Department for
Business, Energy
& Industrial Strategy

Evaluation of second Climate Change Agreements scheme

Technical Report

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1. Introduction

This technical report sets out further details of the methodology used for the evaluation of the second Climate Change Agreements (CCA) scheme on behalf of the Department of Business, Energy and Industrial Strategy (BEIS). Chapter 1 of the main report provides a description of the CCA policy and a glossary of technical terms. This technical report provides further detail to support the findings presented in the main report. As explained in chapter 2 of the main report, the evaluation comprised a number of workstreams:

- Development of an overall evaluation framework and theory of change (ToC), including a literature and evidence review;
- Analysis of scheme data held by the Environment Agency (EA) on CCA participants;
- Micro-econometric analysis of meter data for CCA and non-CCA sites;
- Macro-economic modelling to estimate the economic impact of the CCA scheme;
- A quantitative survey with CCA participants;
- In-depth qualitative research with sector associations administering CCAs, CCA participants and non-participants;
- Cost-effectiveness analysis;
- Contribution analysis and synthesis process.

Table 1 summarises the different stakeholder groups covered by each workstream.

Table 1: Stakeholder groups covered by each evaluation workstream

Workstream	Industry or economy-wide	CCA sector associations	CCA participant organisations	Non-participant organisations
Theory of change	Y	Y	Y	Y
Scheme data analysis		Y	Y	
Micro-econometric analysis			Y	Y
Macro-economic modelling	Y			
Quantitative survey			Y	
Qualitative research		Y	Y	Y
Cost-effectiveness analysis	Y		Y	
Contribution analysis	Y	Y	Y	Y

The approach to each of these workstreams is explained in the chapters that follow. This report also includes the research materials from all workstreams.

2. Overview of evaluation workstreams

Overall approach to the evaluation

This evaluation explores the complex and inter-related influences of CCAs on both business energy efficiency practice and competitiveness. 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 in the 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 Theory of Change as the evaluation proceeded, and to develop contribution stories for different groups and types of CCA participants. The contribution analysis drew on evidence across all the workstreams, including micro-econometric and macro-economic modelling evidence.

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.

Evaluation framework, Theory of Change and evidence review

Evaluation framework

Phase 1 of the evaluation built on an earlier scoping study[1] which recommended piloting to test the feasibility of proposed methods. During Phase 1 the evaluation, the feasibility and utility of different methods and approaches were assessed. This culminated in the development of an evaluation framework and evaluation plan for the main evaluation (Phase 2), which commenced in February 2019.

The detailed evaluation questions in the evaluation framework are set out in Table 2.

Table 2: Evaluation Questions

1. What have been the outcomes observed during Phase 2 of the CCA scheme?

1.1. What have been the outcomes during the CCA scheme?

a. What types of energy efficiency measures have scheme participants implemented which have been reported as part of their targets? Do these measures focus on buildings or processes?

b. What were the energy/ carbon savings associated with these measures?

c. What has been the use of buy-out as part of the scheme? How has this differed by sectors/participants?

d. Are there differences in energy/ carbon savings or energy efficiency measures for different sectors?

1.2. What have been the participant (or non-participant) behaviours and attitudes during the scheme?

a. What has influenced organisations' and sectors' decisions to join, not join or leave the scheme?

b. How do participants perceive the target regime? How have the baselines and targets influenced their behaviour? What are their perceptions of the process? What lessons can be learnt for the future target setting process?

c. Do the CCA targets / buy-out regime influence the commitment and energy saving ambitions of senior management?

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?

2.1. Are the energy/ carbon savings at CCA units greater than those for the counterfactual scenarios?

[1] 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.

a. Have participants implemented more measures than compared with comparison organisations?

b. Have they saved more energy/ carbon, or over a different timeframe?

c. Have measures been implemented sooner or more effectively than in the absence of the scheme?

d. Are there differences in energy/ carbon savings impacts by sector? What explains these differences?

e. What else can explain any changes in energy/ carbon savings?

2.2. Has the competitiveness of UK CCA units been maintained or improved compared with the counterfactual scenarios?

a. What influences the competitiveness of CCA sites? What role does the cost of energy have?

b. Have investment, revenues and employment at UK CCA units increased compared to the counterfactual scenarios?

c. Has production moved to or from the UK?

d. Have UK units in the CCA performed better than non-participants?

e. Have CCA sites taken business away from non-CCA sites in the UK?

f. Are there differences in competitiveness impacts by sector? What explains these differences?

g. What else can explain any changes in competitiveness?

2.3. Did the CCA scheme influence decisions about investment in the UK?

a. Would activities have been maintained in the UK without the discount?

b. Were other locations considered, how did they compare?

c. Was investment diverted from elsewhere?

d. What else influenced decisions about investment in the UK?

e. What role did the CCA play in investment decisions?

2.4. Did the CCA influence decisions about energy saving?

a. What has influenced the use of the buy-out option?

b. What else has influenced decisions about energy efficiency?

c. What role did CCA play in decisions about energy saving?

d. Do CCA reporting requirements influence the timing of measures?

2.5. How might units have behaved under the counterfactual scenarios?

3. Is the CCA scheme offering value for money for Government, units and society?

3.1. What have been the costs (including of compliance) and benefits (including return on investment, competitiveness and reductions in energy bills) for CCA participants?

3.2. What have been the costs to Government/ society (including administration, enforcement costs and net tax revenues forgone) and what have been the environmental/ economic/ competitiveness benefits secured?

3.3. Do these costs and benefits represent value for money for respective parties?

3.4 Have there been differences by sector in costs and benefits?

3.5 Have there been any perverse effects of the scheme?

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

4.1. Has the target setting process and baselines/ targets themselves been effective in supporting delivery of the objectives of the scheme and why?

4.2. How did sector bodies engage with the units? Was engagement with the sector bodies an effective way of administering the scheme?

4.3. Were targets set at a level which encouraged units to maximise energy/ carbon savings without impacting on competitiveness?

4.4. How effective has enforcement of the scheme been in ensuring scheme objectives have been delivered?

5. What can we learn for any potential future iterations of the CCA scheme and future policy?

5.1 Are there comparable international schemes and what can we learn about their effectiveness and impact?

5.2 What are the implications of the evaluation findings for any potential future schemes / iterations of the CCA?

a. What effect would a bigger/smaller discount have on energy efficiency behaviour or energy/ carbon savings? How stretching can the targets become?

b. What would be the effect of changing the buy-out price on energy efficiency behaviour or energy/ carbon savings?

5.3 What is the wider learning for future policy development?

5.4 How important will CCAs be in future, given the min-met exemption2 and the shift from CRC to higher CCL3?

Theory of change (ToC)

As explained in the main report, an initial ToC was developed collaboratively 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 was informed by a review of literature relevant to other countries' experience of Voluntary Agreements (VAs) and carbon leakage, as explained below.

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.

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

[3] The CCA scheme provided participants with discounts on CCL and exemptions from CRC allowances on eligible activities. Climate Change Levy (CCL) rates were increased from 1st April 2019, after the end of the CRC Energy Efficiency scheme.

During Phase 1 of the evaluation, the evaluation team identified evidence gaps where the ToC was less well supported. The programme of evaluation research in Phase 2 was designed to fill these evidence gaps. A revised version of the ToC, informed by the synthesis of evidence from evaluation research, is presented in Appendix 2 to the main report. The revised ToC was reviewed by BEIS and the EA, and was tested against evidence from all the workstreams and from the final workshop with sector association representatives.

Review of international evidence

During Phase 1, the ToC development was supported by a review of existing evidence on international voluntary agreement (VA) schemes and carbon leakage. The review responded to one particular research question posed by BEIS: Research Question (5.1) Are there comparable international schemes and what can we learn about their effectiveness and impact?

This research question was chosen because it was a priority for BEIS to explore learning from international schemes that are comparable to the CCA scheme.

The approach used for this evidence review was as follows:

- Key word searches and snowballing generated a list of 30 documents (subsequently an additional 10 were identified);
- This process identified documents dealing with policy and practice on VAs in other OECD countries[4];
- The search focused on documents published post 2010, dealing with both historic and current activity;
- Documents were screened, on the basis of perceived relevance to the research question, and a final list of 20 were subject to in-depth review.

A bibliography of the literature reviewed is presented at the end of this report. Limitations of the evidence review were that:

- Restriction of the review to 20 documents, necessary for budgetary reasons, inevitably imposed limitations on the findings. The review presented an accurate summary of the key relevant insights contained within the reviewed material, but the findings should not be considered as being definitive.
- The reviewed documents occasionally referred to links between VAs for energy efficiency improvements/carbon reduction and other forms of policy intervention, but for the most part such linkages were not explored. It was not therefore possible to comment on the extent to which the success of a VA was down to the scheme alone or a result of interactions with other policy instruments, or other external factors.
- Information on impact was limited. Information was generally available on scheme impact in relation to energy use and or greenhouse gas (GHG) emission reduction but was not provided in ways that allowed for ready comparisons to be made across schemes. Information on attribution was limited to a handful of schemes and the

[4] This included literature on VA or related schemes in Australia, Belgium, Canada, Denmark, Estonia, Finland, France, Germany, Japan, Latvia, Luxembourg, the Netherlands, Norway, Republic of Ireland, Slovenia, Sweden and Switzerland.

literature provided little insight into the impact of VAs on carbon leakage and none regarding their impacts on industrial competitiveness.

A summary of success factors for VAs, based on the review of international evidence, is presented in chapter 8 of the main report. The evidence review also informed the initial development of the ToC and the overall approach to the wider evaluation. In particular, the review highlighted that drawing international comparisons was complex because of the lack of directly comparable schemes and successive changes in voluntary agreements and tax-discount policies for energy-intensive firms in other countries. Most countries in Europe have had some form of voluntary agreement scheme, making it difficult to find 'clean slate' countries that are subject to the European Union Emissions Trading System (EU ETS) but do not have some form of policy comparable to the CCA scheme.

A related finding from the Phase 1 work was that it was not feasible to use 'Qualitative Comparative Analysis' (QCA) to analyse the relationship between policy features and energy efficiency outcomes in international comparator countries, owing to the scale of work required to understand comparators in sufficient depth.

Reanalysis of existing quantitative survey data

During Phase 1 of the evaluation, findings were reanalysed from past surveys that researched the energy efficiency behaviour of CCA participants and non-participants, including findings from the CRC Energy Efficiency Scheme (CRC), Electricity Demand Reduction (EDR) and interim Energy Savings Opportunity Scheme (ESOS) evaluations for BEIS. For the CRC reanalysis, CCA participation was coded in the original dataset provided by the EA and was retained in the anonymised CRC dataset held by BEIS. For the EDR survey of non-participants, CCA participants were identified by matching organisations that responded to the survey to the list of CCA participant organisations, before anonymisation of the EDR dataset. This was undertaken, with BEIS approval, before the end of the EDR evaluation. For the reanalysis of the ESOS survey data, CCA participants were self-identified based on their survey responses. The main subgroups identified in each dataset were CCA participant and non-participant firms (both ineligible and non-joining firms) and other manufacturing firms. The latter may not be comparable to CCA firms in terms of energy intensity.

This reanalysis informed the ToC development and the approach taken to the quantitative survey, as well as generating statistics that are quoted in chapter 4 of the main report.

Analysis of scheme data

One of the workstreams involved analysis of CCA scheme data held by the EA, to assess how patterns of participation and performance differed between CCA sectors and different types of participants for different target periods (TPs). This analysis was used as the basis for estimating Climate Change Levy (CCL) and CRC revenue forgone by Government as a result of CCA discounts and exemptions. The methodology used for this analysis is described further in chapter 2 of this Technical Report.

Micro-econometric analysis

As explained in the main report, micro-econometric analysis was used to compare energy consumption and economic performance at CCA sites with consumption and performance at

similar non-CCA sites. This analysis was undertaken at facility level, using site-level variables from the Inter-Departmental Business Register (IDBR), CCA scheme data, and electricity and gas meter point consumption datasets provided by BEIS.

Facilities in the CCA scheme database were matched into the BEIS database of electricity and gas meters, using postcode and address matching. The facility postcodes and addresses were also matched to sites within the IDBR, so that the economic characteristics of relevant enterprises and sites could be identified. Turnover data was not available at site level but employment data was available: to overcome this issue, enterprise-level turnover data was scaled down to site level on the basis of the distribution of employment.

Matching rates for electricity meters: economic variables were matched to electricity meter point consumption data and CCA scheme data for over 40% of facilities in the CCA scheme. These matching rates were sufficient to provide robust micro-econometric results for electricity consumption. Matching of gas meters was more problematic, at around 13%[5], leading to smaller sample sizes for the micro-econometric analysis of gas consumption. It was more problematic to develop robust findings for gas consumption and the smaller sample sizes may have played a role in this.

Non-CCA comparison sites were identified by Standard Industrial Classification (SIC) code (for SIC codes identified as having similar energy intensities, according to data from the Annual Business Survey (ABS)) or through the list of CRC Information Declarers)[6]. As with the participant organisations, meter data for these sites was sourced from the BEIS meter point consumption dataset while economic data was sourced from the IDBR, with turnover being scaled down to site level on the basis of the distribution of employment.

The micro-econometric analysis then tested for differences in the performance of 'treated' and 'comparison sites' using a 'difference in difference' methodology, using instrumental variables. The eligibility of each facility, for the CCA and for the min-met exemption, was captured by 'Instrumental Variables' (i.e. variables that were 1 if they were eligible for the relevant policy/exemption and 0 if they were not). 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 (with 2011-2012 being the pre-CCA period, and 2013-2016 being the CCA period). The design of the comparison groups is discussed further below. Tests were applied to ensure that the non-CCA facilities were similar to CCA facilities in their observed behaviour prior to the second scheme. Performance was assessed in terms of electricity consumption, gas consumption, turnover, employment and fuel intensity (electricity or gas consumption per unit of turnover).

