as air quality. The GVA benefits (based on macro-modelling evidence) and energy and carbon saving benefits (based on micro-econometric findings) outweighed the estimated administrative costs and costs of compliance for participants (based on quantitative survey evidence). Sector-level analysis (based on scheme data and micro-econometric findings) indicated that the energy savings attributable to the CCA scheme were estimated to be 1.2-2.3 TWh per year, and carbon savings were estimated to be 0.3-0.7 million tonnes of CO₂ equivalent per year, compared to the counterfactual scenario⁷⁹. The monetary value of turnover benefits and energy bill savings were estimated to be significantly greater in scale than the monetary value of carbon savings, at the carbon values currently projected by Government⁸⁰.

As noted above, the scheme included some sectors with no or limited direct exposure to international competition and some with relatively low energy intensity. It is possible that the value to society could have been increased by targeting the scheme more narrowly at sectors that were at risk from international competition (which were more at risk of carbon

⁷⁹ The counterfactual scenario was full CCL and no CCA targets for non-min-met sectors; and no CCL or CCA targets for min-met sectors.

⁸⁰ The short-term traded value of carbon of £12.76/tCO₂e was assumed to be 2018, rising to £80/tonne by 2030 (2018 prices). ((BEIS, 2018) [Updated short-term traded carbon values – used for UK public policy appraisal](#))

leakage) and at sectors with higher energy intensity (which showed greater CCA impact)⁸¹.

Sector associations commented that non-CCA participants in eligible sectors would pay higher CCL rates than competitors who were CCA participants, and that this would put them at a competitive disadvantage. This concerned them because the CCA scheme closed to new entrants in November 2018, with the implication that firms and sites starting eligible activities after this date would be excluded from the scheme. BEIS and the EA advised that the timing of the closure had been set at the start of the scheme and was designed to protect the scheme's value for money to Government, by ensuring that participants had enough time to take action on energy efficiency during the final stages of the scheme.

Introduction

The evaluation considered whether the second CCA scheme has delivered value for money for CCA participants, Government and wider society, compared to a counterfactual of firms paying full CCL (and, where relevant, CRC). A full cost-benefit analysis was not undertaken, so this assessment of value for money is based on estimates of costs and benefits to different parties, based on evidence from the various evaluation workstreams. Details of the calculations are presented in the Technical Report.

Overall costs and benefits to CCA participants

Overall benefits for CCA participants appear to have outweighed costs significantly, although there are uncertainties around some of the estimates of cost and benefits, as explained in Technical Report. Uncertainties around the estimates of CCL and CRC avoided are discussed in the next sub-section.

During TP3, the overall CCL and CRC savings and energy bill savings appear to have outweighed the estimated costs of CCA administration costs, buy-out cost and (where attributable to the CCA) costs of energy saving measures. The energy savings attributable to the CCA scheme during TP3 were estimated to be in the range 1.2-2.3 TWh per year, relative to the counterfactual scenario in TP3. This is lower than total energy savings reported by the EA because the EA estimates compare TP3 emissions to base year emissions and do not take account of attribution⁸². Excluding the benefits of increased turnover arising from increased competitiveness (which are considered under benefits to wider society below), the estimated financial impact on CCA participants was in the range £185-450 million per year, as shown in Table 6.1 below. The wide range of net benefits arose from combining high and low estimates

⁸¹ The micro-econometric analysis found a greater scale of impact on energy use by sites in sectors that were admitted to the CCA scheme because they met energy-intensity and trade-intensity criteria, than for sites in sectors that were admitted because they were covered by Environmental Permitting Regulations (EPR).

⁸² [The biennial progress report for TP3](#), published by the EA, reported energy savings of 29 TWh for the two-year period relative to the base year (which was 2008 for most TUs). This is equivalent to energy savings of 14.5 TWh per year, relative to the base year, across all TUs. These savings may be attributable to many factors, not just CCA influence.

for various costs and benefits, as shown in Table 6.1. The assumptions underlying these estimates are presented in the Technical Report.

Similar levels of benefit were predicted for TP4 (£227-390 million per year), for a situation where CCL rates have increased to compensate for the end of the CRC Energy Efficiency scheme. The new CCL rates cover a wider range of firms than the CRC scheme, so the number of participants increased towards the end of TP3 in anticipation of this change, before the scheme closed to new entrants.

Qualitative evidence suggests that overall value for money differed between participants. CCA participation was less cost-effective for firms with eligible activities that used less energy because their potential CCL savings were lower compared to the cost of fees, time inputs and potential buy-out. Sector associations and energy consultants recognised that the increase in CCL rates and discounts in April 2019 would tend to reduce the size threshold for CCA participation, since small firms that would not have paid CRC would now have to pay higher CCL rates. Energy consultants and most sector associations reported that CCL savings of several thousand pounds were generally needed to justify participation, particularly if this involved employment of an energy consultant to manage the firm's CCA administration. However, some sector associations with many small members reported that CCA participation could be worthwhile for CCL savings of a few hundred pounds. In these cases, the sector association appeared to provide the support required to enable small firms to participate. Participation was marginally more cost-effective for firms that could easily meet targets and did not have to pay buy-out, although buy-out costs were not high relative to CCL savings.

Table 6.1: Annual estimated overall costs and benefits for CCA participants (£ millions)

Costs and benefits to participants	Annual estimate for TP3 (£ millions)
Costs to participants	
EA fees	2
Sector association fees	7
Other external costs (e.g. energy consultants, energy monitoring)	4
Time inputs by participants	1
Buy-out payments	14
Estimated spend on energy measures (attributable to CCA scheme)	
- High energy bill savings	31-157
- Low energy bill savings	31-75
Estimated total costs	59-104
Benefits to participants	
CCL avoided	166-192
CRC avoided	47-162
Net reduction in energy bills (attributable to CCA scheme)	75-157
Estimated total benefits	289-511
Net benefits to participants	185-451

(Source: Estimates based on evaluation evidence, across all workstreams). Note that the upper estimates were derived by combining the highest estimates of benefits with the lowest estimates of costs.

Some unintended impacts of the CCA scheme were identified in chapter 5. In particular, eligible firms that were unable to join the CCA scheme (e.g. because of closure of the scheme in November 2018) may have been at a competitive disadvantage compared to firms within the scheme, as their energy costs would be around 10% higher (at the CCL rates introduced in April 2019). The economic benefits outlined above do not take account of any disbenefits to firms and sectors outside the scheme. Details of these calculations are presented in the Technical Report.

Costs and benefits for Government

The direct costs of the scheme to Government are the value of CRC and CCL revenue forgone, while the direct monetary benefit is the value of buy-out paid. As this is not a full cost-benefit analysis, the assessment is high-level and does not take into account non-monetary benefits such as contributions to legally-binding carbon reduction targets or secondary financial effects in terms of changes in other tax revenues arising from changes in employment or company profits. The costs of CCA administration are treated as a cost to participants, covered by EA and sector association fees, and are not included as a cost to Government.

The cost to Government of CCL and CRC forgone, net of buy-out payments, was estimated to be in the range £200-340 million per year, as shown in Table 6.2. The end of the CRC Energy Efficiency Scheme in April 2019 will not significantly affect the net cost because CCL rates and discounts have been increased to compensate for the end of CRC: the estimated net cost to Government in TP4 is £240-280 million per year.

Table 6.2: Annual estimated overall costs and benefits for Government (£ millions)

Costs and benefits to Government	Annual estimate TP3 (£ millions)
CCL revenue forgone	166-192
CRC revenue forgone	47-162
Estimated total costs	213-354
Buy-out payments	14
Estimated total benefits	14
Estimated net cost	199-339

(Source: Estimates based on evaluation evidence, across all workstreams)

There are some uncertainties about the estimates of CCL revenue forgone. Confidentiality requirements precluded the evaluation being able to access HMRC data on CCL forgone as a result of the CCA scheme, which is collected through [requirements to report CCL discount in excess of the state aid threshold](#). The estimates are therefore based on CCA scheme data.

The estimates exclude TUs that are known to have existing exemptions from CCL arising from the CHPQA scheme or from the use of electricity for electrolysis. The upper bound includes CCL forgone on all other TUs that have remained in the scheme, including those in sectors where some TUs left as a result of the min-met exemption. It is not clear whether the remaining TUs in these sectors would actually qualify for the min-met exemption, so a lower bound has also been calculated. This assumes that all TUs in these sectors are already exempt from CCL irrespective of their participation in the CCA scheme. None of these estimates include any CCL

relief on primary energy use on sites that are covered by both the EU ETS and CCA schemes⁸³. Conversely, the estimates may include some electricity consumption met by onsite renewables which is not subject to CCL. These latter two uncertainties are expected to roughly balance out.

There are also uncertainties about CRC revenues forgone because it was challenging to identify which companies would have been subject to CRC Phase 2 if the CCA had not existed. The lower estimate represents CRC payments that would have been made on CCA sites, in the absence of the CCA scheme, by companies that are known to be covered by CRC Phase 2. This leaves out those companies that were fully exempted from CRC Phase 2 as a result of the CCA scheme. This lower bound estimate also excludes all TUs in sectors affected by the min-met exemption. The higher bound includes CRC payments that would have been due from CCA companies that had to report in CRC Phase 1⁸⁴, in addition to those paying allowances in CRC Phase 2. Energy used by TUs that have sites in the CHPQA scheme, or that undertake large-scale electrolysis, have been excluded from all the estimates. Details of these calculations are presented in the Technical Report.

Overall costs and benefits for society

From the perspective of wider society, the main benefits of the CCA scheme appear to have been a contribution to industrial competitiveness and energy bill savings, and a reduction in carbon emissions. These outweighed the estimated administrative costs and costs of compliance (e.g. costs of energy measures installed).

Costs and benefits to society were roughly estimated on an annual basis from the start of the second CCA scheme in January 2013 through to the end of December 2022 in the final certification period. Benefits were pro-rated according to the number of facilities in the scheme in each TP. Industrial competitiveness benefits were assumed to continue to the end of December 2022 (since CCL discounts continue during the certification period). Some energy and carbon savings were assumed to persist for ten years beyond the end of TP4: this is consistent with the micro-econometric findings for min-met leavers which suggest some persistence of energy efficiency savings, and with data on typical lifespans for building-related measures⁸⁵. There was considerable uncertainty about the proportion of savings that would persist. Qualitative and quantitative survey evidence suggested that savings may have arisen from potentially reversible changes in energy management practices as well as from investment in more energy efficient equipment. To reflect this uncertainty, a wide range of

⁸³ Sites that are in both the EU ETS and CCA schemes receive CCL discounts on all their energy use, but only have to report electricity use for CCA target purposes. This avoids double counting as primary energy use is reported separately for EU ETS purposes. Electricity use on EU ETS sites is not reported to EU ETS because it is classed as secondary energy and EU ETS is paid by the generator rather than producer of the electricity. Preliminary estimates suggest that the overlap is significant for the Chemicals (CIA) and Paper (CPI) sectors and that CCL forgone for these two sectors was around £20 million per year in TP2 and TP3.

⁸⁴ In CRC Phase 1 (April 2010 to March 2013), qualifying firms with CCA sites still had to report their total consumption to the CRC scheme, although they paid no CRC allowances on CCA sites. The CRC Phase 2 scheme (April 2013 to March 2019) was simplified so that emissions from CCA and EU ETS sites did not count towards qualifying emissions for CRC Phase 2. The energy and emissions within the scope of CRC were significantly reduced in CRC Phase 2.