The definitions of 'treated' and 'comparison' groups are summarised in Table 3 and described in more detail in the micro-econometric report. These make use of the two definitions of sector eligibility for the CCA scheme: most sectors joined at the start of the first CCA scheme (in 2001) as a result of eligibility under Environmental Protection Regulations (EPR). Some additional sectors joined during the first or second CCA scheme, as a result of eligibility under energy-intensity and trade-intensity criteria, referred to here as EI criteria.

[5] 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.
[6] 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.

Table 3: Summary of treated groups and comparison groups

Scenario	Treated group	Comparison group
CCA membership – how did the CCA influence performance of units in the scheme, compared to similar eligible units outside the scheme?	EPR (i.e. facilities in those CCA sectors that entered the scheme as a result of eligibility for Environmental Protection Regulations)	Non-CCA and non-CRC sites which were required by CRC to provide information on their energy consumption (called CRC Information Declarers)
	EI (i.e. facilities in those CCA sectors that entered the scheme later, as a result of qualifying under energy (and trade) intensity criteria)	Non-CCA and non-CRC sites in sectors with similar energy intensities (according to ABS data), that have not joined the CCA scheme
Min-met leavers – how did min-met facilities that chose to leave the CCA scheme as a result of the min-met exemption perform relative to all CCA facilities remaining in the scheme?	Min-met (i.e. facilities were reported by the EU ETS to have left the CCA scheme as a result of the min-met exemption)	CCA sites remaining in the scheme (in min-met and other sectors).

The aim was for comparison groups to consist of facilities that were as similar as possible to the treated groups but that had chosen not to take up the relevant policy opportunity (i.e. 'membership of the CCA scheme'; or 'leaving the CCA scheme as result of the min-met intervention'). In order for the econometric method to take account of the voluntary nature of these interventions, the comparison groups were chosen to include a mix of facilities that were either eligible or ineligible for the relevant intervention. Where the treated group was 'CCA members', the comparison group consisted of facilities that had not joined the scheme, some of which would apparently have been eligible under the relevant criteria (in that they were in sectors that satisfied EPR or EI criteria) and others of which appear not to have been eligible. Similarly, where the treated group was 'min-met leavers', the comparison group consisted of facilities that remained in the CCA scheme, some of which would appear eligible for the min-met exemption while others were not.

In practice, comparison sites in the CCA membership scenarios were smaller on average than CCA sites, in terms of both energy consumption and turnover. However, fixed differences[7] in the characteristics of the CCA and comparison groups were controlled for by using a 'difference in difference' approach. The analysis looked for changes in the differences over time between the CCA and comparison group, not at differences in levels of consumption (or levels of other characteristics). The critical point for the validity of the micro-econometric analysis was that the comparison sites behaved similarly to CCA sites in the period prior to the second CCA scheme.[8] This was assessed using statistical tests, as explained in the micro-econometric report. The effects of CCA policy were explored using an instrumental variable for CCA participation, while the effects of CRC policy were avoided through the selection of comparison sites outside the CRC scheme.[9]

There are two potential limitations assessed as part of the evaluation which could have affected whether the micro-econometric analysis took account of all of the electricity

[7] Fixed differences mean differences that do not vary over time.
[8] Based on the period 2011-2012.
[9] The potential influences of EU ETS, EII and ESOS policies, when relevant, were taken into account by introducing fixed effects over the period of analysis (2011-2016).

consumption by CCA and non-CCA firms. These were the exclusion of electricity generated through onsite renewables and the use of unmetered fuels.

The electricity consumption data used in the micro-econometric analysis is from electricity supplier meters and therefore does not include electricity generated from onsite renewables or Combined Heat and Power (CHP) plants. Theoretically, the results could be explained by faster take-up of renewable electricity by CCA sites compared to non-CCA sites, if this led to a greater reduction in metered electricity use for CCA than non-CCA sites. However, the CCA scheme did not provide additional incentives for renewables, because electricity generated from renewables still counted towards CCA targets, whether these were measured in terms of energy or carbon[10]. Although there was no direct evidence about the proportion of renewable electricity used on CCA sites, findings from the qualitative interviews suggested that take-up of renewable electricity was unlikely to be faster on CCA sites than on non-CCA sites, because renewable electricity investments were not generally motivated by the CCA scheme.

An analysis of energy consumption data reported by CCA participants to the Environment Agency (EA) for CCA target performance, which does include electricity generated from onsite renewables, also shows a slight decrease in electricity use over time compared to gas and other fuels during the second CCA scheme from target periods one to three[11] (TP1 to TP3) (from 77.2% of reported carbon emissions to 74.5% of reported carbon emissions, using CCA emissions factors[12]). Although the 4% reduction in electricity appears consistent with the micro-econometric findings for EPR sectors, the numbers are calculated on a different basis and may not be fully comparable. Further details of energy consumption within the CCA scheme data are provided in chapter 3 of this report.

The second potential limitation could be that the micro-econometric meter data analysis does not take account of changes in the usage of unmetered fuels (e.g. fuel oil, biomass, Liquefied Petroleum Gas). Again, theoretically the reduction in electricity consumption could be explained by an increase in use of unmetered fuels for CCA sites, if this increase was faster than for non-CCA sites. Analysis of CCA scheme data shows that the share of non-metered fuels in reported energy consumption rose slightly from 3.8% of estimated carbon emissions in TP1 to 5.9% in TP3, when averaged across all CCA sectors, with significantly higher usage in sectors that have readily available sources of biomass or that use chemical feedstocks (see chapter 3 in this report). However, qualitative research indicated there was a disincentive for most CCA sites to switch to unmetered biomass fuels (relative to non-CCA sites) because this tended to result in higher energy usage (even if carbon emissions were reduced). As most CCA sites had targets defined in terms of energy rather than carbon, switching to biomass tended to make CCA targets harder to achieve, although sector associations may have taken biomass into account when negotiating targets for their sector. Generally, while the EA data showed that there was increased take-up of unmetered fuels on CCA sites during the second CCA scheme, the rate of take-up on non-CCA sites would be expected to be faster.

It is therefore unlikely that the findings of the micro-econometric analysis are significantly affected by either of these two limitations.

[10] This is through an average emissions factor for the electricity grid that was set at the start of the second scheme.
[11] TP1 covered the period 2013-2014; TP2 covered 2015-2016; TP3 covered 2017-18; TP4 covers 2019-2020.
[12] The CCA scheme uses fixed emissions factors across the second CCA scheme, so that target performance is unaffected by decarbonisation of the national electricity grid.

Further details of the micro-econometric analysis, including further technical limitations of the method, are presented in the micro-econometric report.

Macro-economic analysis

The macro-economic workstream comprised two elements:

- Macro-level econometric analysis - this sought to establish the extent to which the CCA scheme influenced energy consumption, supplementing the micro-econometric analysis outlined above.
- Macro-economic modelling - this estimated the scale of CCA impact on key economic variables, using evidence-based assumptions about the influence of the scheme on energy consumption and energy costs.

These two elements are outlined in more detail below.

Macro-level econometric analysis

During Phase 1 of the evaluation, econometric analysis was undertaken at macro-level (i.e. 2-digit SIC code level) to test whether the CCA scheme had influenced energy consumption. This analysis did not use a macro-economic model but used similar methods to the micro-econometric analysis, applying these at industry sector level rather than site level. A 'difference in difference' method was used to compare changes in electricity and gas consumption, 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. The analysis controlled for variations in energy prices and Gross Value Added (GVA).

The macro-level results from this analysis suggested that the second CCA scheme had no additional statistically significant impact on energy consumption. However, the general direction of these macro results for non-min-met sectors were in line with the results from the micro-econometric analysis, as presented above. The macro-level economic analysis is presented in full in the macro-econometric 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.

Steps were taken to reduce the risk of bias in the results (i.e. by estimating equations at an industry sector level and validating the suitability of the comparison group). Statistical tests were carried out to ensure robustness. However, using the macro-level data has limitations due to the small sample size and because it involves comparing aggregated effects across a large group of heterogenous firms. The macro-level econometric results should therefore be interpreted within the context of the results emerging from other workstreams (in particular, from the micro-econometric analysis).

Macro-economic modelling

During Phase 2 of the evaluation, macro-economic modelling was then undertaken using the E3ME model[13] to calculate the estimated impact of CCL and CRC discounts, and energy demand savings, on economic variables at the macro-level.

E3ME is built around an input-output structure with a detailed representation of industry interdependencies. The input-output framework in E3ME shows, for each industry sector[14] in the UK, the cost of energy relative to total production costs. The input-output framework thus reflects industry-specific exposure to competitiveness risks from higher energy prices and costs. It can also show how reductions in energy prices and taxes can improve industry competitiveness (due to reduced production costs). The E3ME model includes a series of price equations (estimated for each sector and country) which reflect different cost pass-through rates among sectors and reflect how energy costs ultimately affect prices of the goods and services produced. Import and export prices and bilateral trade equations are also estimated in each sector and country.

The E3ME modelling used assumptions on energy demand savings that were based on the Phase 1 econometric work (from both the micro-econometric workstream and the Phase 1 macro-level econometric analysis). Findings were calculated at 2-digit SIC code sector level (i.e. high-level industry sectors).

A counterfactual was developed to represent the case where industries were not covered by CCA agreements and therefore faced the full cost of the CCL (and, where applicable, the CRC).

A series of scenarios were then constructed that, when compared against the counterfactual, show the impact that CCAs have had on industry unit costs, prices and Gross Value Added (GVA). The upper estimate for the energy impact was based on statistically significant findings from the micro-econometric workstream. The micro-econometric analysis found that the CCA scheme reduced electricity consumption by between 4.1% and 11.4% for Target Units in sectors that entered the scheme via Environmental Protection Regulations (EPR) or Energy Intensity/Trade Intensity (EI) criteria, respectively. The micro-econometric work also found that the CCA scheme reduced gas consumption by between 0% and 12.6% for the EPR and EI sectors respectively. The upper estimate for energy savings in the macro-economic modelling work used a weighted average of these figures (i.e. 6.3% reduction in electricity use and 1.9% reduction in gas use) across CCA sectors.

The lower estimates for energy impact assumed that the CCA scheme had no statistically significant impact on energy demand, which was consistent with the lack of statistically significant findings from the Phase 1 macro-level econometric work (see above). While the lower estimate assumed that the CCA scheme did not reduce energy consumption directly, there were still some economic effects because the CCA provided discounts in CCL (and for some firms) CRC elements of energy costs.

The four scenarios used in the E3ME modelling, and compared to the counterfactual, are summarised in Table 4 below.

[13] 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.
[14] Based on a classification that is broadly consistent with the SIC 2-digit classification.

Table 4 Overview of scenarios modelled

Scenario name	Description
S1: CCL discount	S1 tests the impact of the CCL discount only in those sector associations that were signed up to Phase 2 CCAs, over the period 2014-2017.
S1a: CCL discount + CRC exemption	S1a tests the combined impact of the CCL discount and the CRC exemptions (for those firms that would otherwise be subject to this payment) in Phase 2 CCAs, over the period 2014-2017.
S2: CCL discount + electricity savings	S2 is as S1, but, in addition to the CCL discount, it includes an estimated 6.3% average reduction in electricity use and 1.9% average reduction in gas use associated with the CCAs over the Phase 2 CCA period (2014-2017). The energy savings are assumed to accumulate over time.
S2a: CCL discount + CRC exemption + electricity savings	S2a tests the combined impact of the CCL discount and CRC exemption, in addition to an estimated 6.3% average electricity savings and 1.9% average gas savings over the period 2014-2017.

The macro-economic modelling, using the E3ME model, generated findings about the estimated impact of the CCA scheme under these four scenarios for the following economic variables:

- Industry production costs, by 2-digit SIC sector (based on model assumptions about the proportion of energy costs within total production costs, by sector);
- Industry prices by 2-digit SIC sector (based on model assumptions about the extent to which reductions in production costs would be passed on to customers, by sector);
- Gross Value Added for 2-digit SIC sectors (based on model assumptions about the impact of industry prices on domestic demand and international competitiveness).

Further details of the macro-economic analysis are presented in the macro-econometric report.

Quantitative survey of CCA participants

During Phase 2 of the evaluation, a combined telephone and online survey was undertaken with 387 CCA participants, across 11 sector groups, weighted by sector group to reflect the CCA population as a whole. 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. Only statistically significant differences are presented in the main report.

The methodology used in the quantitative survey and data analysis is presented in chapter 5 of this report, while the data tables from the survey of CCA participants are presented in a separate report.

Qualitative research

During Phase 1 of the evaluation, reanalysis of transcripts was undertaken from past qualitative research with CCA participants who were interviewed as part of the CRC evaluation for BEIS.

During Phase 2, further in-depth telephone interviews were undertaken 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.

The non-participants interviewed within the qualitative research workstream included a mix of 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 workstream, within SIC codes with relatively high energy intensity but low CCA participation.

The qualitative workstream also included an online survey of the 53 sector associations. This generated responses that provided both qualitative and quantitative evidence for 39 sectors.

Details of the methodology for the online survey and in-depth telephone interviews are presented in chapter 4 of this report.

Cost-effectiveness analysis

In addition to the workstream analysis methods described above, the evidence collected across these evaluation workstreams was analysed to assess the cost-effectiveness of the CCA scheme. This was not a full cost-benefit analysis but a high-level assessment focusing on the main costs and benefits of the scheme. Rough estimates of costs and benefits were assessed from the perspective of:

- CCA participants (estimated for typical years in TP3 and TP4)
- Government (estimated for typical years in TP3 and TP4)
- Wider society (estimated over time since the start of the second scheme).

Details of the cost-effectiveness analysis, including the source of evidence used to inform estimates of costs and benefits, are presented in chapter 6, below.

Synthesis using contribution analysis

Contribution analysis was the method used to bring together and test the evidence across all the evaluation workstreams, particularly to assess the additionality and attribution within our theory. 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 synthesis process used to develop and refine the ToC, drawing together evidence from all the workstreams and testing alternative explanations, is explained in chapter 7 of this report.