⁸⁵ This is based on the effective life of building measures, typically ranging from under 5 years to over 20 years with an average around 10 years, from confidential data compiled by Salix, a public sector financing initiative.

post-scheme outcomes were tested, with savings being assumed to persist for 10 years at between 25% and 75% of the level attributed to the CCA scheme during the target periods.

Carbon savings relative to the counterfactual scenario were estimated to be around 0.3-0.7 million tonnes of CO₂ equivalent per year in TP3, based on estimates of the energy savings that were attributable to the scheme. For reasons explained earlier in this chapter, these estimates are lower than the EA’s estimate of carbon saved because the latter is calculated relative to the base year (2008 for most TUs) and may be attributable to a range of factors, not just the CCA scheme. The monetary value of energy bill savings and GVA benefits were estimated to be significantly greater in scale than the monetary value of carbon savings, at the carbon values currently projected by Government. The GVA estimates presented here are based on macro-economic modelling and are conservative relative to the turnover impacts estimated by the micro-econometric workstream.

The estimated ‘Net Present Social Value’ presented in Table 6.3 below is calculated using a discount rate of 3.5% and the annual social cost of carbon from the Treasury Green Book⁸⁶. Details of these calculations are presented in the Technical Report.

Table 6.3: Estimated Net Present Social Value (£ millions, 2019 prices, discounted to 2019)

Net Present Social Value costs and benefits	(£ millions)
Costs	
Administrative costs (including EA fees, sector association fees and time/costs for participants)	119
Estimated costs of compliance (i.e. additional expenditure on energy efficiency actions)	
- High energy bill savings	248-1,255
- Low energy bill savings	248-604
Estimated total costs	
- High energy bill savings	367-1,374
- Low energy bill savings	367-722
Benefits	
Carbon savings to end 2022 (monetised)	21-41
Carbon savings beyond scheme (monetised)	28-166
Estimated energy bill savings to end 2022 (Long Run Variable Cost)	604-1,255
Estimated energy bill savings beyond scheme (Long Run Variable Cost)	136-847
Estimated increase in GVA	1,502-1,734
Estimated total benefits	2,290-4044
Estimated net benefit	1,567-3,677

(Source: Estimates based on evaluation evidence, across all workstreams). Note that the upper estimates were derived by combining the highest estimates of benefits with the lowest estimates of costs.

While the estimated benefits to society appear significantly greater than the estimated costs, the assessment of the ToC for the policy in the Technical Report suggests that the value to society could possibly have been increased by targeting the scheme more narrowly at sectors

⁸⁶ HM Treasury (2018). ‘The Green Book – Central Government Guidance on Appraisal and Evaluation’

that were at risk from international competition and at sectors with higher rather than lower energy intensity. The original sectors admitted to the scheme include some sectors that are covered by EPR regulations but have not been fully assessed in terms of their energy and trade intensity.

7. How effective and efficient has delivery of the second CCA scheme been?

Summary

Participants and sector associations were generally familiar with the scheme and had developed systems to meet its relatively complex requirements. Longstanding participants did not therefore perceive the scheme as burdensome. The most onerous aspects of the scheme were reported to be scheme entry applications and variations, demonstration of compliance with the 70/30 rule⁸⁷ and target stringency tests. The baseline year of 2008 was seen as dated and anomalies in baseline year production were reported which resulted in some targets being overly relaxed or stringent. Eligibility rules (based on Environmental Permitting Regulations (EPR) and on energy- and trade-intensity criteria) were also found to be dated. Some sectors qualifying on EPR grounds were not particularly energy or trade intensive, meaning that their inclusion might therefore not be entirely consistent with the scheme's current objectives.

In a survey of sector association representatives, nearly half had reservations about the effectiveness of the CCA audit and enforcement processes, describing them as 'somewhat effective'⁸⁸. In interviews, some sector associations called for them to be strengthened. The EA reported that audit rates were lower for the voluntary CCA scheme than for other mandatory schemes (e.g. CRC), on the grounds that onerous audits and enforcement might discourage firms from participating in a voluntary scheme.

The target-setting process is outlined in this chapter. Some sector associations and participants would have preferred the target-setting process with Government at the start of the second CCA scheme to have been more collaborative and transparent. There were mixed views on the tightness of resulting targets. Sector associations reported that their sector targets were very, or reasonably, challenging and reported some TUs leaving the scheme as a result of tight targets. In the quantitative survey, targets being tough to meet was the most commonly cited factor behind participants missing targets. But in qualitative research, other participants reported having easy to achieve targets (e.g. because of activity levels in their baseline year). Energy consultancies suggested that variations in performance were partly due to variations in the tightness of targets between sectors, as well as differences in circumstances or baselines between CCA participants.

Whilst there were wide variations in the approach taken by sector associations to their management of the CCA scheme, most (88%) CCA participants thought that their management was efficient or very efficient.

⁸⁷ The 70/30 rule allows CCA participants to report energy use for non-eligible activities, and claim CCL reductions on this energy use, provided it comprises no more than 30% of site energy use. The burdensome aspect of this rule was demonstration of compliance, particularly for sites close to the 70/30 limit.

⁸⁸ There were five response options ranging from 'not at all effective' to 'extremely effective' with 'somewhat effective' being the central response.

Scheme administration

The CCA scheme is administered on behalf of BEIS by the EA, with support from the sector associations. The sector associations act as intermediaries between the EA and operators and so can advise operators on scheme rules and requirements. The sector associations also provide expert representation to the EA for operators who have concerns about aspects of the scheme. This is reflected in the findings below.

Administrative burden

Qualitative research found that longstanding participants were familiar with the scheme's requirements and had effective systems in place to meet its complex requirements. This would not necessarily be the case for those newer to the scheme. Variations were observed in the approaches of sector associations to scheme administration (e.g. in the level of automation used for data collection and the level of support provided) so it is inevitable that participant experiences and perceptions of the scheme's complexity will have varied significantly.

Some sector associations did not find the administration of the scheme to be burdensome and described it as straightforward. This was partly because the scheme is longstanding and partly because some associations outsource scheme administration to third party consultants.

Scheme entry applications and variations were typically described as being the most burdensome aspect of scheme administration for sector associations and it was suggested that variations were made more demanding by the implementation of stringency testing⁸⁹. Implementation of this test was delayed until TP3 and it was perceived as being introduced without sufficient consultation. The EA have pointed out that the method for stringency tests was set out in the Technical Annex⁹⁰ for the CCA scheme and implementation was in fact consulted on. However, some participants and sector associations perceived the stringency tests to be onerous, requiring operators to provide details of data and throughput in the previous TP.

Some sectors also expressed frustration about demonstrating compliance with the 70/30 rule⁹¹. One sector association suggested that the nature of businesses in their agreement meant that they would always qualify under the rule, which made the completion of internal paperwork to demonstrate compliance with the rule 'a bit painful' and 'pointless'. Another sector association suggested that demonstrating compliance with the 70/30 rule, alongside completion of other entry requirements, may discourage potential participants from joining a CCA scheme (e.g. because of the need to install additional metering). It was reported to be particularly onerous for the minority of facilities that were close to the threshold, who had to

⁸⁹ TUs seeking changes to their agreement during TP3 (e.g. because of a facility joining) have to undergo 'stringency testing' to ensure that their revised target requires improvement on what their performance would have been in the previous TP. Any adjustments to targets are only be applied in future target periods (i.e. TP4).

⁹⁰ BEIS (2013). [Climate Change Agreements: Technical Annex](#) (version 2.0)

⁹¹ The 70/30 rule (originally in the scheme as a 90/10 rule) allows CCA participants to report energy use for ineligible activities, and claim CCL reductions on this energy use, provided it comprises no more than 30% of site energy use. Technically, this is an eligibility criterion for entry to the scheme, rather than a scheme rule. Sites need to provide evidence of compliance on joining the CCA scheme. Most operators are allowed to submit estimates of ineligible consumption, but those falling below the 70% threshold have to use sub-metering to report eligible consumption. Sites need to satisfy themselves that they continue to fall below the threshold and are required to notify the EA if they cross the threshold (with possible implications for sub-metering).

keep recalculating their eligibility under the rule in order to notify the EA if they crossed the threshold.

All of the [sector] participants passed the 70/30 rule, so they didn't have any additional cost of installing some metering there.

(Sector association)

In response to such issues, there were suggestions from sector associations that the efficiency of the scheme could be enhanced by Government granting greater discretion to the EA in interpreting and applying scheme rules, particularly in relation to structural changes arising from genuine business need.

Scheme structure

A key issue arising from the qualitative research with sector associations and participants was the base year. The 2008 baseline year was widely viewed as being too dated and had rendered some TUs targets meaningless where significant business changes had taken place since that date.

So, lots of companies have 2008 base year, which isn't really representative of what they're doing now, and that makes it very difficult.

(Sector association)

For example, some firms had invested in more automated processes which used fewer staff but more energy, with the result that their consumption was well above their baseline despite their energy management being strong in other respects.

Dependence on one year's performance for the baseline was reported to cause problems for firms that had anomalous performance in the baseline year. For example, low production in that year would help those with relative or Novem targets (because the efficiency of operations in that year would be relatively low) but would be a disadvantage for those with absolute targets (because their target would be based on a year with low energy consumption).

The mismatch between a firm's target and its current activity was reported as potentially leading to TUs or sites leaving the scheme because it was no longer financially viable to participate. Conversely, some firms reportedly had easy targets because of a favourable baseline year and were able to generate surplus on a significant scale.

Some concern was also expressed by sector associations about eligibility rules, including the fact that the original sectors were chosen on the basis of coverage by EPRs rather than energy and trade criteria. EPR was used as the criterion for participation in the first CCA scheme, as a proxy for large and generally intensive energy users. Where energy and trade criteria had been applied, and particularly where certain activities within industrial sectors had been excluded from the scheme on these grounds, there was concern amongst sector associations that some eligibility assessments were dated and might need to be updated to reflect recent changes to these industries.

It was difficult for the evaluation to assess the reliability with which energy and trade-intensity criteria had been applied to non-EPR sectors. There was some evidence that assessment of a

sectors trade intensity had been more difficult than assessment of energy-intensity, possibly owing to the complexities of trade data.

Audit and enforcement

Nearly half of sector association respondents to the online survey had reservations about the effectiveness of the CCA audit and enforcement processes, with 47% describing them as 'somewhat effective', while 35% described them as 'very effective' and 18% as 'extremely effective'⁹².

The overall quantity of audit activity was not seen to be onerous by respondents to the qualitative research. Some sector body and participant respondents to the qualitative research had no experience of being audited. The EA advised that 15 facility audits and 10 sector audits had been completed in 2019 up to November, with a further 24 audits being initiated towards the end of 2019⁹³. The EA reported that audit frequencies were lower for the voluntary CCA scheme than for mandatory schemes such as CRC, on the grounds that onerous audits and enforcement might discourage firms from participating.

Among those who had been audited, there were contrasting experiences. Some participants described the approach as light touch compared to audits for other purposes, whilst others found it far more challenging. The EA have suggested that this may be a function of whether the participant was supported by a consultant or how well-prepared the auditee was and how robust their data was before the audit.

The EA advised that almost all audits are done remotely, typically involving an audit call of up to 2 hours, with some data preparation beforehand. The use of remote auditing was seen to be a cost-effective way of covering more participants, but one sector association questioned whether carrying out audits remotely could be effective. Some criticism was made of a perceived inconsistency in the approach to audits. This was accompanied by a call for an audit template in order to address this, but the EA advised that an audit template is already used.