3. Scheme data analysis

Summary

Confidential CCA participation and performance data provided by the Environment Agency (EA) was analysed for TP2 and TP3. Detailed performance data was not available for all target units (TUs) in TP1, so analysis of TP1 was based on published data. The analysis of performance, based on scheme data, is presented in Appendix 3 of the main report. Scheme data was also used to estimate the cost to Government of CCL discounts and CRC exemptions provided by the CCA scheme. These estimates were used in the cost-effectiveness analysis described in chapter 6 of the Technical Report. This chapter also presents tables showing the classification of sectors, including the identification of sectors affected by the mineralogical-metallurgical (min-met) exemption.

Scheme participation

Key findings from the analysis of publicly available data, comparing the Target Units[15] (TUs) that reported at TP1 and TP2, were that:

- 14% of TUs that reported at TP1 left before the TP2 reporting process.
- The sectors most affected were those covered by the min-met exemption, those with high numbers of participants (e.g. Food & Drink) and some agriculture-related sectors.
- 8% of TUs reporting at TP2 were new to the scheme in TP2, spread over a wide range of sectors.
- Three sectors had significant proportions of both leavers and joiners (Ceramics, Glass and Steel).
- Analysis suggested that TUs which left before TP2 were smaller than average in terms of emissions[16].
- Analysis, based on publicly available data, showed that those that needed buy-out at TP1 were more likely to leave before TP2.

Key findings from the analysis of fuller, confidential data, examining TUs that left during TP3 were that:

- For most sectors, total emissions reported for TUs that left were much lower than the average emissions per TU for that sector. This suggests that, generally, smaller TUs (with lower emissions) were more likely to leave. There were two exceptions to this from sectors that had very low numbers of leavers (Aluminium (AFED) and Surface Engineering Heat Treatment (SEHT)).

[15] In the second CCA scheme, targets apply at 'Target Unit' level. A Target Unit is a facility (i.e. site) or group of facilities that has joined together for the purposes of CCA target setting and reporting.
[16] It was not possible to compare size by throughput owing to the range of different throughput units used.

- For most sectors (19 out of 33 sectors from which TUs left during TP3) buy-out/TU was higher than average. This suggests that the TUs which struggled to meet targets were more likely to leave. Again there were some exceptions - in a few sectors, those TUs which left required no buy-out.
- For most sectors (28) the surplus gained by leavers was lower than average (although in Plastics (BPF) there were much higher than average surpluses). Again, this suggests that the TUs which struggled to meet targets were more likely to leave.

Key findings about TUs joining in the final stages of TP3 (Step 4) were that:

- At January 2019, there were 3448 TUs and 9222 facilities in the second CCA scheme, of which 439 TUs and 1628 facilities joined during 2018. This means that nearly 13% of TUs and nearly 18% of facilities in the scheme at January 2019 joined in the last year, prior to closure of the scheme to new entrants.
- Of the 439 new entrant TUs, 44 (10%) had previous TU IDs, which suggests that they had left the scheme and re-entered, most likely due to change of ownership. There were re-entrants in 19 of the 37 sectors in which there were new entrants.
- Sectors with a high number of TUs and facilities joining were: Data Centres, Cold Storage, Plastics, Food & Drink and Printing.
- Three other sectors had high number of facilities joining but a low number of TUs joining: Poultry Meat Processing, Bakers, and Supermarkets. This is consistent with the high number of facilities per TU for all TUs in these three sectors, as shown in Appendix 3 to the main report.
- 12 sectors had no new facilities or TUs in this period.

A small number of participants left the scheme between the end of TP3 and preparation of the EA's biennial report on TP3 performance, so there are minor differences between the numbers of TUs and facilities in CCA datasets that were provided to the evaluation at different times, as shown in Table 5.

Table 5: Details of EA datasets for the second CCA scheme (2019)

EA dataset	Use of dataset in this evaluation	Number of TUs in scheme	Number of facilities in scheme
January 2019	Detailed performance analysis (Appendix 3 of main report)	3,448	9,222
May 2019	High-level results presented in main report	3,418	9,219
EA biennial report on TP3	Not used, as the final EA report was published after the analysis was completed	3,416	9,187

The EA advised that the slight reduction in the numbers of TUs and facilities in the scheme during 2019 was caused by a few TUs choosing to leave the scheme at the end of TP3, possibly to avoid paying buy-out.

Performance analysis

The performance data presented in the Appendices to the main report are based on confidential data provided by the EA for TP2 and TP3, in November 2018 and January 2019 respectively. Detailed performance data was not available for all TUs in TP1 so it was not possible to undertake detailed analysis of TP1 performance.

Reported consumption of electricity, gas and other fuels

CCA scheme data was used to calculate consumption of electricity, gas and non-metered fuels across different CCA sectors. The non-metered fuels reported individually within CCA reports were fuel oil, coal, coke, LPG, Kerosene, Gas Oil and Naphtha. A number of TUs also reported use of 'other fuels', which included wood chip, peat, biogas, biomass, wood pellets, solvents, municipal waste, Amine C8, mixed process oils, methanol and its residues and other refinery gas.

Table 6 shows the metered electricity and gas use and use of all other non-metered fuels during TP2 and TP3. To avoid disclosure, this is summarised at a high level, for groups of sectors entering the CCA scheme under the EPR and EI entry routes. A list of these sectors can be found later in this chapter. The highest proportions of non-metered fuel use were found in EPR sectors (including Chemicals, Horticulture, Sawmills, Spirits, Eggs & Poultry Meat and Poultry Meat Rearing). While the Chemicals sector has access to a range of chemical fuels, it is likely that these other EPR sectors have access to organic waste that can be used as fuel.

Estimates of electricity and gas consumption by CCA participants were used by the macro-economic workstream to help estimate the proportion of different 2-digit SIC sectors that were covered by the CCA scheme. They were also used in the cost-effectiveness analysis, with electricity converted to secondary energy.

Table 6: Use of electricity, gas and non-metered fuels during TP2 and TP3

	Fuel type	EI sectors (GWhr)	Fuel break-down for EI sectors	EPR sectors	Fuel break-down for EPR sectors	All sectors	Fuel break-down for all sectors
TP2	Electricity (primary energy)	48,833	87.0%	124,713	74.1%	173,546	77.3%
	Gas	6,906	12.3%	37,665	22.4%	44,571	19.9%
	Non-metered fuels	413	0.7%	6,009	3.6%	6,422	2.9%
	Total energy use	**56,153**	**100.0%**	**168,387**	**100.0%**	**224,540**	**100.0%**
TP3	Electricity (primary energy)	51,534	85.9%	117,974	70.4%	169,508	74.5%
	Gas	7,176	12.0%	37,569	22.4%	44,745	19.7%

	Fuel type	EI sectors (GWhr)	Fuel break-down for EI sectors	EPR sectors	Fuel break-down for EPR sectors	All sectors	Fuel break-down for all sectors
	Non-metered fuel	1,269	2.1%	12,092	7.2%	13,362	5.9%
	Total energy use	**59,980**	**100.0%**	**167,635**	**100.0%**	**227,615**	**100.0%**

Source: EA scheme data, May 2019. Note: non-metered fuels include fuel oil, coal, coke, LPG, Kerosene, Gas Oil, Naphtha and 'other fuels' (including wood chip, peat, biogas, biomass, wood pellets, solvents, municipal waste, Amine C8, mixed process oils, methanol and its residues and other refinery gas).

Estimation of CCL forgone

Methodology for CCL calculations for TP2 and TP3

This section sets out the details of methodology used to estimate CCL and CRC forgone, based on reported scheme data, as used in the cost-effectiveness analysis presented in chapter 6 of this report.

CCL Levy and discounts by fuel and year for the period of TP2 and TP3 were collected from official web sites. The former were converted from values per weight to values per kWh using official figures. The resulting data are shown in Table 7 for TP2 and Table 8 for TP3. Only a subset of all the possible fuels were reported in TP2 and TP3, so only fuels which were reported as used in TP2 and TP3 respectively are listed in these tables. As CCL values are defined for financial year periods, energy use was assumed to be evenly spread over the period and CCL values were weighted for the relevant number of months of a given financial year within the target period.

Table 7: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 8: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%

The basic approach, subject to the caveats below, was that the CCL discount rates and CCL rate for each fuel were multiplied by total energy consumption by fuel across the CCA scheme to estimate the total CCL forgone. Electricity values were converted from primary energy (as reported by TUs) to delivered energy (as used for CCL charges) by dividing by a factor of 2.6, using the methodology advised by the EA.

TUs that may have already been fully or partially exempt from the CCL due to the Combined Heat and Power Quality Assurance (CHPQA) scheme exemption were identified by cross-checking the company names and addresses in the published CHPQA register and facility details provided by the EA. Seventeen facilities were identified of which 15 reported at TP2 and TP3. Six of the facilities were in 'bubbled'[17] agreements; it was assumed that all the energy reported by the TU was exempt so as to provide a conservative estimate of CCL revenue lost.

One Chemicals facility was identified by Ricardo (CCA advisers to the EA) as using most of their electricity for electrolysis, which is also exempt from CCL. This is part of a bubble but again all energy use (not just electricity) reported by this TU was excluded from the calculation in order to be conservative.

Electricity generated from off-site renewable sources was exempt from CCL for the first seven months of TP2 (until the end of July 2015), while electricity generated from on-site renewables is still exempt from CCL. However, it is not possible to identify electricity generated from renewable sources in CCA scheme reporting, as electricity consumption is reported irrespective of its source. The value of the CCL exemption for TP2 and TP3 will therefore be slightly over-estimated in this respect. The risk of over-estimation for onsite renewables is balanced by under-estimation in relation to EU ETS, as explained in the next paragraph. For illustrative purposes, if onsite renewables represented 10% of total electricity consumption reported for CCA purposes in TP3, this would imply an over-estimate of £16.6 million per year.

[17] A 'bubbled' agreement is a single TU agreement covering multiple facilities (i.e. sites).

The estimates presented here omit CCL discounts from primary energy use on sites that are in both the CCA and EU ETS schemes. These sites obtain CCL discounts by virtue of their participation in the CCA rather than EU ETS, so these discounts should also be ascribed to the CCA scheme. Although many EU ETS sectors are eligible for min-met and therefore already exempt from CCL, analysis suggests that there may be significant overlap for two non-min-met sectors: the Chemicals and Paper sectors. The scale of this effect is estimated later in this report.

The upper estimate for CCL forgone assumes that all CCA participants would pay CCL if they were not in the CCA, except for the adjustments listed above for CHPQA and electrolysis. The lower estimate assumes that all TUs in min-met sectors would already be exempt from CCL as a result of the min-met exemption. These provide upper and lower bounds for the impact of the min-met exemption on CCL forgone.

Results for CCL forgone in TP2 and TP3

If TUs in min-met sectors are included, the estimated revenue lost to Government from CCL discounts was £374.3 million from TP2 and £383.9 million for TP3, subject to the caveats set out above. The breakdown by fuel, presented in Table 9, shows that discounts on electricity accounted for 84-85% of CCL forgone in TP2 and TP3. This dominance of electricity would be slightly reduced if electricity from onsite renewables was excluded from these figures, and if primary energy use on joint EU ETS/CCA sites was included.

Table 9: Upper estimate of CCL forgone in TP2 and TP3

Fuel	Estimate of CCL revenue forgone in TP2 (£ million)	Estimate of CCL revenue forgone in TP3 (£ million)
Electricity	**315.1**	**321.2**
Gas	**55.3**	**57.5**
Fuel oil	0.9	0.9
Coal	0.5	1.7
Coke	0.0	0.0 *
Kerosene	0.3	0.3
LPG	0.3	1.5
Gas oil/diesel oil	1.4	0.8
Naphtha	0.8	0.0 *
Total for 2-year TP	374.3	383.9
Annual estimate (£ million pa)	187.2	191.9

*Fuel use was reported but less than would generate £0.1 million in avoided levy.

The analysis for CCL was repeated excluding TUs in Min-met sectors as they possibly had at least partial exemption. This could be interpreted as a lower bound on CCL forgone, as some TUs in these sectors (or some energy use within these TUs) may not be eligible for the min-met exemption. The results are shown in Table 10.

Table 10: Lower estimate of CCL forgone in TP2 and TP3

Fuel	Estimate of CCL revenue forgone in TP2 (£ million)	Estimate of CCL revenue forgone in TP3 (£ million)
Electricity	268.1	278.7
Gas	48.5	50.6
Fuel oil	0.9	0.9
Coal	0.4	0.4
Coke	0.0	0.0
Kerosene	0.3	0.2
LPG	1.3	1.4
Gas oil/diesel oil	0.8	0.7
Naphtha	0.0	0.0
Total for 2-year TP	320.2	332.9
Annual estimate (£ million pa)	160.1	166.4

Estimates of CCL forgone on primary energy use from EU ETS/CCA sites

As explained above, the estimates of CCL forgone were calculated using CCA emissions reported to the EA which do not include emissions from primary energy use (e.g. gas use) on EU ETS/CCA sites. This primary energy use is also eligible for CCL discounts because of these sites' participation in the CCA scheme, unless it is already exempt from CCL for other reasons.

It was not possible to cross check estimates of CCL discounts with HMRC's 'state aid' data for a sample of firms with sites in the EU ETS scheme, owing to confidentiality restrictions around access to HMRC data at firm level.

In place of this, publicly available EU ETS databases were reviewed to identify CCA sectors that had EU ETS sites. Although many EU ETS sectors are eligible for min-met and therefore already exempt from CCL, the analysis identified significant overlap for two non-min-met sectors: the Chemicals sector (CIA) and paper sectors (CPI). Preliminary estimates, shown in Table 11, suggest that possible CCL forgone as a result of EU ETS primary energy use in these sectors may be about £20 million per year in TP2 and TP3 (based on matching site addresses and company names between the EU ETS and the CIA and CPI sectors in the CCA scheme, using publicly available EU ETS site emission data, and assuming that all the primary fuel use on these sites was gas). Around a quarter of this estimate is derived from the paper sector, while the remaining three-quarters is derived from the chemicals sector. To the extent that primary fuels other than natural gas were used, that parts of the EU ETS site were not covered by the CCA scheme, or that the fuels were exempt from CCL for another reason, these figures may be slightly different or overestimates.