Some felt that the level and robustness of audit was appropriate but there was some questioning of whether processes were sufficiently robust. One sector association questioned whether participants should be free to decide whether to share audit findings with sector associations, as is currently the case: it was suggested that removing this discretion would make it easier for sector associations to support any follow-up actions. A further criticism was that actions identified in audits were not always enforced in a timely fashion. However, the same sector association indicated that they thought that enforcement was becoming more robust whilst others welcomed the introduction of financial penalties.

Targets

The target-setting process

In the qualitative research, some sector associations and participants said they would have preferred the target-setting process to have been more collaborative and transparent. Review

⁹² There were five response options ranging from 'not at all effective' to 'extremely effective' with 'somewhat effective' being the central response.

⁹³ The audits completed in 2019, up to November, represented 0.2% of facilities in the scheme at the end of TP3 and 20% of sectors with current TUs.

of a sample letter sent to a sector association in 2012 showed that the sectors were consulted and were told the types of considerations⁹⁴ on which the proposed target was based but were not given details of the assumptions made.

Concerns we had when it was made was that it was just a figure given [by DECC⁹⁵]. There was no back up in terms of how this figure had been derived. There was no transparency associated with it. It was just a figure we were given. We never actually received an explanation of how this figure had been arrived at.

(Sector association)

Sector associations engaged in the target-setting process in very different ways. Some simply accepted the target proposed by DECC, whilst others challenged it. In doing so, the extent to which they consulted with their sector varied significantly. Where a more 'bottom-up' approach to sector-level target-setting had been adopted by the sector association, this was seen as a strength by some participants. Sector associations which had adopted such an approach also saw it as a strength and reported it to have generated co-benefits for them in terms of building their understanding of the sector.

Sector associations had discretion as to how to allocate targets within their sectors. Some sector associations simply applied the overall sector target to all participants, either because this was seen to be the fairest and simplest approach or because of a lack of data on which to base an alternative approach. Other approaches reported by sector associations included:

- Apportioning the target based on the energy mix, energy use and/or past energy performance of each TU;
- Apportioning the target based on the types of technologies used within each TU.

Having flexibility in apportioning the target between target units was cited as a strength of the scheme. However, some sector associations commented that apportioning targets between participants was time-consuming and that it was important for the allocation process to be seen as even-handed.

Target levels

There was some divergence between sector associations and participants regarding the extent to which targets were perceived to be challenging. In the online survey, all sector associations reported targets as very or reasonably challenging. Sector associations cited TUs leaving the scheme as a result of the targets or complaining about the level of the targets. In the quantitative survey, targets being tough to meet was the most commonly cited factor behind participants missing targets.

However, in qualitative research, some participants reported they had easy targets. As already noted, this could have been caused by the nature of business activity within the baseline year

⁹⁴ For example, the types of considerations included: information previously provided by the sector on energy efficient technologies available to the sector, removal of EU ETS emissions, known potential abatement technologies not included in sector returns, previous CCA performance, information on the split of emissions and abatement potential between traded and non-traded, modelling work and CHP potential.

⁹⁵ The Department for Energy and Climate Change – the precursor department to BEIS.

but in qualitative research with energy consultancies it was suggested that this was also due to variations in the stringency of targets between sectors.

They must have had a really clever consultant working with the government for that particular sector's targets. It's kind of, "It's a walk in the park, we don't need to do anything, we're going to hit it without even turning anything off or on or anything new. We've made no investment, it just comes to us. We don't have to try. Who cares? We'll take the money, thanks"... There are some sectors where the target is the other way. It's, "We're never going to hit this. We've done this, we've done this, we've done this, we're never going to hit the target. We'll just take it on the chin that we're only going to get 60% of what we should be getting, because the other 40% we'll have to pay back in two years when the target period ends."

(Energy consultant)

There was evidence from both the qualitative and quantitative research that targets were generally becoming more demanding over time, due to shrinking numbers of lower cost opportunities for energy efficiency improvements. For some participants, it was also due to the business activities becoming even more detached from the baseline year on which the targets were set.

Role of sector associations

The vast majority (88%) of respondents to the quantitative survey thought that sector association management of the CCA was efficient or very efficient. The main reasons given related to sector associations being proactive and communicating well. Qualitative evidence also indicated that CCA participants valued the support of sector associations, not only in terms of scheme administration but also – for some - in terms of support and information on energy efficiency.

Although there was consensus about their effectiveness, the approach to the CCA taken by sector associations varied significantly, in terms of:

- Their engagement in the target-setting process with Government, as described above.
- Their charges to participants. The sector association survey identified a wide variation in approaches to charging including combinations of: a flat fee for all sector participants; a carbon variable; and charges based on the percentage of energy savings achieved.
- The frequency of reporting required of participants in their sector. Most required reports at least annually but some required monthly reporting.
- The approach to reporting. Examples of web-based systems were encountered. Others reported via email. One sector association was still using a paper-based approach.
- The level and types of support provided to participants. For example, some were actively involved in providing workshops and other support on energy efficiency improvements, whilst others were simply administering the scheme.

Using sector associations does not appear to add significant costs to the scheme. Average sector association fees were £2008 per TU per year⁹⁶. Sector association revenues from the CCA scheme were reported to be in the range £0-£360,000 per year while costs were reported to be in the range £2,750-£300,000 per year. The average net income for sector associations responding to the survey was £15,500 per year (calculated as revenue minus costs). Some sector associations were keen to emphasise their not-for-profit structure and/or cost recovery approach to CCA administration.

At the sector association workshop, sector associations emphasised the importance of their involvement in policies like the CCA in terms of:

- Reducing the risk of competitive distortion through helping to ensure that competing businesses are treated equally.
- Allowing the expertise of sector associations to be drawn on, e.g. in ensuring appropriate targets.
- Helping to overcome capacity constraints within target firms, through sector associations undertaking important elements of scheme administration.

⁹⁶ Source: online survey of sector associations. This is based on responses from 14 sector associations.

8. Views on future policy

Summary

The CCA policy was viewed positively by the vast majority of research respondents: 92% of CCA participants reported that they were likely to continue in the scheme and participate in a future scheme, if there is one. Qualitative research found that some CCA participants and sector associations saw the CCA as one of the few policies providing a positive incentive for energy efficiency, with the CCL discount increasing the cash available for firms that met performance criteria, and tax/buy-out avoidance motivating action on energy efficiency. There was evidence from a range of sources (including CCA participants, sector associations and the micro-econometric and macro-economic workstreams) that the CCL (and, formerly, CRC) shelter provided by the CCA scheme supported the competitiveness of those energy intensive industries that were open to international competition, as well as supporting the profitability of other UK industries which operate on tight margins (irrespective of international competition). While CCL discounts were viewed as relieving only one part of the cumulative burden of non-commodity costs on energy intensive industry, most CCA participants and sector associations reported that any removal of the CCL discounts would be interpreted by industry as a negative signal from Government. CCL discounts were reported to have become more important with the introduction of new, higher CCL rates in April 2019 and the scheme was viewed as increasingly relevant to Government's new commitment to reach zero carbon emissions by 2050. Key learning points from the evaluation evidence, in relation to the design of a future policy were to:

- Learn from international good practice (e.g. learning from energy efficiency networks in Germany and other countries).
- Ensure that any future policy is part of a holistic energy policy for industrial consumers, with consistent reporting requirements across different policies and possibly financial support for large investments, where these would improve energy efficiency.
- Review the eligibility of CCA sectors to improve the targeting of the scheme at sectors that are both energy intensive and open to international competition.
- More consistency in the stringency of targets and possibly higher buy-out fees, to increase the impact of the scheme on energy efficiency, with targets taking into account the potential for further improvements in energy efficiency in each sector.
- Changes to performance metrics and targets to make them more consistent with carbon reduction, which is increasingly a concern for Government and for companies – linked to, but in some ways different, from energy efficiency concerns.
- Increased verification of emissions, and/or increase levels of auditing, possibly in conjunction with the Streamlined Energy and Carbon Reporting (SECR) requirements introduced in April 2019.

A number of suggestions were also made about ways in which delivery of a future policy could be improved, including more flexible interpretation of scheme rules by the EA,

streamlining of evidence requirements for the 70/30 rule, more consistency in the advice support by the EA/Ricardo and more consistent quality of support to participants by sector associations.

Significance of a CCA-type scheme in future

During the evaluation, CCA participants and sector associations were asked about their views on future policy beyond the second CCA scheme. As discussed in chapter 7, the CCA scheme was generally seen as well-established and well understood. The vast majority of respondents viewed the scheme positively. In the quantitative survey, 92% of CCA participants reported that they were quite likely or very likely to remain in the present scheme and to participate in a future scheme, if there was one.

The second CCA scheme was popular with industry because it provided a combination of 'carrots' and 'sticks' for action on energy efficiency, with the balance weighted rather more towards 'carrots' than 'sticks'. It increased the cash available for investment by firms that met performance criteria. The scope to avoid tax and/or buy-out by taking energy efficiency action was seen as a particular motivating factor.

I actually see the Climate Change Levy scheme and the relief that's offered as being a very positive stimulus to encouraging businesses to look at energy efficiency. I guess it's like anything in life. If you think that you can avoid tax by doing the right thing, then it gives you an extra impetus and a little bit more enthusiasm for actually looking at that and adopting. (CCA participant)

The shelter that the CCA provided from CCL (and, in the past, CRC) was seen by sector associations and many participants as supporting the competitiveness of energy intensive industries that are open to international competition, as well as supporting the competitiveness of some UK industries that are less affected by international competition but that operate on very tight margins. This shelter was seen as important given the cumulative burden of regulation and charges on electricity use for large users in the UK. However, for some current and former participants, the CCL discounts provided by the CCA scheme became less important when the min-met exemption was introduced. Some sector associations mentioned that CCL discounts were now seen in the context of EII exemptions, which provide a higher level of energy cost savings for those firms that are eligible and are not conditional on energy efficiency improvements.

Those organisations that were less positive about the value of a future CCA-style policy tended to see the CCA as having strong influence during the first scheme, when there were fewer other energy efficiency policies, but felt that its influence had reduced as other energy efficiency policies were introduced. Some also commented that easier and lower cost energy efficiency measures had now been implemented, leaving harder and more costly measures that could not be driven by the CCA alone. However, others felt that there would always be scope for modest improvements in energy efficiency and that the CCA provided the impetus for firms to keep looking for this.

There always will be some scope for, actually if you produced a process flow map for the factory or if you invested in training here or computerised this bit of kit, or whatever. There are always going to be improvements that can be made. If the

incentive of the CCA saving is removed, then they might not be looked at as deeply and as often as they currently are.

(Sector association)

While CCL was viewed as relieving only one part of the cumulative burden of non-commodity costs on energy intensive industry, most CCA participants and sector associations reported that any removal of the CCL discounts would be interpreted by industry as a negative signal from Government.

If the CCA scheme was scrapped and it just became a carbon tax, ouch. That would have some serious implications. The [industry] is well embedded into Europe, and internationally as well. So I think if there was ever anything that penalised that, in the way of energy costs, for example, scrapping the CCA scheme, there would be some serious decisions made, unless there was some similar scheme that was put in place.

(Sector association)

Going forward, some respondents commented that the CCA scheme had become more important with the introduction of new, higher CCL rates and the Government's recent commitment to reach net zero carbon emissions by 2050. Some respondents in the qualitative research voiced the expectation that targets would be more challenging in any future scheme, but some commented that tougher targets would need to be matched with more financial support for larger energy efficiency investments (e.g. through funding or finance being made available).