Table 11: Estimates of CCL forgone on primary energy use on Chemicals and Paper sites in CCA/EU ETS

Sector	2015	2016	2017	2018	TP2 total	TP3 total
Chemicals (CIA sites)						
EU ETS primary energy emissions (ktCO2)	2,364	2,200	2,412	1,975		
Gas equivalent energy use (GWh)	12,852	11,962	13,165	10,734		
Estimated CCL forgone (£ million)					31.1	31.08
Paper (CPI sites)						
EU ETS primary energy emissions (ktCO2)	808	737	770	805		
Gas equivalent energy use (GWh)	4,393	4,004	4,187	4,376		
Estimated CCL forgone (£ million)					10.5	11.1
TOTAL ESTIMATED CCL forgone (£ million)					41.7	42.1
Annual estimate of CCL forgone (£ million)					20.8	21.0

Methodology for TP4 projections of CCL forgone

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 there will be no CRC forgone after April 2019, there will be a considerable increase (of around 50%) for CCL rates for most fuels and an accompanying increase in CCA discounts on these fuels. The weighted average rates for TP4 are shown in Table 12.

As for the TP2 and TP3 estimates, partially or fully exempt TUs were not included in the calculations. Upper and lower bounds were calculated for CCL forgone, to account for uncertainty in the CCL status of TUs in sectors affected by the min-met exemption.

Table 12: 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%

Results for CCL projections for TP4

These rates were used together with the TP3 reported results to give an illustration of what the loss in CCL revenue might be for TP4. As shown in Table 13, the upper estimate (including TUs that have remained in the scheme in min-met sectors) suggest that CCL revenue forgone would be around £587 million, an increase over TP3 of over 50%. This is broadly similar to the combined revenue forgone from CCL and CRC.

Table 13: Upper estimate of CCL forgone in TP4

Fuel	Upper estimate of CCL forgone in TP4 if performance was as for TP3 (£ millions)
Electricity	460.4
Gas	119.3
Fuel oil	1.7
Coal	0.8
Coke	0.0
Kerosene	0.5
LPG	2.7
Gas oil/diesel oil	1.4
Naphtha	0.0
Total for TP4	586.9
Annual estimate (£ million pa)	293.5

A lower estimate of CCL revenue forgone in TP4 was developed by excluding all TUs in sectors affected by the min-met exemption. This is likely to be an underestimate as some of the TUs in sectors affected by the min-met exemption may not themselves be eligible, or fully eligible, for the min-met exemption from CCL. The results are shown in Table 14 below.

Table 14: Lower estimate of CCL forgone in TP4

Fuel	Lower estimate of CCL forgone in TP4, if performance was as for TP3 (£millions)
Electricity	399.4
Gas	104.9
Fuel oil	1.7
Coal	0.6
Coke	0.0
Kerosene	0.5
LPG	2.7
Gas oil/diesel oil	1.4
Naphtha	0.0
Total	511.1
Annual estimate (£ million pa)	255.6

CRC calculations

A separate analysis was undertaken to estimate the cost of lost revenue from exemption from CRC payments for TP2 and TP3. Facilities operated by firms that were eligible under CRC Phase 1 and 2 were identified by company name and facility address as part of the micro-econometric analysis. These were cross referenced against the TUs which reported at TP2 and TP3. Energy use by TUs fully or partially exempt due to CHPQA and electrolysis electricity use were excluded from these calculations.

CRC charges by fuel and year for the period of TP2 and TP3 were collected from official web sites. These are shown in Table 15, together with values calculated for the TP2 and TP3 periods. Since CRC values are defined for financial year periods, it was assumed that energy use was evenly spread over the period. The CRC values have been weighted for the relevant number of months of a given financial year within the target period. The overall price is weighted by the reported[18] use of forecast and compliance allowances for each year.

[18] CRC annual reports 2014-15 to 2018-19.

Table 15: CRC charges by fuel type and year

Year	Forecast Sale Price (/t CO2)	Compliance Sale Price (/t CO2)	Compliance price weighted by actual usage of forecast and compliance (/t CO2)
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

The carbon conversion factors by year and for TP2 and TP3 (weighted as before) are shown in Table 16. Although conversion factors are given for grid and self-supplied electricity, only the former was used as the CCA reporting does not allow for separate reporting of use of grid and self-supplied electricity. The carbon content of grid electricity is higher so this may result in a slight over-estimate of the cost of CRC exemption.

Table 16: CRC Carbon conversion factors by fuel and year

Year	Electricity (grid) (kg CO2/kWh)	Electricity (on site and self supplied) (kg CO2/kWh)	Gas/ (kg CO2/kWh)
2014/15	0.53310	0.49023	0.184557
2015/16	0.49636	0.45850	0.184070
2016/17	0.44662	0.40957	0.183645
2017/18	0.38146	0.34885	0.183810
2018/19	0.30482	0.28088	0.183620
TP2 period weighted average	0.48230	0.44412	0.183972
TP3 period weighted average	0.36087	0.33095	0.183718

The basic approach was that the CCA reported electricity use (converted from primary to delivered energy) and gas use - for TUs identified as being involved in CRC - was converted to carbon emissions, using the CRC conversion rates. The carbon emissions were then used to calculate the cost of avoided CRC allowances, using CRC allowance prices.

The upper and lower estimates for CRC took account of CRC eligibility criteria during TP2 and TP3. While CRC Phase 1 ran from April 2010 to March 2014, CRC Phase 2 ran from April 2014 to March 2019 so the latter overlapped with TP2 (2015 and 2016) and TP3 (2017 to 2018). The lower and upper bounds were calculated as follows.

- For the lower estimate, CRC sites were identified using data from the micro-econometric workstream which flagged that a facility (or more accurately, its parent company) had a non-CCA site in CRC Phase 2. The lower estimate missed firms which only have CCA sites, and were therefore totally outside CRC Phase 2, but which would have been liable for CRC if the CCA scheme did not exist.
- For the upper estimate, CRC sites were identified using data from the micro-econometric workstream which identified that a facility (or more accurately, its parent company) was either in CRC Phase 1 or in CRC Phase 2. Due to the nature of eligibility for CRC Phase 1[19], this process ensured that firms missed from the 'lower estimate' would be included. The upper estimate may be an over-estimate to the extent that some of the companies included in CRC Phase 1 may have fallen below the qualifying threshold for CRC Phase 2, irrespective of the inclusion of CCA sites.

A realistic estimate is likely to fall between these two values, arguably closer to the upper than lower estimate because relatively few firms would have been expected to fall out of the CRC scheme between Phase 1 and Phase 2, for reasons other than the change in CCA and EU ETS rules.

As for the CCL calculations, upper and lower estimates were also developed to account for uncertainties in whether TUs in min-met sectors remaining in the CCA scheme would already be exempt from CRC because of the min-met exemption.

The overall upper estimate for CRC forgone is calculated using the wider definition of CRC participation and also includes CRC forgone for min-met TUs that have remained in the scheme. The overall lower estimate uses the narrower definition of CRC participation and also excludes min-met TUs.

Results for CRC revenue forgone

Our estimates of revenue lost from exemption of CCA sites from CRC range from £108 million to £382 million for TP2 and from £94 million to £323 million for TP3. The annual estimates for TP3 range from £47 million to £162 million. The upper estimates are the same order of magnitude as the CCL forgone. These estimates are broken down as shown in Table 17.

Table 17: Estimates of lost CRC revenue due to CCA exemption

	Number of reporting TUs estimated to be exempt from CRC as a result of CCAs	Cost of Electricity exemption	Cost of gas exemption	Total
TP2				
Lower estimate – CCA firms identified as having non-CCA sites in CRC Phase 2; excluding TUs in min-met sectors	345	£88.3m	£19.3m	£107.6m
Upper estimate – CCA firms identified as participating in CRC Phase 1 and/or having non-CCA sites in CRC phase 2; including TUs in min-met sectors that have remained in the CCA scheme	1850	£304.9m	£76.7m	£381.5m

[19] In CRC Phase 1, firms were required to report energy use from CCA and EU ETS sites, even if they did not have to pay CRC allowances on these sites.

	Number of reporting TUs estimated to be exempt from CRC as a result of CCAs	Cost of Electricity exemption	Cost of gas exemption	Total
TP3				
Lower estimate – CCA firms identified as having non-CCA sites in CRC Phase 2; excluding TUs in min-met sectors	379	£72.6m	£21.3m	£93.9m
Upper estimate – CCA firms identified as participating in CRC Phase 1 and/or having non-CCA sites in CRC phase 2; including TUs in min-met sectors that have remained in the CCA scheme	1988	£242.3m	£81.0m	£323.4m

The number of TUs estimated to be exempt from CRC as a result of CCAs has increased in TP3 because of increased CCA participation during TP3.

These estimates are based on data-matching carried out for the micro-econometric workstream. Although the policy flags for participation in CRC Phases 1 and 2 have been subject to quality assurance by the micro-econometric workstream, some errors may remain.

Neither the CCL nor the CRC estimates take into account the economic or tax benefits that may have been generated as a result of CCA participants having lower energy costs. The economic effects of lower energy costs were modelled by the macro-economic workstream.

Classification of sectors

Sectors affected by the mineralogical-metallurgical (min-met) exemption

The EA have advised that the following 14 sectors were affected by TUs leaving as a result of the min-met exemption. They provided a list of the TUs reported to have left because of the exemption during 2013/14. The proportion of TUs leaving varied between sectors. The proportion leaving, shown in Table 18, was calculated by comparing the number of TUs that left for this reason to the number reporting at TP2 (plus those that left). Where the percentage leaving is 100%, this means that no TUs reported for that sector in TP2.

Table 18: Sectors affected by the min-met exemption

Sector ID	Sector Name	Estimated percentage of TUs leaving during 2013/14 as a result of min-met exemption*
ADS	Aerospace	9%
AFED	Aluminium	33%
BCA	Cement	60%
BCC	Ceramics	61%
BGMC	Glass	58%
BLA	Lime	100%

Sector ID	Sector Name	Estimated percentage of TUs leaving during 2013/14 as a result of min-met exemption*
CAST	Foundries	98%
CBM	Metalforming	23%
EUR	Eurisol / Mineral Wool	100%
GPDA	Gypsum Products	100%
NFA	Non-Ferrous Metals	72%
SEA	Surface engineering	5%
SEHT	Surface engineering heat treatment	35%
UKSA	Steel	60%

*Calculated as percentage of 'leavers' plus 'total of TUs reporting for this sector at TP2'.

Further TUs may have left as a result of the min-met exemption, since 2013/14.

Sectors entering the CCA scheme via energy intensity qualification route

Fourteen sectors qualified for the CCA scheme under energy intensity and/or import penetration criteria rather than under Environmental Permitting Regulation (EPR) criteria. These sectors qualifying under the EI route were:

- BATE (Textiles – energy intensive)
- BCCF (Calcium Carbonate)
- BCGA (compressed gases)
- BNMA (Geotextiles)
- BPF (plastics)
- CAST (Foundries)
- CONF (sawmills)
- CSDF (cold stores)
- DATC (data centres)
- KABC (Kaolin and Ball Clay)
- PIFA (packaging and films)
- NFU4 (Horticulture)
- SEHT (Heat Treatment)
- TSA (Laundries)

Some of the remaining sectors, qualifying under the EPR route, also had high energy or trade intensity.

Sectors assessed as having relatively high energy and/or trade intensity

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.

An assessment of energy and trade intensity was undertaken by CCA sector, based on energy intensity data based on relevant SIC codes in the Annual Business Survey (available via ONS) and on import penetration data for relevant product codes in UK Trade Information (available via HMRC). This assessment required matching of SIC and product codes to CCA sectors, which was undertaken by UCL. The UCL methodology for energy intensity used firm-level ABS data rather than site-level data, so CAG Consultants reviewed the analysis using a margin of error when applying the thresholds cited above. Sectors were treated as qualifying on EI grounds if their firm-level EI exceeded 5% (rather than the official 10% threshold); similarly sector were treated as qualifying on EI/TI grounds if their firm level EI exceeded 2% (rather than the official 3% threshold) provided that their import penetration exceeded 50%. These relaxed thresholds were chosen by reference to the firm-level EI data from ABS for sectors that were known to have qualified for the CCA via the EI/TI route.

The assessment in Table 19 is therefore highly approximate and should be interpreted as indicative rather than definitive. No ABS data was available for agricultural sectors: these have been assumed to be non-energy intensive, with the exception of the horticulture sector (NFU4) which entered the CCA scheme on EI/TI criteria.

The list below includes all the sectors that actually qualified for the CCA scheme on the grounds of energy and/or trade intensity, as this was based on detailed assessment at the time of entry. It also includes other sectors that qualified under the EPR route but appear to have relatively high energy and/or trade intensity based on HMRC data and firm-level ABS data (using the criteria outlined above).