Design of a future policy

The suggestions below have emerged from a review of evaluation evidence and from direct suggestions from CCA stakeholders.

Learn from international good practice

Voluntary agreements similar to the CCA scheme have been implemented in a number of countries, including Belgium, Denmark, Finland, Germany and Japan. Literature sources for these and other international schemes are listed in the Technical Report. The review of literature undertaken for the evaluation highlighted six high-level success factors for the design of VA schemes.

1. Voluntary Agreements should involve close collaboration between government and relevant sector associations. Efforts should be made to gain and retain trust on both sides. It is important to involve external, independent experts as this helps to build confidence.
2. Scheme participants require a strong incentive to engage with schemes. This might involve 'carrots' or 'sticks' but would normally include an element of both.

3. Schemes need effective mechanisms for identifying and disseminating new technologies, processes and other learning. The responsible authority should lead, but sector associations and participants also have a role to play.
4. The scheme should set clear requirements and expectations for participants. The scheme should be clearly focused on going beyond 'business as usual' and any goals or targets should reflect this.
5. The responsible authority should be committed to the scheme and ensure that it is clearly embedded within a policy and operational framework. The authority should also have access to sufficient resource and expertise.
6. The scheme should include a requirement for regular monitoring, reporting and evaluation, and be subject to regular review.

The literature review also indicated that some countries, such as Germany, have moved away from voluntary agreements towards promoting energy efficiency through industry-led 'energy efficiency networks'. Rather than tax reductions for energy intensive industry that is at risk of carbon leakage being conditional on meeting voluntary energy efficiency targets, tax reductions are unconditional (or – at one point in Germany – conditional on accreditation with an energy management scheme such as ISO 50001). However, the evidence presented in chapter 4 from micro-econometric analysis, about higher energy consumption by min-met firms leaving the CCA scheme, suggests that unconditional exemptions might lead to increased energy consumption.

The industry-led and industry-centred energy efficiency networks are voluntary groups of businesses which aim to promote good practice and cost saving within specific geographical areas or industries. This type of approach has been used in other sectors in the UK: for example, the Courtauld Commitment 2025 is a voluntary initiative that aims to reduce food waste and packaging waste in the food sector. It could be argued that in some instances sector associations have established embryonic energy efficiency networks within their CCA sector, with incentives for participation provided by CCA tax breaks and assistance with knowledge transfer being provided via the sector association, so the foundations of such an approach may already be present.

Holistic approach to industrial policy

CCA participants and sector associations called for a holistic approach to energy policy for industrial consumers, that would foster clean growth and encourage major investment where needed. In particular, there was a call for more support for energy efficiency investment and more consistency between the requirements of different reporting policies. BEIS consulted during 2019 on the [design of an 'Industrial Energy Transformation Fund'](#) which could provide this type of support for major energy efficiency investments, complementing any future CCA scheme.

I think there needs to be a bigger carrot from the government and the scheme needs to be a bit more solid in terms of [...] how they encourage people to actually invest in new technology. I don't think the CCA programme actually does that. It gives them money back to trade [...] but I don't think there is enough done to encourage companies to purchase new technology that is greener and more efficient than they're currently using.

(Sector association)

The evidence presented in chapter 4 suggests that the CCA scheme had more additionality for firms that were not implementing another energy management system such as ISO50001. Some companies reported adopting ISO50001 in order to meet ESOS requirements. Related to this, there were some broad comments from interviewees about the need to simplify the policy landscape for energy-intensive industries and minimise overlap between policies such as the CCA scheme, ESOS and Streamlined Energy and Carbon Reporting (SECR). For example, the CCA scheme and SECR both involve reporting of energy use, while ESOS and the CCA scheme both involve (or should involve) consideration of actions to improve energy efficiency. Some respondents saw ESOS audits as potentially informing their CCA actions, but others saw these simply as overlapping policies pushing in the same direction. Similarly, there were calls for more consistency on reporting and regulatory requirements between different Government departments (e.g. Defra and BEIS).

Review eligibility for a future scheme

There was also some discussion about eligibility criteria. Some CCA participants and sector associations commented that eligibility criteria used in the second scheme had become dated and should be reviewed. For example, some reported that parts of their sectors had been excluded in the past but might now qualify for the scheme under energy intensity and trade intensity criteria.

The evaluation team's analysis of evidence about competitiveness, presented in chapter 5, highlights that some CCA sectors are not significantly affected by international competition, while evidence in chapter 4 highlights that some sectors are much less energy intensive than others. Some of the less energy- and/or trade-intensive sectors qualified for the scheme on the grounds of their eligibility for Environmental Protection Regulation (EPR). While some of these sectors face narrow margins, it is possible that others could in fact pass the cost of CCL on to their consumers. If none of the firms in these sectors had CCAs, then there would still be a level-playing field within the sector even if they paid full CCL. Questions could therefore be raised about the range of sectors included in the CCA scheme, particularly for sectors that meet the EPR regulation but would not qualify for the CCA under energy intensity and trade intensity criteria. While one possible approach might be to extend use of the criteria already used for 'Energy Intensive Industry' compensation schemes, various stakeholders mentioned concern about these criteria (e.g. because they could be met by part but not all of a given sector; or because they could not be met by firms with particular types of contractual arrangements).

The suggestion that eligibility might be reviewed for EPR sectors is based on the evaluation team's analysis of evidence across all workstreams and was directly suggested by only one sector association during the qualitative research. The suggestion of an eligibility review for these sectors caused concern amongst sector associations consulted at the sector association workshop, many of whom were concerned about the potential impact of full CCL on the competitiveness of businesses in their sector.

Increase scheme impact on energy and carbon efficiency

Various stakeholders commented that more could be done to increase the CCA scheme's impact on energy efficiency. The evaluation evidence presented in chapter 4 suggests that the scheme had more additionality where targets were more consistent, well-evidenced and challenging. The evidence also suggests that buy-out fees helped to motivate energy efficiency action for some participants. The design of any future policy should include more consistency

in the stringency of targets and possibly higher buy-out fees, to increase the impact of the scheme on energy efficiency.

As discussed in chapter 7, there were calls for the target setting process to be better evidenced and more transparent, with targets taking into account the potential for further improvements in energy efficiency in each sector. Increased use of Novem targets would help to ensure that targets remained relevant when product mix changed, provided that firms could afford to invest in the sub-metering necessary to provide evidence for Novem target monitoring. Increased use of carbon targets and adjustment of reporting rules would also help to ensure that the CCA scheme did not disincentivise investment in renewables, improving consistency with the Government and companies' carbon reduction agenda, although increased use of carbon targets might not actually reduce energy use.

There were some calls for increased levels of verification of CCA emissions, possibly linked to reporting requirements for other policies (e.g. EU ETS, which requires external verification, or SECR, for which verification is good practice). There were also calls from sector associations for increased levels of auditing and more effective audits (e.g. more site-based audits as opposed to desk-based audits). The sector associations making these calls were motivated to encourage energy efficiency improvements in their sector, as part of their role to support the competitive position and reputation of their sector, and they wanted CCA compliance to provide meaningful evidence of such improvements.

Delivery of a future policy

Elements of the current scheme that were viewed as working well, and which CCA stakeholders commented that they would like to see continue included:

- The use of sector associations, which is seen to enhance participation rates, ensure sector-specific expertise is utilised and reduces the risk of market distortion.
- Freedom for sector associations to choose how to allocate targets between their members (e.g. taking account of past performance).
- The fact that the scheme did not prescribe specific technologies but allowed TUs to meet targets in their own ways (although some sector associations undertook research with their members to find out what measures had been implemented).
- Sector association administration costs being kept down by running some services (such as CCA helplines) across several sectors.
- The rules allowing bubbling of facilities, to reduce administrative costs and even out over/under performance between facilities.
- New rules allowing the use of templates for documentation of multiple facilities that were broadly similar.
- Annual (or more frequent) reporting undertaken by many sector associations, which helped to maintain good practice on reporting by CCA participants and avoid unexpected problems at the end of the TP. This included more frequent online data

collection by some sector associations, allowing monthly monitoring of performance and easy preparation of TP reports.

A number of suggestions were made by CCA participants and sector associations to make delivery of a future policy more effective and efficient. These included:

- More flexibility around interpretation of rules by the EA, to allow for genuine changes in business circumstances or unforeseen circumstances during the course of the scheme.
- More awareness of the potential to appeal the EA's interpretation of rules through the First Tier Tribunal, as set out in the CCA Operations Manual.

It's difficult to do, but if there were a way for some overseeing body to say, "Actually, if there is a clear case where an agency rule is providing a disadvantageous or clearly wrong outcome, it can be changed, overwritten, superseded, suspended or whatever." That could be very helpful.

(Sector association)

- Linked to this call for flexibility, there were calls for streamlining of evidence requirements to support application of the 70/30 rule, particularly for sites that are well above the 70/30 threshold.
- More consistency in the advice provided by the EA and Ricardo, possibly including a telephone help desk rather than email support (although the EA advise that a previous telephone helpdesk was removed owing to underuse).
- More consistent quality of support to participants from sector associations, in line with the level of fees charged by sector associations.

Other things that could do with a bit of evening out or work are really some of the fees and the level of service provided by the sector associations. Some people get a bit of a raw end of the deal, really. Others get quite a good service.

(Energy consultant)

9. Conclusions

The overall conclusion of the evaluation is that the CCA scheme is a policy that is popular with industry and that makes some contribution to the scheme objectives of encouraging energy efficiency and protecting the competitiveness of energy- and trade-intensive industry.

Participants in the scheme, on average, improve energy efficiency action at least as much as if they would if subject to full CCL payments. Within this overall picture, about half of firms report that the scheme does not influence their energy efficiency action. But the remaining half report that the scheme contributes to their action on energy efficiency to some degree, encouraging them to undertake a wider range of actions, to undertake actions earlier or on a wider scale than they would otherwise. The scheme appears to have a similar level of influence to the ESOS and the former CRC Energy Efficiency Scheme, albeit it in a different way, but it appears to have less influence than the EU ETS scheme (given that current values of EU ETS allowances are much higher than the estimated CCL discounts).

The CCA scheme also, on average, contributes to slightly increased growth in the UK and slightly increased competitiveness for sectors open to international competition. Again, this average picture masks underlying differences: the cost-effectiveness of the scheme could possibly be improved if it was targeted more closely at sectors that are at risk from carbon leakage (i.e. that are both energy intensive and trade intensive). Closer targeting could also reduce the risk of unintended effects in terms of disadvantage for firms outside the scheme, either because it is closed to new entrants, because they are too small to participate cost-effectively or because they do not quite meet eligibility criteria.

CCA participants voiced strong support for a future CCA-style policy. This evaluation provides evidence that CCA-style policies do achieve both energy efficiency and competitiveness objectives but also suggests that they are challenging to implement in an effective and cost-effective way. The contribution of any future similar policy to supporting clean growth will be strongly influenced by the targeting of the scheme and the tightness of the targets set for participants.

Appendices

1. Timeline for CCA scheme
2. Theory of change
3. Scheme data tables

Appendix 1: Timeline for CCA scheme

Milestones for the first CCA scheme are shown in *italics*.