Table 19: Sectors assessed as being energy and/or trade intensive

Sector code	Sector description	Assessed as being energy and/or trade intensive
ADS	Aerospace	
AFED	Aluminium	YES
AIC	Agricultural Supply	
AWM	Wall Coverings	
BATC	Textiles	YES
BATE	Textiles (Energy Intensive)	YES
BCA	Cement	YES
BCC	Ceramics	YES

Sector code	Sector description	Assessed as being energy and/or trade intensive
BCCF	Calcium Carbonate	YES
BCGA	Compressed Gases	YES
BEPA	Egg Processing	
BGMC	Glass Making	YES
BLA	Lime (No Current TUs)	YES
BLRA	Brewing	
BMPA	Meat Processing	
BNMA	Geosynthetics Non-Woven	YES
BPC1	Poultry	
BPC2	Poultry	
BPF	Plastics	YES
BPIF	Printing	
BTMA	Tyres	YES
CAST	Foundries	YES
CBM	Metal Forming	
CIA	Chemicals	YES
CONF	Sawmills	YES
CPI	Paper	YES
CSDF	Cold Storage	YES
DATC	Data Centres	YES
DIAL	Dairy	
EUR	Mineral Wool (No Current TUs)	YES
FDF1	Food And Drink	
FDFS	Supermarkets	
GPDA	Gypsum (No Current TUs)	YES
KABC	Kaolin and Ball Clay	YES
MAGB	Malting	
MPMA	Metal Packaging	
NAMB	Bakers	

Sector code	Sector description	Assessed as being energy and/or trade intensive
NFA	Non-Ferrous Metals	YES
NFU1	Pigs	
NFU4	Horticulture	YES
NFU5	Egg & Poultry Meat	
NMI	Semi-Conductor Manufacture	YES
PIFA	Packaging and Industrial Films	YES
SEA	Surface Engineering	
SEEC	Spirits	YES
SEHT	Heat Treatment	YES
SMMT	Motor Manufacturing	
TSA	Laundries	YES
UKLF	Leather	
UKRA	Rendering	
UKSA	Steel	YES
WPIF	Wood Panels	YES

Source: Analysis by UCL and CAG Consultants, based on Annual Business Survey (ABS) and HMRC data.

4. Qualitative research

Summary

All 53 sector associations were invited to take part in an online survey. This generated responses covering 39 sectors.

In-depth telephone interviews were undertaken with 19 sector associations, 23 CCA participants and nine non-participants (including three firms that had been in the CCA scheme but had left). To overcome difficulties in recruiting non-participants, there were also interviews with three energy consultancies that had experience of advising firms on CCA participation. The research was undertaken in two waves to allow some of the interviews to fill evidence gaps and resolve questions raised by the quantitative survey.

Scope

All sector associations were invited to take part in an online survey. Responses were received from 39 out of 53 sector associations, generating evidence that was either qualitative (e.g. comments on aspects of the scheme) and quantitative (e.g. average participation rates) .

In addition, in-depth interviews undertaken during the qualitative research comprised:

- 19 telephone interviews of up to 90 minutes with CCA sector associations, covering 27 sectors;
- Three interviews with energy consultancies that work with CCA participants and non-participants;
- 23 telephone interviews of up to 75 minutes with CCA participants, drawn from a cross-section of CCA sectors; and
- Nine telephone interviews of around 30-45 minutes with non-participants (comprising three leavers and six firms that were in similar sectors to CCA participants but had not participated in the scheme).

Sampling

Sampling for online survey

The online survey of sector associations was a full census, including four sector associations[20] that did not currently have active TUs in the scheme.

[20] Although there were 53 umbrella agreements in the CCA scheme, four of these currently have no TUs in the scheme because of withdrawals arising from the min-met exemption. The dormant sectors were: EUR – mineral wool; CAST – Foundries; BLA – Lime; and GPDA – Gypsum.

Sampling for sector association interviews

In the evaluation plan, it was proposed to select sectors to cover those of particular relevance to the ToC and other workstreams (e.g. leavers such as the min-met sector and joiners such as the data centre and sawmill sectors), those that represented a significant proportion of energy/carbon use and those that were of interest because of the findings of micro-econometric or scheme data analysis.

The final sample for the qualitative research was with 19 sector associations, covering 27 out of the 49 active CCA sectors. Where consultancies administered CCAs on behalf of a sector association, a sector association representative was always included in the interview. These consultancies were involved in some of the interviews, at the request of the relevant sector association. Sampling of sector associations was purposive and aimed to include sectors with large numbers of TUs and sectors with high levels of energy and carbon savings, to provide comparability with the micro-econometrics, scheme data analysis and quantitative research. To test ToC assumptions, the sampling included sectors affected by the min-met exemption, sectors with extensive 'bubbling' of facilities, sectors with both newer and older infrastructure and sectors that had recently joined the CCA scheme.

Sampling for in-depth participants interviews

Sampling was informed partly by theory and partly by queries arising from other workstreams. A mix of firms from different sector groups were included, including some in sectors that joined recently (e.g. data centres), some in sectors representing a high proportion of sites (e.g. food, agriculture), some in sectors generating a high proportion of emissions (e.g. chemicals, paper & pulp, other industry) and some in the min-met sector that have retained their CCAs. Some sectors with high numbers of CCA participants were also included, to allow triangulation with findings from the quantitative and micro-econometric workstreams. And, finally, we purposively selected five participants to follow up queries arising from the quantitative survey.

The spread of interviewees across sector groups is set out in Table 20 below.

Table 20: Sector breakdown of CCA participant sample

Primary criteria: Sector Group (as used for quantitative survey sampling)	**List of sectors in this sector group**	**Sectors covered by the 23 CCA participant interviews** (Note: some interviewees had TUs in multiple sectors)
Agriculture	AIC, BPC1, BPC2, NFU1, NFU4, NFU5	AIC, BPC1, BPC2, NFU1, NFU5
Meat (BPMA)	BMPA	BMPA
Plastics	BPF	BPF
Printing	BPIF	BPIF
Chemicals	CIA	CIA
Food (FDF1)	FDF1	FDF1

Primary criteria: Sector Group (as used for quantitative survey sampling)	**List of sectors in this sector group**	**Sectors covered by the 23 CCA participant interviews** (Note: some interviewees had TUs in multiple sectors)
Min-Met[21]	ADS, AFED, BCA, BCC, KABC, BGMC, BLA*, CAST*, CBM, EUR*, GPDA*, NFA, SEA, SEHT, UKSA	ADS, AFED, SEA
Other food and drink	BEPA, BLRA, BPC2, CSDF, DIAL, FDFS, MAGB, NAMB, SEEC, UKRA	FDFS, CSDF, NAMB, UKRA
Other industry	AWM, BATC, BATE, BCCF, BCGA, BNMA, BTMA, CBM, MPMA, NMI, PIFA, SMMT, UKLF, WPIF	SMMT, PIFA, BATE
Non industry	DATC, TSA	DATC, TSA
Paper and pulp	CONF, CPI	CONF, CPI
TOTAL	53 sectors, of which 49 have active TUs	23 participants covering 24 sectors

* dormant sectors with no active TUs

CCA participants were purposively selected to meet sampling criteria. As well as covering the sectors above, they were chosen to provide a balance of firms with:

- Relative targets that met these targets in TP3 vs those using buy-out;
- Novem targets that met these targets in TP3 vs those using buy-out;
- Absolute targets that met these targets in TP 3 vs those using buy-out;
- Mix of large and small firms;
- Mix of higher/lower energy intensity;
- Mix of firms from sectors with higher/lower exposure to competition from imports;
- Firms using bubbling (i.e. multiple facilities within a TU);
- Firms that joined the CCA scheme recently;
- Firms covered only by CCA/CCL, as well as firms covered by both CCA and EU ETS or CRC;
- Firms that had reported CCA influence on fuel-switching in the quantitative survey;
- Firms in sectors that had reported significant CCA influence in the quantitative survey;
- Firms that had had targets adjusted as a result of stringency testing.

[21] This includes all the sectors from which the EA identified that some firms left as a result of the min-met exemption. In some of these sectors, only a small proportion of TUs left. CAG has estimated that Min-Met leavers represented 23% of CBM, 9% of ADS and 5% of SEA TUs previously in the scheme.

All the firms interviewed used the 70:30 rule, and a few used the 3/7ths rule (mimicking the effect of the 70:30 rule for sites with more than 30% non-eligible consumption).

Eleven participant interviews were sourced from participants that had agreed to 'opt-in' to the evaluation research via the Environment Agency (EA) (i.e. they were firms that had pro-actively offered to participate in the research) and a further five were follow-ups to the quantitative survey. The 'opt-in' process that was part of the quantitative survey is described further in chapter 5 of this report. The remaining seven interviews were sourced from 'non-opt-in' participants. With the exception of the follow-on interviews, participants selected for in-depth interview were excluded from the quantitative survey to avoid over-burdening respondents. The follow-on interviews were slightly shorter as they built on information already gathered through the quantitative survey.

Sampling for non-participants

In the evaluation plan for Phase 2, it was proposed that the non-participant sample should include:

- Firms in mineralogical and metallurgical sectors that were originally part of the second CCA scheme but had left at an early stage (presumably because of the min-met exemption);
- Firms in agricultural and food/drink-related sectors that were in the second CCA scheme but had chosen to leave;
- Firms that were in the same 4 digit SIC-code as CCA participants but had chosen not to join the scheme (dependent on micro-econometric matching);
- Firms that have energy (and possibly trade) intensities similar to CCA participants that were not eligible for any CCA scheme but which pay CCL and/or CRC (dependent on micro-econometric matching).

The non-participant sample comprised firms that had left the scheme (identifiable from scheme data) as well as firms that had chosen not to join (despite being eligible) and firms that were not (to their knowledge) eligible for CCAs.

Recruitment of non-participants proved very challenging and the number of non-participants interviewed was much lower than originally anticipated. Three energy consultancies were also interviewed to supplement the qualitative evidence on non-participants and during these interviews more information was sought about potential reasons for lower engagement by non-participants.

The original and final samples are set out in Table 21 below. Some secondary information was obtained through the recruitment process, such as the reasons for refusal of interviews – this was analysed together with findings from the interviews.

Table 21: Sampling of non-participants

Non-participant group	Original sample (20 non-participants)	Actual sample (9 non-participants plus 3 energy consultancies)
Min-met leavers	3 firms that left as a result of the min-met exemption (Firms were identified in min-met sectors that had left the CCA scheme in the last 2-3 years, using CCA databases. To avoid duplication with the quantitative survey of CCA participants, which was being undertaken in parallel, firms that had other TUs still in the scheme were excluded.)	1 interview secured in a min-met sector, but this firm left because of a change of circumstances. Some firms approached confirmed that they had min-met exemptions but were not willing to undertake a full interview. No further evidence was sought as the information gathered from them during the recruitment process, by email or on the telephone, provided clear confirmation of their reason for leaving.
Other leavers	3 firms in the agricultural and food & drink sector groups that left the scheme (Again, firms were identified in non-min-met sectors that had left the scheme in the last 2-3 years, using CCA databases, excluding firms that had other TUs still in the scheme. Owing to problems contacting small agricultural operators that had ceased trading, this was extended to include any non-min-met sectors.)	2 interviews secured where changes of circumstances had led to firms leaving the scheme. There were multiple failures to secure interview on the grounds of firms going out of business and no longer being contactable. No further evidence sought because the uncontactability of firms provided evidence that they had gone out of business.
Eligible non-joiners in CCA sectors	4 firms in sectors identified by UCL matching work to have significant numbers of non-joiners; similar to CCA firms in size/other characteristics	3 firms interviewed that may have been eligible (identified via EA opt-in process for CRC firms and via a selection of sector associations covering large sectors). In one of these cases, a firm had some TUs in the CCA scheme but had chosen not to put other eligible facilities into the scheme, so the interview explored their reasoning about this.
Firms in non-eligible sectors	10 non-participant firms in non-eligible 4-digit SIC code sectors identified by UCL that pay CCL and have energy and/or trade intensities similar to specific CCA sectors (including firms with a mix of coverage by CRC, EU ETS and EII)	3 firms interviewed from the matched sectors that did not appear to be eligible for CCAs. There were multiple refusals for interview on the grounds of irrelevance to the interviewee.
Energy consultancies providing CCA services (included as fallback in the absence of non-participant sample)	Not included in original sample.	3 energy consultancies that provide CCA services to their clients, to gain insights into why some eligible firms do not sign up and whether these firms behave differently from CCA firms. (3 energy consultancies identified via sector associations for large sectors. Four further CCA energy consultancies identified via web search.)

Data collection

The online survey used to collect quantitative and qualitative information from sector associations is presented in Appendix B.

Tailored topic guides for in-depth interviews were prepared for each sample group, which are also shown in Appendix B to this report. The topic guides and survey were approved by BEIS prior to research. Minor modifications were made during the research process, as agreed with BEIS, both to clarify some of the questions and to reduce the length of the interviews without losing essential information.

The average interview lengths were as follows:

- Interviews with sector associations: around 90 minutes for initial interviews; 30-45 minutes for follow-up interviews;
- Interviews with energy consultancies: around 45-60 minutes
- Interviews with CCA participants: around 75 minutes for the main interviews; and around 45-60 minutes for follow-up interviews;
- Interviews with non-participants: around 30-45 minutes

The interviews were recorded and transcribed. Recordings were quality assured by Winning Moves during the research period, with findings being fed back to individual researchers and a summary shared with BEIS.

Recruitment

Recruitment for CCA sector associations

A link to the online survey was sent by email to all CCA sector associations on a list provided by the EA. This list comprised all 53 sector associations in the scheme, including four with no active TUs. Reminders were sent to encourage responses. A total of 39 sectors were covered by responses to the online survey, with some sector associations sending responses covering more than one sector.

In-depth telephone interviews were undertaken with the sector association representatives with responsibility for specific umbrella agreements, according to the purposive sampling approach set out earlier in this chapter. Where agreements were administered by a consultancy, a representative of the consultancy was invited to join the interview. Named contacts were publicly available for the sector associations, who were willing participants in the research. Twenty-four sector associations were approached and a total of 19 were interviewed, with the assistance of the consultancies where relevant.

Recruitment for CCA participants

Within CCA participant firms, we undertook interviews with the individual who held responsibility for management of their CCA and/or energy management. Job titles varied: in many cases interviewees were energy managers, but for smaller firms without a dedicated energy manager the person with these responsibilities was often the operations manager,

facilities manager, finance director or managing director. In some firms, the person with responsibility for environmental issues also had responsibility for health and safety compliance.

Recruitment for CCA participants was undertaken in three parts. Firstly, named contacts were available for firms that had agreed to participate via the EA opt-in process. Secondly, efforts were also made to include some participants that did not opt-in to reduce response bias associated with the opt-in process. These were harder to recruit as names or contact details for these firms were not available, only job titles. Web searches (e.g. LinkedIn, company websites) were used to identify named contacts where possible. In some cases, it was problematic to get past company switchboards where they had a 'no name' policy and where no contact name was available. Small batches of sample were approached by email and phone, with organisations being treated as 'exhausted' after 4-5 attempts to contact. Finally, we interviewed five CCA participants that had already been interviewed as part of the quantitative survey, to follow up queries arising from their responses.

Table 22: Profile of in-depth interviews with CCA participants

	Number of organisations approached	Number of completed interviews	Refusals/ exhausted sample
Opt-in CCA participants	13	11	2
Non-opt-in CCA participants	28	7	19
Follow-on interviews with CCA participants	8	5	3
Total CCA participants	49	23	26

Recruitment for non-participants

Within non-CCA firms, telephone interviews were undertaken with the person responsible for energy management or (for firms that had recently left the CCA) the person with most knowledge of their CCA.

Contact details were available for relevant contacts at four firms that opted-in to the non-participant research process. Three firms were identified via the 'opt-in process' that the EA extended to CRC participants while a fourth firm requested an interview via BEIS. Three of these four firms were interviewed: two were interested in joining the CCA scheme (or in one case, re-joining) but had concerns about eligibility criteria; the third was also non-eligible.

Recruitment of other non-participants was highly problematic, partly because contact details were not available and partly because most of these firms regarded the CCA research as irrelevant to their business and therefore low priority for their time. A further complication was that some firms leaving the CCA scheme had gone out of business and were no longer contactable. Candidate firms were initially approached in small batches, using a combination of email, telephone and web-searching, with contacts being 'exhausted' before substitutes were approached. Several mitigation strategies were used:

- Incentives were offered, in the form of £30 donations to charities of the interviewee's choice. A small number took up this offer;

- An alternative strategy was attempted using a market research recruitment agency which had a field team dedicated to ringing a large number of firms in parallel;
- The incentive offered by the market research recruitment agency was increased to £50 donation but this did not increase take-up.

The alternative strategy did not generate any interviews, and the 'small batch' strategy generated a total of four interviews (two leavers and two non-participants). In the second wave of research, further efforts were made to identify non-participants via selected sector associations, with energy consultancies being interviewed as an alternative means of finding evidence about reasons for non-participation and differences between participants and non-participants. The overall profile of interviews with leavers and non-participants is shown in Table 23 below.

Table 23: Profile of in-depth interviews with non-participants

	Number of organisations approached	Number of completed interviews	Refusals/ exhausted sample
Leavers (opt-in)	1	1	0
Leavers (non-opt-in; small batch method)	13*	2	11 (8 business closed or number not available; 3 sample exhausted; 1- person with knowledge of CCAs has left the company)
Leavers (non-opt-in; alternative recruitment method)	13	0	13 (6 business closed or number not available; 7 sample exhausted; 1 refusal)
Leavers (total)	**27**	**3**	**24**
Non-participants (opt-in)	3	2	1
Non-participants (non-opt-in; small batch method)	12*	2	12 (12 exhausted sample)
Non-participants (non-opt-in; alternative recruitment method)	126	0	126 (13 not able to obtain a correct phone number for the company; 62 sample exhausted; 19 not interested in taking part – no reason given; 13 – not interested as energy management is dealt with in another country or by the landlord or no one at the company deals with energy management; 7 – right person is not available due to annual leave; 6 - no capacity to take part; 5 – 'no market research' policy; 1 – company does not qualify for CCA)
Non-participants (via sector associations)	3	2	1
Non-participants (total)	**144**	**6**	**138**

* excludes a few contacts where preliminary contact was made by small batch method and the identified contact was then included in the sample for the alternative recruitment method

Analysis

A coding frame was developed based around the detailed evaluation questions and the assumptions in the theory of change. This evolved slightly over the analysis period, with a few additional codes being added to capture issues arising from the analysis.

The coding was undertaken by three researchers using qualitative analysis software. The coded excerpts were then reviewed and analysed by two of these researchers, with adjustments made to coding where necessary to ensure consistency.

Descriptors were attached to each of the transcripts to aid analysis. In particular, descriptors were used to indicate the level of CCA influence reported by an organisation, both influence on energy efficiency and influence on competitiveness. While this is not a 'realist' evaluation, the contexts and reasonings for each case and how they appeared to lead to different levels of CCA influence were analysed. It was therefore subsequently possible to characterise the types of organisations attributing different levels of influence to the scheme and explore the reasons they gave for influence (or lack of it).

While analysis of influence was undertaken on a case by case basis, thematic analysis was used for the other codes.

Limitations

The main limitations of this qualitative research are that:

- The number of non-participant interviews was smaller than originally planned and therefore there is the potential for the range of views of non-participants to not be fully reflected in this evidence. This was mitigated by interviewing energy consultancies and sector associations to obtain indirect evidence about the attitudes and behaviour of non-participants. Indirect evidence was also gathered through the recruitment process for non-participants, which is included in the findings presented in this report. It is also mitigated by evidence from the micro-econometric workstream, which compared energy consumption and economic performance for CCA participants and non-participants.
- 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. In the analysis of qualitative data, care was taken to triangulate the subjective views of sector associations, CCA participants and energy consultants, who had different perspectives on the CCA scheme. During the synthesis process, the evidence from all these interviewees was triangulated against 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 aimed to reach a balanced perspective on the scheme.

These limitations are not believed to impact significantly on the robustness of the findings, as findings were triangulated with evidence from other workstreams during the synthesis process.

5. Quantitative survey of CCA participants

Winning Moves conducted a telephone and online survey with 387 CCA participants. This chapter presents the research approach, including sampling, weighting and analysis methods. The questionnaires are presented in Appendix C to this report.

Winning Moves completed telephone and online surveys with businesses currently participating in the second phase of the CCA scheme. The objectives of these surveys were to:

- investigate whether there were statistically significant differences in attitudes and behaviours towards energy/carbon saving and business competitiveness, between different firm types; and
- gather evidence about attitudes towards different elements of the scheme, experience of CCA implementation and costs associated with compliance.

This chapter provides a more detailed summary of the final research methodology used to collate necessary data and evidence, including sampling.

Sector categorisation

For the purposes of the quantitative survey, sector associations were clustered into common categories to aid sampling. These were:

- Agriculture
- BMPA Meat
- BPF plastics
- BPIF printing
- CIA chemicals
- FDF1 food and drink
- Min-met
- Non industry
- Other food and drink
- Other industry
- Paper and pulp

These sector groups were developed using the following methodology:

- Initially, each CCA was categorised into one of the sectors used in the BEIS Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050 project[22].
- The min-met sectors were extracted from the Roadmap groups and aggregated as a single group.
- Individual CCAs / sectors with large number of TUs were split out to allow these to be analysed separately (i.e. BMPA, BPF, BPIF, CIA, FDF1).
- Sectors with no TUs at present were reviewed and categorised as not applicable.

The categorisation of sectors into these groups is shown in Table 24.

Table 24: Sector categorisation

CCA	Sector association	Categorisation for quantitative survey
AIC	The Agricultural Industries Confederation (Agricultural Supply)	Agriculture
BPC1	British Poultry Council (Poultry meat rearing)	Agriculture
NFU1	National Farmers Union	Agriculture
NFU4	National Farmers Union	Agriculture
NFU5	National Farmers Union	Agriculture
BMPA	British Meat Processors Association	BMPA Meat
BPF	The British Plastics Federation	BPF plastics
BPIF	British Printing Industries Federation	BPIF printing
CIA	Chemical Industries Association	CIA chemicals
FDF1	Food and Drink Federation	FDF1 food and drink
ADS	ADS Group Ltd (Aerospace)	Min-met
AFED	Aluminium Federation	Min-met
BCA	Mineral Products Association (Cement)	Min-met
BCC	British Ceramic Confederation	Min-met
BGMC	British Glass	Min-met
CAST	Castings Technology International Ltd (Foundries)	Min-met
CBM	Confederation of British Metal Forming	Min-met
NFA	The National Metal forming Centre (Non-Ferrous Metals)	Min-met
SEA	Surface Engineering Association	Min-met

[22] BEIS (2015) Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050.

CCA	Sector association	Categorisation for quantitative survey
SEHT	Surface Engineering Association (Heat Treatment)	Min-met
UKSA	UK Steel Association	Min-met
EUR	The Mineral Wool Insulation Manufacturers Association (MIMA)	N/A (All TUs left the scheme due to Min-met
GPDA	Gypsum Products Development Association	N/A (All TUs left the scheme due to Min-met
BLA	British Lime Association	N/A (All TUs left the scheme due to Min-met)
SGS	Mineral Products Association (Slag Grinding)	N/A (no TUs currently in second CCA scheme)
DATC	Information Technology Telecommunications and Electronics Association (Tech UK)	Non industry
TSA	Textile Services Association Limited (Laundries)	Non industry
BEPA	The British Egg Industry Council	Other food and drink
BLRA	Beer and Pub Association	Other food and drink
BPC2	British Poultry Council (Poultry meat processing)	Other food and drink
CSDF	Food Storage & Distribution Federation	Other food and drink
DIAL	Dairy UK	Other food and drink
FDFS	Food and Drink Federation - Supermarkets	Other food and drink
MAGB	Maltsters' Association of Great Britain (MAGB)	Other food and drink
NAMB	The National Association of Master Bakers	Other food and drink
SEEC	Spirits Energy Efficiency Company	Other food and drink
UKRA	Foodchain & Biomass Renewables Association (Rendering)	Other food and drink
AWM	British Coating Federation	Other industry
BATC	UK Fashion and Textile Association	Other industry
BATE	UK Fashion and Textile Association	Other industry
BCCF	The British Calcium Carbonate Federation	Other industry
BCGA	British Compressed Gases Association	Other industry
BNMA	British Non-woven Manufacturers Association (Geosynthetics non-woven)	Other industry
BTMA	British Tyre Manufacturer's Association	Other industry
KABC	Kaolin and Ball Clay Association	Other industry

CCA	Sector association	Categorisation for quantitative survey
MPMA	The Metal Packaging Manufacturers Association	Other industry
NMI	National Microelectronics Institute (Semi-conductors)	Other industry
PIFA	British Plastics Federation (Packaging & films)	Other industry
SMMT	Society of Motor Manufacturers and Traders	Other industry
UKLF	UK Leather Federation	Other industry
WPIF	Wood Panel Industries Federation	Other industry
CONF	Confederation of Forest Industries (UK) Ltd (Confor)	Paper and pulp
CPI	The Confederation of Paper Industries	Paper and pulp

Pilot Survey

A two-week pilot survey was conducted to test the feasibility of the proposed approach. Before participating in the 30-minute telephone interview, businesses completed a pre-interview questionnaire that collected information on the firm and their participation in the CCA and other government schemes.

The pilot identified that completion of 400 interviews, within a five-week fieldwork period, would be challenging due to: a) lower than expected response rates and b) difficulties in identifying the appropriate individual to interview.

The main telephone survey was subsequently implemented. This included minor amendments to the questionnaire.

Telephone survey

Sampling

The aim was to complete 400 telephone interviews with CCA participants. EA scheme data were analysed against a commercial database of company information, which estimated that there were just over 2,600 separate organisations participating in the second CCA scheme in June 2019. Some of these companies had multiple TUs. It was possible that some of these organisations were related (e.g. had a common parent company).

The sample was divided into two parts:

- Around 300 participants had ‘opted-in’ to the research by providing their contact details to Winning Moves, in response to an initial email request from the Environment Agency;
- ‘Non-opt-in’ participants, who had not provided their contact details, were identified using TU details, company names and addresses from EA scheme data.

It was decided that the target should be to conduct between 150 and 200 interviews with 'opt-in' participants, and 200-250 interviews with 'non-opt-in' participants from the wider population of CCA participants.

A balance was sought between 'opt-ins' and non-opt-ins', in recognition that 'opt-in' responses might be systematically different from 'non-opt-ins'. Those with multiple TUs and CCAs were over-represented in the 'opt-in' sample. This was adjusted for in the weights applied during the analysis stage. Otherwise, those 'opting in' were found to be broadly representative of the population as a whole (e.g. in terms of both sector group and target performance), which alleviated concerns that this cohort might skew the response profile significantly.

A random sampling approach was adopted for both 'opt-ins' and 'non-opt-ins', with the overall profile (including by sector and company size) of respondent organisations continually monitored as the fieldwork progressed. A mid-point review of fieldwork, in late June 2019, identified that the response rate from 'non-opt-ins' was low. . A decision was taken to introduce an online survey for all CCA participants that had not yet responded to the telephone survey, including both 'opt-in' and 'non-opt-in' participants. This generated 86 additional responses, bringing the total number to 387 (including 16 pilot completions).

Recruitment

The EA were unable to provide contact details for CCA participants for data protection and confidentiality reasons – as such, the following two-stage recruitment process was used for the telephone survey:

1. All CCA participants were emailed by the EA and asked to supply their contact details. This provided approximately 300 businesses for possible interview.

2. For CCA businesses who had not responded via this route, Experian matched a list of named organisations to obtain contact details for as many of the remaining 2,354 participant businesses as possible. This produced a final list of 1,892 usable contacts.

This process provided the research team with approximately 2,200 businesses to contact to secure 400 interviews. Ultimately, 301 CCA participants completed the telephone survey (including the 16 responses received during the pilot).

Response rates

The overall response rate for the telephone survey was 12%, comprising a higher response rate for 'opt-in' participants (over 60%) and a much lower rate for 'non-opt-ins' (under 10%). Where named contacts could be identified for 'non-opt-ins', via Experian data or web searches, the response rate for this group rose to approximately one in three. The response rate for the online survey was 7%.

Survey approach

The telephone survey used a two-stage approach:

- a pre-interview questionnaire to collect and record basic profiling, financial and performance data before the telephone interview, as shown in Appendix C.