Year	Target period	Sectors with CCAs	CCL discount	CCA consultations and announcements	Legislation	Other policy developments
1998				<i>Marshall Task Force</i>		
1999						<i>CCL announced</i>
2000				<i>CCA announced; target setting process</i>	<i>Finance Act 2000; PPC Regs 2000</i>	<i>CCL started April 2001</i>
2001	<i>Old scheme TP1 (targets applied to one year's emissions)</i>	<i>44 (based on PPC⁹⁷ regulations)</i>	<i>80% (Apr 2001 - Mar 2011)</i>			
2002				<i>Target review</i>		<i>UK ETS from April 2002 (pilot scheme)</i>
2003	<i>TP2 (as above)</i>	<i>42 (based on PPC regulations)</i>				
2004				<i>Target review</i>		
2005	<i>TP3 (as above)</i>	<i>52 (criteria broadened to include energy intensity)</i>			<i>New eligibility criteria</i>	<i>EU ETS Phase I (with opt out) Jan 2005-Dec 2007</i>
2006				<i>Target review</i>	<i>CCA amendment regs 2006; Env. Permitting Regulations 2007</i>	
2007	<i>TP4 (as above)</i>	<i>52</i>				
2008				<i>Target review; CRC consultation process</i>		<i>EU ETS Phase II (no opt out) Jan 2008 –Dec 2013;</i> <i>Declaration period for CRC Phase 1</i>
2009	<i>TP5 (as above)</i>	<i>54</i>		<i>Consultation on carbon floor price/CCL.</i>	<i>CRC legislation passed.</i>	<i>UK ETS closed to new entrants</i>

⁹⁷ Pollution Prevention and Control regulations (2000), which were superseded by the Environmental Permitting (England and Wales) regulations (2010).

Evaluation of second Climate Change Agreements scheme

Year	Target period	Sectors with CCAs	CCL discount	CCA consultations and announcements	Legislation	Other policy developments
2010				<i>High-level discussions on future of CCAs (Dec 2010)</i>		<i>CRC Phase 1 (Apr 2010 – Mar 2014) – complex rules for CCA exemptions</i>
2011	Certification period for first CCA scheme		65% (Apr 2011-Mar 2013)	Announcement re new CCA scheme (Mar 2011)		
2012				Target setting for new scheme		Consultation on CRC
2013	New scheme TP1	53 Mineralogical and metallurgical sectors exempt from CCL and CRC from Dec 2014, therefore likely to opt out of CCAs.	90% for elec; 65% for other fuels (Apr 2013 onwards)			Simplification of CRC introduced Declaration period for CRC Phase 2 (Apr 2012 to Mar 2013) EU ETS Phase III (Jan 2013 – Dec 2020)
2014				Target review; Announcements re ESOS	ESOS legislation	CRC Phase 2 (Apr 2014 – Mar 2019) – rules for CCA and EU ETS exemptions simplified; EDR launched – Jun 2014
2015	TP2	53		Publish approach to target review – Feb 2015 TP 1 Target Unit data submitted – May 2015 TP1 buy out fees to be paid – Jul 2015		CRC review publication – Spring 2015 Deadline for ESOS audits – Dec 2015
2016				Consultation on change of buy-out price, Decision taken by BEIS not to have a detailed review of targets.	Amendment to The Climate Change Agreements (Administration) to change	

Evaluation of second Climate Change Agreements scheme

Year	Target period	Sectors with CCAs	CCL discount	CCA consultations and announcements	Legislation	Other policy developments
					buyout price from £12 to £14 for TP3 and TP4	
2017	TP3	53 (of which 49 have active TUs)		TP2 Target Unit data submitted – May 2017 TP2 buy out fees to be paid – Jul 2017		5th Carbon Budget set
2018				Scheme closed to new entrants – 1 st Nov 2018		Exemptions from or compensation for some elements of electricity charges (e.g. ROCs, FiTs, CfDs, Carbon Price Floor) introduced for Energy Intensive Industry
2019	TP4	53 (of which 49 have active TUs)	Higher rates of CCL introduced in April 2019, with higher discount rates (93% for electricity, 78% for other fuels)	TP3 Target Unit data submitted – May 2019 TP3 buy out fees to be paid – Jul 2019		ESOS 2nd 4-year audit end of CRC Phase 2 allowance price – end March 2019 CRC Closure following 18/19 compliance year Increased rates of CCL from April 2019 New SECR carbon reporting requirements from April 2019
2020						

Evaluation of second Climate Change Agreements scheme

Year	Target period	Sectors with CCAs	CCL discount	CCA consultations and announcements	Legislation	Other policy developments
2021	Final certification period (ends in March 2023)			TP4 Target Unit data submitted – May 2021 TP4 buy out fees to be paid – Jul 2021		EU ETS Phase IV starts
2022						
2023						

(Source: Evaluation Team's compilation of policy developments).

Appendix 2: Theory of change

The theory of change (ToC) presented on the next page sets out the research team's understanding of how BEIS and the EA understand the CCA to work. The main components of the ToC are:

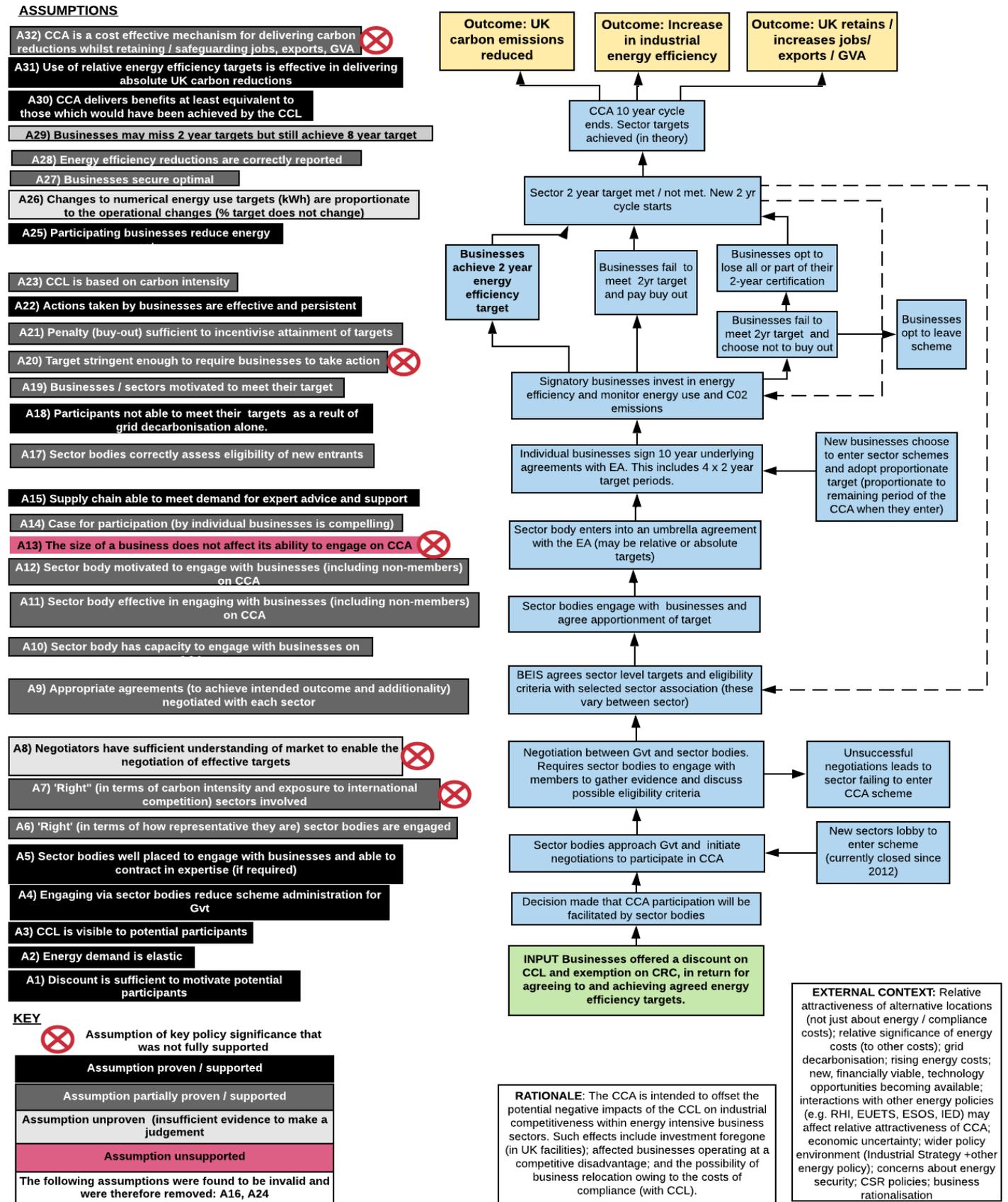
- The rationale for the CCA scheme (white box at the bottom of the diagram)
- The CCA programme logic (the flow diagram in blue), which describes how the scheme is intended to work, starting from the bottom and running up the page;
- The desired outcomes (shown in yellow at the top of the diagram);
- External factors affecting the outcomes from the scheme (white box, bottom right); and
- The list of underpinning assumptions (shown on the left-hand side of the diagram), both implicit and explicit, which dictate the extent to which the scheme will operate in line with the expected programme logic.

The ToC is read from bottom to top, with the assumptions also flowing in this direction.

In total there are thirty-two assumptions, each of which have been assessed against the research evidence to determine their validity. For reference, a summary assessment for each ToC assumption is provided in the table at the end of this appendix. In summary, as shown in the ToC:

- Nine of the assumptions were found to be 'proven / supported';
- Sixteen were found to be partially proven / supported;
- Three were found to be unsupported;
- One was found not to be relevant in the context of the evaluation; and
- Insufficient evidence was available to enable an assessment to be made of three of the assumptions (i.e. they were unproven).

Figure A2.1: Revised Theory of Change



The fact that some assumptions have been found to be partially proven / supported or unsupported indicates that the CCA may not be operating in line with what is currently understood to be the scheme design. However, not all assumptions are of equal importance to the operation of the scheme and of those listed, five (identified in the diagram by the red triangles) are felt to have particular policy significance; these are discussed below.

A7) 'Right' (in terms of carbon intensity and exposure to international competition) sectors involved.

The research generated partial support for this assumption - some sectors are energy- and trade-intensive, but some of the original sectors that entered via the EPR scheme are not.

A8) Negotiators have sufficient understanding of the market to enable the negotiation of effective targets.

This assumption applies to both Government and sector association negotiators. In some cases, qualitative interviewees did not feel that Government negotiators had the necessary sector understanding to enable the negotiation of effective targets and felt that there was a need for a more collaborative target setting process. In other cases, sector association members did not feel that they themselves had ready access to the necessary data. In contrast, there was some evidence that proposed targets, when informed by Phase 1 activity, were seen (by sector bodies and business representatives involved in the negotiations) as fair and reasonable. However, BEIS staff views, shared during ToC development workshops, suggest that Government negotiators felt disadvantaged, largely owing to information asymmetry. On balance therefore, this assumption is found to be unproven.

A13) The size of a business does not affect its ability to engage on CCA.

The evidence suggests that smaller businesses are less likely to be aware of the CCA scheme, benefit less from participation (in terms of the balance of costs and benefits) and are more likely to leave the scheme than larger businesses. These findings suggest that the size of business does affect its ability to engage with the CCA. This assumption is therefore deemed unsupported.

A20) Target stringent enough to require business to take action.

The evidence in relation to this assumption is mixed. In the qualitative research some businesses reported achieving their targets 'comfortably' whilst others reported finding them to be challenging. Most businesses who participated in the quantitative survey reported that they were taking action on energy efficiency, but half stated that they would have undertaken these actions in the absence of the CCA. However, the research found a widespread view that the targets will become more difficult to achieve moving forward, suggesting that the assumption may be more likely to be supported in future years. The evidence therefore does not wholly support the assumption and it is therefore adjudged to be partially proven.

A32) CCA is a cost-effective mechanism for delivering carbon reductions whilst retaining / safeguarding jobs, exports, GVA.

The CCA scheme appears to have generated more benefits, and incurred fewer costs, for CCA participants compared to a counterfactual scenario of 'full CCL, no targets'. For Government, and society as a whole, the benefits of the CCA scheme also appear to outweigh the costs of the scheme compared to a 'full CCL, no targets' counterfactual scenario. However, it appears likely that the scheme could have been more cost-effective if its design had been improved to reduce 'deadweight' (i.e. changes that would have happened anyway).

Evaluation of second Climate Change Agreements scheme

The following table shows the individual assessments for each assumption in the ToC.

Table A2.1: Assessments for each ToC assumption.

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
A32	CCA is a cost-effective mechanism for delivering carbon reductions whilst retaining / safeguarding jobs, exports, GVA.	<p>The CCA scheme appears to have generated more benefits, and incurred fewer costs, for CCA participants compared to a counterfactual scenario of 'full CCL, no targets'.</p> <p>For Government, and society as a whole, the benefits of the CCA scheme also appear to outweigh the costs of the scheme compared to a 'full CCL, no targets' counterfactual scenario.</p> <p>However, it appears likely that the scheme could have been more cost-effective if its design had been improved to reduce 'deadweight' (i.e. changes that would have happened anyway).</p>		X			
A31	Use of relative efficiency targets is effective in delivering absolute UK carbon reductions	The research found that most participating business are working to relative targets. Micro-econometric analysis found evidence that participants are securing statistically significant reductions in energy use, relative to non-CCA counter-factual organisations. This supports the assumption that the use of relative efficiency targets is effective in delivering absolute energy and by default carbon, reductions.	X				

Evaluation of second Climate Change Agreements scheme

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
A30	CCA delivers benefits at least equivalent to those which would have been achieved by the CCL	<p>Micro-econometric analysis indicates that CCA participants increase GVA and reduce electricity and gas consumption, relative to non-participants. The same analysis also indicates that participants accessing CCA via the environmental route reduce their electricity intensity, relative to organisations subject to full CCL.</p> <p>In summary, the micro-econometric evidence supports the assumption that the CCA delivers benefits at least equivalent to those which would have been achieved by the CCL alone.</p>	X				
A29	Businesses may miss 2-year target but still achieve 8-year target	The period covered by the research does not allow for an assessment of this assumption at this time.			X		
A28	Energy efficiency reductions are correctly reported	Figures from the Environment Agency show that the accuracy of reporting is usually good, with low levels of errors found in CCA audits. However, there were examples of higher levels of errors being found and the number of audits undertaken each year was low. There are also refund requests related to incorrect reports. As a result, the assumption is adjudged to be only partially supported.		X			

Evaluation of second Climate Change Agreements scheme

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
A27	Businesses secure optimal outcomes (i.e. scheme understood and expert advice available)	The evidence supports the assumption that most participating businesses have access to expert support and that they value this support. When asked how support might be improved very few businesses made any suggestions, further reinforcing evidence from the quantitative and qualitative research that businesses value the support and deem it effective. There is, however, some evidence that some smaller businesses may not be receiving the level of support they require and so this assumption is adjudged to be partially supported.		X			
A26	Changes to numerical energy use targets (kWh) are proportionate to the operational changes (% target does not apply)	Relative and absolute targets (and Novem targets, as a variant of relative targets) offer different ways of approximating the way that energy use varies with production, but neither really reflects the true relationship between energy use and production. The assumption is therefore found to be unproven.			X		
A25	Participating businesses reduce energy use	The quantitative and qualitative evidence indicates that most businesses have introduced energy efficiency measures and would therefore be expected to make energy efficiency gains. This is supported by the micro-econometric analysis which indicates that, at an aggregate level, CCA businesses reduce their energy use. This assumption is therefore adjudged to be supported.	X				

Evaluation of second Climate Change Agreements scheme

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
A24	There is no rebound effect	This assumption does not hold - economic theory suggests that there is a rebound effect. But this is accounted for elsewhere in the theory of change, so this assumption is considered to be redundant and is omitted from the final ToC diagram.					X
A23	CCL is based on energy carbon intensity	There is a broad relationship between CCL rates and carbon intensity for different fuels, but not a precise relationship in every case and so the assumption is found to be partially proven.		X			
A22	Actions taken by business are effective and persistent (i.e. businesses are not gaming the system, or simply reducing energy use in response to an economic downturn)	<p>The evidence suggests that most scheme participants invested in some form of capital equipment intended to directly reduce energy use. Assuming that such measures were correctly specified, installed and operate as expected, then it would be expected that such investments would have a persistent impact.</p> <p>Other measures, including the introduction of energy management systems, behavioural initiatives and the introduction, or continued operation, of energy strategies also seem likely to ensure persistence. Based on the evidence therefore it seems reasonable to treat the assumption that, for those businesses that have undertaken action, the associated impacts will persist as supported.</p>	X				

Evaluation of second Climate Change Agreements scheme

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
A21	Penalty (buy out) sufficient to incentivise attainment of target	<p>Just over half of participating businesses achieve their CCA target without using buy out (or surplus carried forward). Of those who missed their target most only missed by a small margin. This suggests that businesses may be looking to avoid buy-out -a view for which there is some qualitative support - although it may also be evidence that, for some at least, targets were insufficiently challenging (see A20). There is some evidence that businesses take a strategic view on buy out and are prepared to resort to buy out where other business priorities indicate that this is the best option.</p> <p>The evidence is mixed. Buy out appears to incentivise some businesses to achieve their targets but others may simply find the target unchallenging and therefore buy out may simply not be a factor in their thinking. For others, the incentive appears to be insufficient when weighed up against other business priorities. As such the assumption is adjudged to be partially supported.</p>		X			

Evaluation of second Climate Change Agreements scheme

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
A20	Target stringent enough to require business to take action	The evidence in relation to this assumption is mixed. In the qualitative research some businesses reported achieving their targets 'comfortably' whilst others reported finding them to be challenging. Most businesses who participated in the quantitative survey reported that they were taking action on energy efficiency, but half stated that they would have undertaken these actions in the absence of the CCA. However, the research found that there is a widespread view that the targets will become more difficult to achieve moving forward, suggesting that the assumption may be more likely to be found to be supported in future years. The evidence therefore does not wholly support the assumption and it is therefore adjudged to be partially proven.		X			

Evaluation of second Climate Change Agreements scheme

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
A19	Businesses are motivated to meet their target (because of reputational drivers and/or the establishment of a target creates its own momentum)	The evidence suggests that a small majority of CCA participants are motivated by CSR drivers. There is some evidence to suggest that where this is the case this encourages the attainment of CCA targets, and the qualitative research found examples of businesses adopting CCA targets in their CSR reporting. The quantitative research suggests that a small majority view CCA as important in developing a more systematised approach to energy management - including the use of targets and some interviewees (in the qualitative research) indicated that the simple fact of having a target acted as a driver. The qualitative research identified that organisations might choose not to meet targets as a result of other business imperatives. In summary, there is evidence that some businesses are motivated to hit the CCA target but the strength of the driver, and therefore the attainment or otherwise of the target, depends upon issues such as how public facing the business is and the relative significance of other business drivers		X			
A18	Grid decarbonisation is accounted for in target setting	Grid decarbonisation is not taken into account in CCA reporting and so the assumption is unsupported. On reflection it is felt that there was a misunderstanding during the development of the ToC and the assumption should have been recorded as 'Participants not able to meet their targets as a result of grid				X	

Evaluation of second Climate Change Agreements scheme

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
		decarbonisation alone.' This assumption has been entered into the final ToC and is deemed to be supported.					
A17	Sector bodies correctly assess the eligibility of new entrants	The research found that the quality of assessment by sector bodies varies and therefore this is adjudged to be partially proven.		X			
A16	Sufficient firms in each sector sign up to allow sector targets to be met	This assumption has been found to be invalid as there are no expectations in terms of the number of firms that might participate, and sector targets relate to participating firms rather than the sector as a whole. This being the case the assumption has been deemed invalid and it does not feature in the final ToC diagram					X
A15	Supply chain able to meet demand for expert advice and support	Sector bodies make extensive use of external contractors to provide CCA support. Such support is well regarded, and no evidence was found of supply chain constraint. This assumption is therefore adjudged to be supported.	X				
A14	Case for participation (by individual businesses) is compelling (because: a. value of CCL/CRC discount and b. Targets deemed achievable; OR c. Targets disregarded because buy-out is relatively cheap and there are no other significant penalties).	The evidence suggests that most scheme participants find the business case to be compelling. Most (60%) considered the likelihood of their being able to achieve targets and a sizeable minority (40%) considered the cost of buy out when assessing the business case. There is, however, some evidence to suggest that at least some sectors / businesses feel that targets are becoming harder to deliver and so the attractiveness of the business case may		X			

Evaluation of second Climate Change Agreements scheme

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
		be declining. The business case is less compelling for some smaller businesses who appear less likely to enter the scheme and more likely to leave and as a result the assumption is adjudged to be partially proven.					
A13	The size of a business does not affect its ability to engage on CCA.	The evidence suggests that smaller businesses are less likely to be aware of the CCA scheme, benefit less from participation (in terms of the balance of costs and benefits) and are more likely to leave the scheme than larger businesses. These findings suggest that the size of business does affect its ability to engage with the CCA and the assumption is found to be unsupported.				X	
A12	Sector body motivated to engage with businesses on CCA	The qualitative evidence suggests that sector bodies are strongly motivated to engage with businesses on the CCA. However, the qualitative research also suggests that some non-participant businesses are unaware of the scheme which may suggest a lack of motivation (other factors may also apply) amongst at least some sector bodies. As such the assumption is held to be only partially supported.		X			
A11	Sector body effective in engaging with businesses on CCA	There is strong qualitative and quantitative support for the assumption that sector bodies are, in general, effective in providing support to CCA participants. However, there is some evidence to suggest that some sector bodies are less		X			

Evaluation of second Climate Change Agreements scheme

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
		effective than others and therefore this assumption is adjudged to be partially proven.					
A10	Sector body has capacity to engage with businesses on CCA Some overlap with A5	Capacity constraints were not identified as a specific problem by sector bodies but there is some evidence from the qualitative research that, in some sectors, some businesses, particularly smaller businesses, are unaware of the CCA. This may suggest that in at least some cases sector bodies lack the capacity (there may be other reasons) to undertake outreach work to engage businesses.		X			
A9	Appropriate agreements - to achieve intended outcome and additionality - negotiated with each sector	There is evidence of additionality from the qualitative, quantitative and micro-econometric workstreams. The micro-econometric findings suggest that there is, on average, some degree of additionality. However, the qualitative and quantitative evidence also suggests that half of participants would have taken the same actions even if they were not involved in the scheme. This undermines the case for additionality and the assumption is therefore adjudged to be partially proven.		X			