- a telephone questionnaire, structured into six key themes, summarised in Table 25.

Table 25: Themes covered by telephone questionnaire

Questionnaire theme	Type of information collected
Background	Collated additional business profiling information to support CCA scheme data, and IDBR data from UCL. Respondents were asked about their organisational structure, sites and facilities, employment and involvement in the CCA scheme and other related initiatives.
Energy intensive processes and general plans	All CCA Phase 2 participants were eligible for the scheme due to the energy intensive processes needed to manufacture their final products. This section explored what these processes were, what plans (if any) businesses had to reduce energy consumption and carbon emissions resulting from these processes and what factors influenced capital investment in their energy efficiency measures.
Actions to improve energy efficiency	This was the most important section, and included questions aimed at identifying infrastructural and process changes businesses had implemented to improve energy efficiency during scheme involvement.
Location/re-location of energy-intensive processes	Covering both facilities that existed when they joined the second CCA scheme and new facilities constructed during their involvement, this section explored the location and re-location decisions that businesses took and the factors that influenced them.
Attitudes towards CCAs	Considered the wider experience of businesses in the second CCA scheme, covering: respondents' motivations for becoming involved in the scheme; perceptions of the CCA and its influence over energy efficiency decisions; views on targets, performance against these targets and reasons for this performance; and attitudes towards buy-out fees and CCL discount.
Experience of engaging with sector associations	Each CCA has a sector association with responsibility for managing that CCA and supporting businesses that participate in it. Respondents were asked for opinions on their sector association/bodies and the role they played in motivating and supporting businesses to achieve targets in each TP.
Future plans	This short section asked about current performance against TP4 targets and the likelihood of the businesses staying in the scheme beyond the current phase.

Telephone Questionnaire

The following information was imported into the CATI system:

- Organisation name
- Organisation telephone number
- Contact name (if available)
- Organisation address
- Details of participation in CCAs (first and second scheme)
- Number of TUs and facilities and sector agreement for each TU / sector association managing that CCA
- Available information on targets and performance for each TU (including whether targets are absolute, relative to production or Novem (i.e. relative to a weighted basket of products), whether these were met in TP1/TP2/TP3, whether the buyout option was used in TP1/TP2/TP3 and whether they had a surplus from TP1/TP2/TP3).

The following information was collated, where possible, ahead of the interview. If it was not possible to obtain the information from elsewhere, a question was included in the survey, but this was avoided where possible:

- Sector classification (taken from Scheme data)
- Number of sites (IDBR)
- Number of employees in UK (IDBR)
- Details of participation in CRC, EU ETS and Energy Intensive Industries exemption

All interviews were booked in advance allow time for information to be shared with the respondent ahead of the interview, and a set of questions for consideration ahead of the telephone interview where numeric data was requested (e.g. energy costs and % eligible for different schemes, admin burden). This included a link to the privacy notice. Respondents were asked to share the completed response with us ahead of the interview. If this had not been returned at the time of interview, the interviewer went through the questions with them on the phone at the end of the interview.

For the full telephone questionnaire please see Appendix C. Online survey

As explained in the sampling section above, following three weeks of continued low response rates to the telephone survey, a shorter online survey using the SurveyMonkey online platform was implemented. The EA sent a survey link to 1,302 businesses that had not been successfully contacted through the telephone survey. This online survey remained ‘open’ for the final two weeks of the fieldwork period, in a bid to improve response rates and increase the number of completed submissions. There were 86 full completions of the online survey.

The online survey followed the same thematic structure as the telephone survey but asked fewer questions to encourage higher response rates and minimise the likelihood of receiving poorer quality responses.

For the full online survey, please see Appendix C.

Final respondent profile

In total, there were 387 full interviews which formed the final dataset for analysis. The telephone survey resulted in 301 interviews, including 16 pilot responses (which were quality checked before being added). The online survey produced a further 86 full completions. The table below shows the survey population was broadly representative of CCA participants, with the only significant variations being Agriculture (slightly over-represented in the survey population) and FDF1 Food and Drink (slightly under-represented). The weighting approach corrected for these differences.

Table 26: Survey population (Telephone and online survey) versus CCA population

Broad Sector Group	Proportion of survey respondents	CCA participant population
Agriculture	17%	13%
BMPA Meat	2%	3%
BPF plastics	10%	11%

Broad Sector Group	Proportion of survey respondents	CCA participant population
BPIF printing	6%	8%
CIA chemicals	6%	6%
FDF1 food and drink	14%	17%
Min-met	11%	11%
Non industry	6%	4%
Other food and drink	14%	14%
Other industry	12%	11%
Paper and pulp	2%	2%

Number of Target Units	Proportion of survey respondents	CCA participant population
One TU	78%	83%
Multiple TUs	22%	17%

Reasons for joining the scheme	Proportion of survey respondents	CCA participant population
Environmental Permitting Regulation (EPR)	83%	56%
Energy and trade intensity criteria	17%	44%

Target Period Performance	Proportion of survey respondents	CCA participant population
Did not meet target	37%	38%
Generated surplus	47%	49%
Has both types of TUs	12%	8%
No TP3 data	4%	6%

Data analysis

The survey was analysed according to the six questionnaire themes. Comparative analysis was conducted under each theme for the following core variables:

Table 27: Core variables used in the analysis

Core variable	Variable definition and coverage
Sector	There are 53 CCAs across different sectors. These were grouped into the following 11 sector groupings for use and analysis in the evaluation (full definitions for which are provided in Table 24): Agriculture; BMPA Meat; BPF Plastics; BPIF Printing; CIA Chemicals, FDF1 Food and Drink; Other Food and Drink; Min-met; Non-Industry; Other Industry; and Paper and Pulp. In addition to these categories, the data were also analysed using the 'top 5' sectors identified via their contribution to the overall carbon emissions covered by the CCA scheme. These were: Food and Drink, Chemicals, Plastics, Data Centres, and Paper/Pulp, responsible for contributing 50% of total emissions.
Number of target units	Businesses could be single site, have one TU with multiple facilities or have multiple TUs. Differences between these size categories were explored in the analysis.
Number of employees	Alongside TUs, a 'derived variable' for number of employees was also created, using the following standard size bands: Micro (fewer than 10), Small (10-49), Medium (50-249), Large (250+).
Number of sites	Mirroring the TU variable, number of sites was split between single site and multiple site organisations.
Overseas offices	Organisations participating in the CCA included those with overseas sites and facilities, head offices and management teams. The analysis distinguished between UK- only businesses and those with overseas facilities.
Energy Intensity	Energy intensive processes and energy intensity varied by sector/CCA, with costs more significant for businesses with highest intensity. However, analysis by sector should have addressed differences for energy intensity.
Target performance	Business performance against CCA targets was structured into 4 TPs, each of two years, starting in 2013. The analysis explored differences between TP3 performance: businesses that exceeded TP3 targets and generated a surplus; met their TP3; and missed their target in TP3.
New entrants vs established organisations	New entrants were defined as businesses that joined the scheme at the start of TP3, as there were insufficient numbers to run analysis by the previous definition (of businesses that had joined the scheme after November 2018).
Involvement with other policies and schemes	Key for assessing attribution of the CCA scheme, this compared responses between businesses also involved in one or more of the following: CRC Scheme; EU ETS; Energy Intensive Industries compensation and exemption schemes; and ESOS
Target type	Businesses and/or their sector association could select from three different target types: Absolute, Relative or Novem. The analysis explored differences that use of these targets may have made to performance.
Reasons for joining the scheme	Differences between businesses motivated to join the scheme because of Environmental Permitting Regulations (EPR) and those that joined due to energy and trade intensity criteria.

The final dataset was weighted by sector and company size to adjust for any under or over-representation of particular groups (from the core variables). Significance testing was conducted to confirm if observed differences were statistically significant at the 95% level. Only differences that were statistically significant were included in the main report, except where stated.

Additional data analysis

In addition to identifying differences within and between core variables, bespoke analysis was conducted to test a range of additional hypotheses. The results of this analysis were included in relevant sections of the main report where relationships were statistically significant.

Missing data

Only five of the 53 CCAs were not represented in the survey. These five sectors were those with one single business or where there were umbrella agreements in place but no target units due to the min-met exemption.

Weighting

The data collected in the survey were weighted to the population of CCA participants on the basis of sector and company size (based on number of TUs and number of facilities). The weighting factors are detailed in the table below.

Table 28: Response rates for non-participants (in-depth interviews)

Number of facilities	Sector grouping	Number of observations in sample (n)	Number of entries in database (N)	Weighting factor (N/n)
One facility	Agriculture	38	229	6.026315789
	BMPA Meat	4	53	13.25
	BPF plastics	29	213	7.344827586
	BPIF printing	21	159	7.571428571
	CIA chemicals	15	103	6.866666667
	FDF1 food and drink	36	306	8.5
	Min-met	38	211	5.552631579
	Non industry	14	62	4.428571429
	Other food and drink	29	209	7.206896552
	Other industry	32	218	6.8125
	Paper and pulp	1	25	25
More than one facility	Agriculture	30	106	3.533333333
	BMPA Meat	2	20	10
	BPF plastics	9	59	6.555555556
	BPIF printing	4	40	10
	CIA chemicals	10	51	5.1
	FDF1 food and drink	17	114	6.705882353
	Min-met	6	58	9.666666667
	Non industry	8	46	5.75

Number of facilities	Sector grouping	Number of observations in sample (n)	Number of entries in database (N)	Weighting factor (N/n)
	Other food and drink	26	140	5.384615385
	Other industry	14	54	3.857142857
	Paper and pulp	6	18	3

Limitations

There were three key limitations to the quantitative survey.

- The structure and content of the online questionnaire was amended to make sure questions worked in an online format. This revised structure meant a separate dataset was needed. A ‘master’ dataset was created by merging online data with the telephone survey. Base numbers were provided in charts and tables to help identify which survey the questions related to.
- The base numbers for certain questions, and for some sector categories (e.g. BMPA Meat) were too small to state definitive findings.
- Analysis of certain themes (e.g. actions taken by CCA participants) was dependent on self-reported data provided by survey respondents, collated via the telephone and online surveys.

6. Cost effectiveness analysis

Introduction

As outlined in chapter 1 of this report, the evidence collected across the different evaluation workstreams was analysed to assess the cost-effectiveness of the CCA scheme. The cost-effectiveness analysis was prepared by CAG Consultants with support from UCL, Cambridge Econometrics and Winning Moves. This was not a full cost-benefit analysis but a high-level assessment focusing on the main costs and benefits of the scheme. Rough estimates of costs and benefits were assessed from the perspective of:

- CCA participants
- Government
- Wider society

The types of costs and benefits considered are set out below. Table 29 presents the common assumptions that underpinned the analysis of costs and benefits from these three perspectives.

CCA participants

Costs and benefits were estimated for an average year in TP3 and an average year in TP4. The estimated costs for CCA participants were:

- EA fees (based on advice from EA and information on the number of TUs in the scheme)
- Sector association fees (based on online survey of sector associations)
- Other external costs incurred by participants specifically for the CCA scheme (e.g. energy monitoring, inputs from energy consultants) (based on quantitative survey)
- Time inputs by CCA participants (based on quantitative survey)
- Buy-out payments (based on scheme data)
- Expenditure on energy saving measures (back-calculated from estimated energy savings and also collected in quantitative survey)

The benefits estimated for CCA participants were:

- CCL costs avoided (based on scheme data)
- CRC costs avoided (based on scheme data)
- Reduction in energy costs (calculated by applying micro-econometric findings to energy consumption from scheme data, at the Long Run Variable Cost for energy)

In the analysis of CCA participant costs for TP4, estimates of CCL and CRC costs avoided changed significantly but estimates of the other costs and benefits were assumed to be unchanged from TP3.

Assumptions for each of these elements are presented in Table 29 below.

Government

Costs and benefits were estimated for an average year in TP3 and an average year in TP4. The estimated costs for Government were:

- CCL revenue forgone (based on scheme data, as for CCA participants)
- CRC revenue forgone (based on scheme data, as for CCA participants)

The benefit for Government was:

- Buy-out payments (based on scheme data)

Income from CCA fees was not included in the cost-benefit analysis for Government because these fees cover administration costs incurred by the EA and sector associations.

In the analysis of Government costs for TP4, estimates of CCL and CRC revenue changed significantly but estimates of buy-out payments were assumed to be unchanged from TP3.

Wider society

Costs and benefits were estimated on an annual basis from the beginning of the scheme in 2013 to the year 2030, ten years beyond the end of the scheme. Costs and benefits for each year were based on TP3 estimates, adjusted according to the number of facilities in the scheme in each TP. Administration costs and additional expenditure on energy measures were assumed to be incurred during the eight-year operating period (2013-2020), while economic benefits were assumed to be extend into the certification period (2021-2022). Some energy and carbon savings were assumed to persist beyond the end of the scheme, until 2030 (see details below). Costs and benefits were discounted at 3.5% per year, consistent with Treasury Green Book assumptions. Calculations were undertaken at 2019 price levels, by applying a GDP inflator to pre-2019 costs. Net Present Social Value was calculated for the base year of 2019, so past costs and benefits were scaled up by 3.5% per year and future costs and benefits were discounted at 3.5% per year.

The estimated costs for wider society were:

- Administration costs (including EA fees, sector association fees, external costs, initial time inputs by participants and annual time inputs by participants – from survey data, as for CCA participants)
- Expenditure on energy saving measures (back-calculated from estimated energy savings, and also collected in the quantitative survey)

The estimated benefits for wider society were:

- Increased economic activity (increase in Gross Value Added, from macro-economic modelling)
- Reduction in energy costs during the scheme (calculated by applying micro-econometric findings to energy consumption from scheme data, at the Long Run Variable Cost for energy)
- Value of carbon saved during the scheme (calculated from energy saved, using Treasury Green Book assumptions for carbon prices and the carbon content of electricity and gas).
- Energy cost savings and carbon savings beyond the scheme.