Evaluation of second Climate Change Agreements scheme

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
A8	Negotiators have sufficient understanding of the market to enable the negotiation of effective targets.	This assumption applies to both Government and sector association negotiators. In some cases, qualitative interviewees did not feel that Government negotiators had the necessary sector understanding to enable the negotiation of effective targets and felt that there was a need for a more collaborative target setting process. In other cases sector association members did not feel that they themselves had ready access to the necessary data. In contrast, there was some evidence that proposed targets, when informed by Phase 1 activity, were seen (by sector bodies and business representatives involved in the negotiations) as fair and reasonable. However, BEIS staff views, shared during ToC development workshops, suggest that Government negotiators felt disadvantaged, largely owing to information asymmetry. On balance, therefore this assumption is found to be unproven.			X		
A7	Right (in terms of carbon intensity and exposure to international competition) sectors involved.	The research generated partial support for this assumption - some sectors are energy and trade-intensive, but some of the original sectors that entered via the EPR scheme are not.		X			

Evaluation of second Climate Change Agreements scheme

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
A6	Right (in terms of how representative they are) sector bodies are engaged	The evidence suggests that participants consider that the sector bodies provide an effective and valued service. This suggests that the sector bodies are the 'right' ones for current participants but there is some evidence that at least some sector bodies are less effective in engaging with smaller businesses. It is not clear whether this is a result of a lack of resource or intentional or if there are other sector bodies, currently not engaged with the scheme, who might be more effective in engaging with smaller businesses. Overall the assumption is adjudged to be partially proven.		X			
A5	Sector bodies well placed to engage with businesses and able to contract in expertise (if required)	The quantitative evidence suggests that sector bodies are both efficient and effective providers of support, There is some evidence in the qualitative research that smaller businesses may be unaware of the CCA, but on balance the evidence appears to support the view that sector bodies are well placed to engage with businesses on the CCA and the assumption is found to be supported.	X				
A4	Engaging via sector bodies reduces scheme administration (costs) for Government.	The EA, the scheme administrator, aims to run the scheme on a full cost recovery basis. Other administrative costs associated with the scheme are incurred by the sector bodies and paid for by scheme participants. If these costs are considered as avoided by Government, then the assumption that the involvement of sector bodies reduces scheme administration costs is supported.	X				

Evaluation of second Climate Change Agreements scheme

Assumption code	Assumption	Summary assessment	Assumption proven / supported	Assumption partially proven / supported	Assumption unproven	Assumption unsupported	Assumption found not to be relevant
A3	CCL is visible to potential participants	The quantitative and qualitative evidence supports the assumption that the costs associated with the CCL are visible to participants (where they are liable for CCL) and were so prior to their joining the scheme - the potential for reducing the costs being the primary driver for joining the scheme.	X				
A2	Energy demand is elastic	The research provides no evidence to the contrary and this is well established economic theory. The assumption is deemed to be supported.	X				
A1	Discount is sufficient to motivate potential participants	The evidence suggests that the discount is one of, possibly the, most important reason for businesses to join the CCA. This supports the assumption that the discount is sufficient to motivate participants to join the scheme.	X				

Appendix 3: Scheme data tables

This appendix sets out:

- A summary of the sectors, facilities and TUs in the scheme at January 2019
- Summary tables for performance by sector in TP2 and TP3
- Details of CCL rates and discounts
- Details of CRC charges.

Additional details of the scheme data analysis are included in chapter 3 of the Technical Report.

Status of scheme in January 2019

The figures presented here include some TUs that left between January 2019 and the end of TP3 report, so the total number of TUs is 3,448 compared to 3,418 quoted in the main report.

There are a few sectors (e.g. supermarkets (FDFS) and bakeries (NAMB)) which have high numbers of facilities per TU.

Table A3.1 Status of CCA scheme by sector as at January 2019

Sector ID	Sector name	Number of facilities	Number of TUs	Mean number of Facilities/TU
ADS	Aerospace	31	21	1.5
AFED	Aluminium	25	20	1.3
AIC	Agricultural Supply	132	97	1.4
AWM	Wallcoverings	13	13	1.0
BATC	Textiles	60	60	1.0
BATE	Textiles Energy Intensive	72	68	1.1
BCA	Cement	2	2	1.0
BCC	Ceramics	49	26	1.9
BCCF	Calcium Carbonate	11	6	1.8
BCGA	Compressed Gases	12	3	4.0
BEPA	Egg Processing	1	1	1.0
BGMC	Glass	5	5	1.0
BLRA	Brewing	44	31	1.4
BMPA	Meat	144	108	1.3

Evaluation of second Climate Change Agreements scheme

Sector ID	Sector name	Number of facilities	Number of TUs	Mean number of Facilities/TU
BNMA	Geosynthetics Non-Woven	4	3	1.3
BPC1	Poultry Meat Rearing	677	79	8.6
BPC2	Poultry Meat Processing	57	50	1.1
BPF	Plastics	418	353	1.2
BPIF	Printing	331	311	1.1
BTMA	Tyres	5	4	1.3
CAST	Foundries	2	2	1.0
CBM	Metalforming	71	62	1.1
CIA	Chemicals	214	186	1.2
CONF	Sawmills	21	15	1.4
CPI	Paper	47	36	1.3
CSDF	Cold Storage	425	236	1.8
DATC	Data Centres	172	88	2.0
DIAL	Dairy	88	63	1.4
FDF1	Food and Drink	802	640	1.3
FDFS	Supermarkets	2089	5	417.8
KABC	Kaolin and Ball Clay	12	3	4.0
MAGB	Malting	26	10	2.6
MPMA	Metal Packaging	24	17	1.4
NAMB	Bakers	2048	107	19.1
NFA	Non-Ferrous Metals	16	16	1.0
NFU1	Pigs	115	66	1.7
NFU4	Horticulture	137	102	1.3
NFU5	Eggs & Poultry Meat	220	115	1.9
NMI	Semiconductors	23	22	1.0
PIFA	Packaging & Industrial Films	80	70	1.1
SEA	Surface Engineering	176	157	1.1
SEEC	Spirits	79	24	3.3
SEHT	Surface Engineering Heat Treatment	21	19	1.1
SMMT	Motor Manufacturing	44	40	1.1
TSA	Laundries	130	57	2.3

Sector ID	Sector name	Number of facilities	Number of TUs	Mean number of Facilities/TU
UKLF	Leather	9	6	1.5
UKRA	Rendering	17	14	1.2
UKSA	Steel	15	6	2.5
WPIF	Wood Panels	6	3	2.0
	Grand totals	9222	3448	
	Median	47	26	1.3

Summary of sector performance for TP2 and TP3

These tables were prepared using confidential scheme data from the EA, aggregated and redacted to avoid disclosure. Full data in this format was not readily available for TP1. This tables present the summation of performance data for individual TUs in each sector, because targets apply at TU level in the second CCA scheme. For each TP, these tables present the sum of surplus gained, banked surplus used and buy-out across all TUs in a given sector (measured in tonnes of CO₂ equivalent) relative to the total emissions for that sector. Performance for each TU is measured relative to the target for that TU, as set by the sector association, which defines the expected improvement on that TU's performance from the baseline year (usually 2008). The surplus and buy-out set out in these tables are calculated on a completely different basis from the energy savings calculated in the micro-econometric analysis: they are calculated relative to a TU's own baseline rather than comparison sites; and the over/under performance relative to targets may be attributable to a wide range of factors, not just CCA influence.

Table A3.2: Sector performance at TP2 (complete - covers all TUs that reported at TP2)

Sector name	Sector ID	No of TUs	Surplus gained as % of emissions	Surplus used as % of emissions	Buy out as % of emissions	Total under-performance (surplus used plus buyout) as % of emissions	Sum of TP emissions (tCO ₂)
Aerospace	ADS	20	10.2%	0.4%	3.6%	3.9%	467,452.26
Agricultural Supply	AIC	96	6.4%	0.0%	3.5%	3.5%	731,262.83
Aluminium	AFED	20	8.0%	1.4%	1.2%	2.6%	433,966.09
Bakers	NAMB	100	13.8%	0.3%	7.2%	7.5%	441,374.93
Brewing	BLRA	33	7.7%	0.4%	7.6%	8.0%	425,394.71
Calcium Carbonate	BCCF	5	7.1%	1.1%	5.2%	6.2%	121,074.11
Cement	BCA	2	SD	SD	SD	SD	296,413.18
Ceramics	BCC	27	13.5%	0.1%	1.0%	1.1%	402,232.87

Evaluation of second Climate Change Agreements scheme

Sector name	Sector ID	No of TUs	Surplus gained as % emissions	Surplus used as % of emissions	Buy out as % of emissions	Total under-performance (surplus used plus buyout) as % of emissions	Sum of TP emissions (tCO ₂)
Chemicals	CIA	184	14.9%	0.3%	9.3%	9.7%	6,397,188.94
Cold Storage	CSDF	189	11.8%	0.2%	5.5%	5.8%	1,284,273.88
Compressed Gases	BCGA	4	13.3%	1.2%	1.7%	2.9%	1,505,455.81
Dairy	DIAL	62	14.6%	0.3%	2.9%	3.3%	1,120,544.84
Data Centres	DATC	54	5.7%	0.1%	3.3%	3.4%	2,528,294.82
Egg Processing	BEPA	1	SD	SD	SD	SD	SD
Eggs & Poultry Meat	NFU5	131	11.3%	0.6%	8.9%	9.5%	140,387.62
Food & Drink	FDF1	608	8.9%	0.4%	7.1%	7.5%	8,520,596.50
Foundries	CAST	3	10.7%	0.6%	2.7%	3.3%	53,835.36
Geosynthetics Non-Woven	BNMA	3	2.1%	0.0%	3.1%	3.1%	19,091.91
Glass	BGMC	5	13.7%	0.0%	0.0%	0.0%	270,813.39
Horticulture	NFU4	105	14.0%	1.1%	4.8%	5.9%	486,089.35
Kaolin and Ball Clay	KABC	3	0.0%	4.2%	1.7%	5.9%	228,120.59
Laundries	TSA	52	8.5%	0.1%	1.4%	1.5%	580,373.21
Leather	UKLF	5	2.5%	0.0%	9.0%	9.0%	42,533.40
Malting	MAGB	11	7.8%	0.1%	0.0%	0.1%	489,600.28
Meat	BMPA	111	6.9%	0.5%	6.8%	7.3%	807,410.48
Metal Packaging	MPMA	16	10.9%	0.1%	0.3%	0.4%	504,600.23
Metalforming	CBM	63	25.1%	0.3%	5.7%	6.1%	566,215.51
Motor Manufacturing	SMMT	35	22.4%	0.3%	4.8%	5.1%	1,460,615.47
Non-Ferrous Metals	NFA	19	8.9%	0.5%	1.3%	1.8%	237,184.02
Packaging & Industrial Films	PIFA	64	13.3%	0.5%	2.9%	3.4%	673,194.58
Paper	CPI	35	4.5%	0.1%	1.4%	1.5%	1,950,311.28
Pigs	NFU1	78	13.0%	0.2%	10.5%	10.7%	49,213.74

Evaluation of second Climate Change Agreements scheme

Sector name	Sector ID	No of TUs	Surplus gained as % emissions	Surplus used as % of emissions	Buy out as % of emissions	Total under-performance (surplus used plus buyout) as % of emissions	Sum of TP emissions (tCO ₂)
Plastics	BPF	275	22.3%	0.1%	4.2%	4.4%	2,960,555.54
Poultry Meat Processing	BPC2	51	17.7%	0.3%	5.4%	5.7%	761,796.24
Poultry Meat Rearing	BPC1	81	3.7%	2.5%	7.9%	10.4%	465,844.69
Printing	BPIF	224	23.1%	0.2%	5.2%	5.4%	1,435,907.79
Rendering	UKRA	13	15.2%	0.1%	5.5%	5.6%	145,898.26
Sawmills	CONF	12	44.4%	0.1%	0.6%	0.7%	134,731.26
Semiconductors	NMI	25	29.5%	0.0%	11.7%	11.7%	510,858.16
Spirits	SEEC	20	11.1%	0.5%	2.3%	2.8%	976,216.12
Steel	UKSA	8	8.6%	0.0%	0.7%	0.7%	1,996,979.47
Supermarkets	FDFS	4	11.3%	0.0%	4.2%	4.2%	191,462.89
Surface Engineering	SEA	150	18.3%	1.2%	5.7%	6.9%	1,084,233.62
Surface Engineering Heat Treatment	SEHT	20	9.0%	0.5%	8.7%	9.2%	203,258.64
Textiles	BATC	54	8.5%	0.1%	10.6%	10.7%	372,489.20
Textiles Energy Intensive	BATE	64	9.7%	0.2%	6.9%	7.1%	425,286.12
Tyres	BTMA	4	5.2%	0.0%	13.3%	13.3%	222,648.29
Wallcoverings	AWM	12	14.1%	0.0%	6.3%	6.3%	94,074.98
Wood Panels	WPIF	3	3.1%	0.8%	0.2%	0.9%	378,108.47
Total		3,164	12.5%	0.4%	5.2%	5.6%	45,595,466

Note: for sectors where only a single TU reported some data is not included as it is sensitive data (SD)

Table A3.3: Sector performance at TP3

Sector name	Sector ID	No of TUs	Surplus gained as % emissions	Surplus used as % of emissions	Buy out as % of emissions	Total under-performance (surplus used plus buyout) as % of emissions	Sum of TP emissions (tCO ₂)
Aerospace	ADS	21	8.0%	0.0%	12.8%	12.8%	473,872
Agricultural Supply	AIC	96	9.1%	0.2%	3.3%	3.6%	738,875
Aluminium	AFED	20	25.3%	1.2%	2.3%	3.5%	373,691
Bakers	NAMB	105	16.9%	0.7%	8.6%	9.3%	499,251
Brewing	BLRA	30	15.1%	0.1%	6.8%	7.0%	392,249
Calcium Carbonate	BCCF	6	7.7%	0.0%	8.3%	8.3%	125,872
Cement	BCA	2	SD	SD	SD	SD	293,351
Ceramics	BCC	26	12.5%	0.5%	0.3%	0.7%	411,611
Chemicals	CIA	186	22.5%	0.5%	7.9%	8.4%	6,171,162
Cold Storage	CSDF	236	15.6%	0.5%	5.3%	5.8%	1,370,320
Compressed Gases	BCGA	3	17.3%	0.0%	10.1%	10.1%	1,363,543
Dairy	DIAL	63	15.5%	1.6%	1.7%	3.3%	1,062,277
Data Centres	DATC	88	8.9%	0.8%	4.2%	5.0%	3,011,318
Egg Processing	BEPA	1	SD	SD	SD	SD	SD
Eggs & Poultry Meat	NFU5	114	10.9%	0.8%	8.7%	9.5%	137,667
Food & Drink	FDF1	638	9.2%	0.9%	7.9%	8.8%	8,425,236
Foundries	CAST	2	SD	SD	SD	SD	46,506
Geosynthetics Non-Woven	BNMA	3	1.9%	0.0%	4.7%	4.7%	22,563
Glass	BGMC	5	8.3%	0.0%	0.8%	0.8%	284,171
Horticulture	NFU4	101	17.7%	1.7%	6.0%	7.6%	511,964
Kaolin and Ball Clay	KABC	3	0.8%	0.0%	0.3%	0.3%	211,331
Laundries	TSA	57	8.7%	0.7%	1.0%	1.7%	588,521
Leather	UKLF	6	2.4%	0.0%	12.7%	12.8%	44,694
Malting	MAGB	10	6.5%	0.6%	0.6%	1.3%	492,458
Meat	BMPA	106	8.4%	0.7%	5.7%	6.4%	811,835
Metal Packaging	MPMA	17	9.4%	0.4%	0.5%	0.8%	494,401
Metalforming	CBM	59	29.6%	0.9%	5.6%	6.5%	572,451
Motor Manufacturing	SMMT	40	18.7%	0.9%	6.2%	7.1%	1,431,752

Evaluation of second Climate Change Agreements scheme

Sector name	Sector ID	No of TUs	Surplus gained as % emissions	Surplus used as % of emissions	Buy out as % of emissions	Total under-performance (surplus used plus buyout) as % of emissions	Sum of TP emissions (tCO ₂)
Non-Ferrous Metals	NFA	15	17.0%	3.7%	0.7%	4.3%	193,828
Packaging & Industrial Films	PIFA	70	11.0%	0.2%	3.0%	3.2%	696,029
Paper	CPI	36	8.2%	0.2%	1.6%	1.7%	1,850,585
Pigs	NFU1	66	12.1%	1.7%	11.5%	13.2%	44,635
Plastics	BPF	353	12.7%	0.5%	5.7%	6.2%	3,171,583
Poultry Meat Processing	BPC2	49	17.3%	0.1%	5.8%	5.9%	724,840
Poultry Meat Rearing	BPC1	78	4.0%	4.0%	7.0%	11.0%	458,367
Printing	BPIF	308	19.2%	0.6%	4.9%	5.5%	1,506,395
Rendering	UKRA	14	15.9%	0.6%	3.4%	4.0%	150,063
Sawmills	CONF	15	47.3%	0.0%	1.1%	1.1%	144,584
Semiconductors	NMI	22	40.7%	0.3%	5.2%	5.5%	449,370
Spirits	SEEC	24	7.0%	1.6%	6.1%	7.8%	915,713
Steel	UKSA	6	4.6%	0.0%	1.2%	1.2%	1,528,143
Supermarkets	FDFS	5	0.0%	0.8%	5.2%	6.0%	228,091
Surface Engineering	SEA	149	18.0%	1.5%	6.8%	8.4%	1,034,683
Surface Engineering Heat Treatment	SEHT	17	9.3%	0.0%	8.3%	8.3%	162,255
Textiles	BATC	60	11.4%	1.5%	10.8%	12.3%	362,642
Textiles Energy Intensive	BATE	67	11.4%	1.2%	6.5%	7.7%	363,223
Tyres	BTMA	4	10.0%	0.0%	10.6%	10.6%	169,894
Wallcoverings	AWM	13	12.1%	0.6%	6.9%	7.5%	89,584
Wood Panels	WPIF	3	0.1%	1.3%	1.2%	2.5%	349,625
Total		3418	13.5%	0.7%	5.8%	6.5%	44,959,798

Note: for sectors where only a single TU reported some data is not included as it is sensitive data (SD)

Details of CCL rates and discounts

Table A3.4 CCL rates and discounts for TP2 (January 2015 to December 2016)

Fuel type	CCL Rate from 1 April 2014 (£/kWh)	CCL Rate from 1 April 2015 (£/kWh)	CCL Rate from 1 April 2016 (£/kWh)	Average TP2 CCL rate (£/kWh)	CCA TP2 discount rate
Electricity	0.005410	0.005540	0.005590	0.005540	90%
Natural Gas	0.001880	0.001930	0.001950	0.001930	65%
Liquified Petroleum Gas (LPG) £/kWh	0.000885	0.000907	0.000915	0.000907	65%
Coal (industrial) £/kWh	0.001968	0.002016	0.002035	0.002017	65%
Fuel Oil £/kWh	0.001006	0.001030	0.001040	0.001031	65%
Kerosene £/kWh	0.000943	0.000966	0.000975	0.000967	65%
Gas Oil/ Diesel Oil £/kWh	0.000962	0.000986	0.000995	0.000987	65%

Table A3.5 CCL rates and discounts for TP3 (January 2017 to December 2018)

Fuel type	CCL Rate from 1 April 2016 (£/kWh)	CCL Rate from 1 April 2017 (£/kWh)	CCL Rate from 1 April 2018 (£/kWh)	Average TP3 CCL rate (£/kWh)	CCA TP3 discount rate
Electricity	0.005590	0.005680	0.005830	0.005725	90%
Natural Gas	0.001950	0.001980	0.002030	0.001995	65%
Liquified Petroleum Gas (LPG) £/kWh	0.000915	0.000930	0.000954	0.000937	65%
Coal (industrial) £/kWh	0.002035	0.002068	0.002121	0.002084	65%
Coke	0.001843	0.001874	0.001922	0.001888	65%
Fuel Oil £/kWh	0.001040	0.001057	0.001084	0.001065	65%
Kerosene £/kWh	0.000975	0.000991	0.001016	0.000999	65%
Gas Oil/ Diesel Oil £/kWh	0.000995	0.001012	0.001037	0.001019	65%
Naphtha £/kWh	0.000942	0.000958	0.000982	0.000965	65%

To accompany the end of the CRC scheme in April 2019, HMRC announced changes in CCL rates and CCA discount rates from 2018 to 2019 and 2019 to 2020, which have implications for CCL revenue forgone in TP4. While no CRC allowances were payable after April 2019, there was a considerable increase (of around 50%) for CCL rates for most fuels and an accompanying increase in CCA discounts on these fuels. The average rates that will apply across the TP4 period are shown in Table A4.6.

Table A4.6 CCL rates and discounts for TP4 (January 2019 to December 2020)

Fuel type	CCL Rate from 1 April 2018 (£/kWh)	CCL Rate from 1 April 2019 (£/kWh)	CCL Rate from 1 April 2020 (£/kWh)	Average TP4 CCL rate (£/kWh)	CCA TP4 discount rate
Electricity	0.005830	0.008470	0.008110	0.008010	92%
Natural Gas	0.002030	0.003390	0.004060	0.003470	78%
Liquified Petroleum Gas (LPG) £/kWh	0.000954	0.001590	0.001590	0.001511	76%
Coal (industrial) £/kWh	0.002121	0.002900	0.002900	0.002803	78%
Coke	0.001922	0.002628	0.002628	0.002539	78%
Fuel Oil £/kWh	0.001084	0.001807	0.001807	0.001717	76%
Kerosene £/kWh	0.001016	0.001695	0.001695	0.001610	76%
Gas Oil/ Diesel Oil £/kWh	0.001037	0.001730	0.001730	0.001643	76%
Naphtha £/kWh	0.000982	0.001638	0.001638	0.001556	76%

Details of CRC charges

Table A4.7 CRC charges by fuel type and year

Year	Forecast Sale Price (/t CO ₂)	Compliance Sale Price (/t CO ₂)	Compliance price weighted by actual usage of forecast and compliance (/t CO ₂)
2014/15	£15.60	£16.40	£16.14
2015/16	£15.60	£16.90	£16.19
2016/17	£16.10	£17.20	£16.73
2017/18	£16.60	£17.70	£17.31
2018/19	£17.20	£18.30	£17.84*
TP2 period weighted average			£16.39
TP3 period weighted average			£17.44

* estimated using mean proportion of forecast sales from previous 4 years

This publication is available from: www.gov.uk/government/publications/second-climate-change-agreements-scheme-evaluation

If you need a version of this document in a more accessible format, please email enquiries@beis.gov.uk. Please tell us what format you need. It will help us if you say what assistive technology you use.