There was uncertainty about the degree to which savings would persist, given that quantitative and qualitative findings indicated that savings arose from changes in energy management practices (which were potentially reversible) as well as from investment in more energy efficient equipment. Given these uncertainties, a wide range of outcomes was modelled. Energy savings and carbon savings were assumed to persist for ten years at between 25% and 75% of the levels estimated for the final year of the scheme (2020).

Detail about the assumptions for each of these elements are presented in Table 29 below.

Assumptions for cost-effectiveness analysis

Table 29: Assumptions used in cost-effectiveness analysis

Element	Assumptions	Caveats
CCL forgone	CCL forgone was assumed to be a cost to Government but a benefit to CCA participants. Estimates for TP3 were derived by applying CCL rates and discounts (as set out in Appendix 3 of the synthesis report) to fuel use reported in CCA scheme data. TP4 estimates were derived by assuming the same fuel use as in TP3 but applying new rates of CCL from April 2019 onwards. Both the TP3 and TP4 estimates were adjusted to exclude energy consumption likely to be exempt from CCL for other reasons. In particular, all energy consumption by TUs known to be part of the Combined Heat and Power Quality Assurance scheme was excluded, as was all energy consumption by one chemicals TU that undertakes electrolysis on a large scale, on the grounds that some of the energy use from these TUs already has CCL exemptions. It was problematic to estimate how much of the energy consumption in min-met sectors[23] would be eligible for the min-met exemption, because some sites in these sectors may not be eligible for the min-met exemption at all and others may include some activities that are eligible for the CCA but not for the min-met exemption. This was addressed by developing a lower estimate, excluding all energy consumption by TUs in sectors affected by the min-met exemption, and an upper estimate including all such energy consumption. The true figure is likely to lie between the upper and lower bounds.	Both the upper and lower estimates exclude CCL forgone on primary fuel emissions from EU ETS sites. Excluding min-met sectors, the overlap between EU ETS and CCA sites is mainly found in the chemicals and paper sectors. Site by site matching between EU ETS sites and CCA sites in these sectors suggests that this may result in an underestimate of CCL forgone of around of £20 million per year. Conversely, CCL forgone may be slightly overestimated because scheme data includes electricity consumption from onsite renewables that is exempt from CCL. The estimated CCL forgone from electricity in TP3 was £321 million (£161 per annum). If 10% of this electricity consumed is from onsite renewables, the reduction in CCL

[23] Min-met sectors are defined in chapter 3. The proportion of TUs that left as a result of the min-met exemption in 2013/14 varied between the sectors.

Element	Assumptions	Caveats
		forgone would be £16 million per year, which roughly counterbalances the likely underestimate with respect to EU ETS consumption.
CRC forgone	CRC allowances were assumed to be a cost to Government and a benefit to CCA participants. CRC allowances forgone in TP3 were estimated by applying CRC rates and discounts (as set out in Appendix 3 of the synthesis report) to fuel use in CCA scheme data for those sites identified by the micro-econometric workstream as having participated in CRC Phase 1 and Phase 2[24]. It was problematic to identify firms that would have participated in CRC Phase 2 in the absence of the CCA scheme, and it was also problematic to assess how far energy consumption by TUs in min-met sectors was actually exempt from CRC already. A lower estimate for TP3 was calculated by applying CRC allowance rates to energy consumption on CCA sites owned by firms that were identified as participating in CRC Phase 2. As for CCL estimates, this estimate excluded all energy consumption by TUs in min-met sectors and all energy use from sites identified as being part of the CHPQA scheme or being used for electrolysis, on the grounds that much of this energy use was already exempt from CRC allowances. This is likely to be an underestimate, both because some energy consumption on sites in min-met sectors may not in fact be eligible for the min-met exemption (and hence may actually have paid CRC) and because some firms were able to avoid CRC Phase 2 completely by participating in the CCA scheme (but would not be included in this lower estimate). A upper estimate for TP3 was therefore developed, including CRC allowances for energy consumption by min-met sites that remained in the CCA scheme and also including energy use on sites identified as belonging to firms that were part of CRC	The estimates of CRC forgone are dependent on data matching by the micro-econometric workstream. Inaccuracies in data matching may lead to errors in these estimates. It is likely that incomplete matching has resulted in underestimates of CRC forgone in TP3. CRC forgone in TP4 was assumed to be zero. This is a slight underestimate as there would have been some CRC savings in the first three months of TP4.

[24] CRC Phase 1 ran from April 2010 to end March 2014, while CRC Phase 2 ran from April 2014 to end March 2019.

Element	Assumptions	Caveats
	Phase 1 and/or Phase 2. CRC Phase 1 required firms to report to the CRC scheme even if all their energy consumption was exempt from CRC allowances on the grounds of CCA participation. This may be a slight over-estimate because some firms may have fallen below the Phase 2 threshold for other reasons.	
Number of facilities in the CCA scheme	The number of facilities in the second CCA scheme was based on scheme data. TP1 – 7,812 TP2 – 7,783 TP3 – 9,187 TP4 – 9,000 (estimate) Certification period – as for TP4 The number of facilities in the scheme during TP4 was assumed to be slightly lower than TP3 owing to some TUs (and their facilities) would choosing to leave rather than pay buy-out at the end of TP3.	
Number of TUs in the CCA scheme	At the end of TP3, scheme data indicated that there were 3,418 TUs in the scheme.	
Number of organisations in the CCA scheme	Data matching was undertaken by the quantitative research workstream, using EA scheme data for TP3 combined with commercial databases of company information. Where subsidiaries or groups of companies could be identified, they were treated as part of a single organisation. The data matching work estimated that there were 2,608 unique organisations in the scheme in TP3.	There may be some further ownership relationships between these organisations that could not be identified from this data matching work.
Administrative cost of CCA scheme	EA fee income was used as a proxy for the Government's administrative costs, on the grounds that fee income broadly covers costs incurred by the EA.	Given the number of new entrants to the scheme during 2018, EA income in TP3 may

Element	Assumptions	Caveats
	The cost estimates assumed EA fees of £185 per year per facility. For TP3, EA fee income was calculated from the number of facilities in the scheme, assuming an average of: 7805 facilities at end Dec 2017 and 9219 facilities at end Dec 2018. On the advice of the EA, annual sector association fees of £1k were assumed to be waived for almost every sector because the sector associations collect fees on behalf of the EA. The estimate of £1.6 million per year for TP3 was cross-checked against the EA's actual reported annual fee income, which was £1.4 million in 2017 and £1.7 million in 2018.	slightly exceed CCA administration costs in that year.
Sector association fees	Sector association fee income was used as a proxy for administrative costs incurred by sector associations. Mean revenue from sector associations fees from online survey responses was £2,008 per TU per annum. This was multiplied by the number of TUs reporting to the scheme at the end of TP3 (3418). This is based on responses from 14 sector associations. It is slightly higher than the mean level of costs incurred by sector associations, as reported by 19 sector associations (£1,313 per annum).	Sector association income may slightly exceed CCA administration costs incurred by sector associations.
External costs incurred by CCA participants	External costs were based on responses to the pre-interview questions in the quantitative survey, cross-checked against individual responses in the qualitative research. Where external costs were reported by participants, the mean external cost was £13,024 while the median external costs per organisation was £5,000 (n=47). For most respondents, this reflected consultancy fees (n=33) while for some it included metering (n=10) or other costs (n=4). Of the 143 respondents answering the question on external costs, 47 had some external costs, 91 did not have any and 6 did not know. It was there estimated that 33% of those answering the question had external costs. A further 158 respondents	

Element	Assumptions	Caveats
	completing the pre-interview questions did not complete the question on external costs, so it is not known whether they had any such costs. In the absence of better information, the median cost of £5,000 has been applied to 33% of the estimated 2,608 unique organisations in the CCA scheme at the time of the quantitative survey (see above).	
Value of participant time inputs – initial set-up	Time inputs for initial set-up were based on responses to the pre-interview questions in the quantitative survey, cross-checked against individual responses in the qualitative research. Median time inputs per organisation for initial set-up were 4 days, specifically for the CCA scheme, in addition to any external costs detailed above. This was costed at £500 per day and applied to the estimated 2,608 organisations in the CCA scheme at TP3. Given that there was a significant influx of new members during 2018, some of the set-up costs were allocated to 2017/18 rather than the start of the scheme.	
Value of CCA participant time inputs – annual cost	Ongoing time inputs by CCA participants were based on responses to the pre-interview questions in the quantitative survey, cross-checked against individual responses in the qualitative research. Median time inputs per organisation were 2 days per TP, specifically for the CCA scheme, in addition to any external costs detailed above. This equates to 1 day per year. This has been costed at £500 per day and applied to the estimated 2,608 organisations in the CCA scheme at TP3.	
Cost of energy saving measures	A lower bound for the cost of energy saving measures was derived from the quantitative survey. The survey found that 73% of CCA participants had invested less than £1M, while about 36% had invested less than £200,000 in energy efficiency	The data from the quantitative survey appeared low relative to the energy bill savings achieved (estimated at £75M to £157M per

Element	Assumptions	Caveats
(i.e. cost of compliance)	measures. The median for investment in energy efficiency measures from the quantitative survey was £400,000 or £0.4M (n=268). The attribution findings from the quantitative survey suggest that at least half of this would have been spent anyway and some would have been influenced slightly (in terms of timing or scale). Only 6% reported that their expenditure that would not have been made at all. But a further 24% reported that they would have invested on a smaller scale. There was no evidence about how much this investment would have been reduced – so the assumption was that 50% would not have been undertaken. The estimated cost of compliance (based on the 6% that would not have implemented measures at all plus half of the 24% that would not have done them on same scale) = £0.4*2608*0.18M = £188M. This is the amount spent since the start of the scheme in 2013, over 6 years, so the annual spend is estimated to be £188M/6 = £31M. For the upper bound estimate, it was assumed that the cost of energy efficiency measures during the scheme were equivalent to one year of estimated energy cost savings. This is based on the assumption that - on average - measures would have had a one-year payback. This notional average is taken across all measures, from behavioural changes to major investments. The upper bound for the cost of energy savings measures was varied according to the level of energy savings measured assumed.	year – see below), particularly since survey findings indicated that firms were willing to accept paybacks on investments up to 2 years in most cases. This either indicates that recall on capital spend affecting energy efficiency over 6-7 years was poor (for example, that they only referred to spending that was narrowly targeted at energy efficiency) or that they only remembered spending in recent years. Both appear very plausible explanations. Another possible explanation is that energy savings were achieved through changes to energy management as well as through capital investments, which is consistent with findings from qualitative and quantitative research. This would imply that some of the savings may not be so persistent, beyond the life of the second CCA scheme. This rationale has informed the use of a one-year payback to calculate the upper bound for the capital cost of energy efficiency measures. It has also informed

Element	Assumptions	Caveats
		the lower bound for persistence of energy savings beyond the scheme.
Buy-out payments	The figures for buy-out payments were taken from the EA's biennial report for TP3. They reflect buy-out of £28.9 million actually paid in TP3, at £14 per tonne of CO2e. This cost has been spread over two years. This is lower than the scheme data estimate because it is based on the buy-out actually paid, rather than the buy-out due to be paid. There may yet be some further payments of buy-out due but the EA expect these to be low.	
Increase in GVA	Estimates of GVA impact were based on the macro-modelling outputs. The macro-modelling estimated the percentage change in GVA for each 2-digit sector over the period 2014 to 2017, as if the whole of the sector was in the CCA scheme. The absolute change to GVA in each 2-digit sector was then calculated by applying this percentage change to the estimated level of GVA for each 2 digit-sector that was covered by the CCA scheme (see details below). The GVA estimates were averaged over the period 2014 – 2017, at current prices. The cost-effectiveness analysis used macro scenarios that included the impact of energy savings, as there was robust evidence of these from the micro-econometric workstream. The lower estimate for GVA impact was based on the macro-modelling scenario for CCL discounts and energy savings (with the latter being based on average micro-econometric savings across EPR and EI sectors). Energy savings were applied to both electricity and gas consumption, using the weighted average of micro-estimates for sectors that entered the CCA scheme via the EPR and EI routes. The energy savings were applied cumulatively over the period 2014 to 2017, so that the average saving	

<table>
<tr><th>Element</th><th>Assumptions</th><th>Caveats</th></tr>
<tr><td></td><td>over the period was consistent with the micro-econometric estimates of average impact across sites and across time, for the time period 2013 to 2016.

The upper GVA estimate was based on the macro-modelling scenario that assumed CRC discounts as well as CCL discounts and energy savings. While not all CCA participants would benefit from CRC discounts, this upper estimated was included to indicate some potential upside in the GVA estimates. This is because the micro estimates of impact on turnover would imply a higher impact on GVA than shown here.</td><td></td></tr>
<tr><td>Percentage of 2-digit CCA sectors covered by the CCA scheme</td><td>
<table>
<tr><th>Sector</th><th>Estimated CCA coverage by 2-digit sector (UCL method: share of total number of facilities)</th><th>Estimated CCA coverage by 2-digit sector (scheme data method: share of total energy consumption)</th><th>Estimated CCA coverage by-2 digit sector (average of two methods)</th></tr>
<tr><td>Agriculture</td><td>4%</td><td>20%</td><td>12%</td></tr>
<tr><td>Food, drink & tobacco</td><td>46%</td><td>58%</td><td>52%</td></tr>
<tr><td>Textiles</td><td>9%</td><td>35%</td><td>22%</td></tr>
<tr><td>Wearing apparel</td><td>0%</td><td>0%</td><td>0%</td></tr>
<tr><td>Leather</td><td>0%</td><td>24%</td><td>12%</td></tr>
<tr><td>Wood & wood prods</td><td>1%</td><td>10%</td><td>5%</td></tr>
</table>
</td><td></td></tr>
</table>

<table>
<tr><th>Element</th><th>Assumptions</th><th>Caveats</th></tr>
<tr><td></td><td>
<table>
<tr><td>Paper & paper prods</td><td>46%</td><td>18%</td><td>32%</td></tr>
<tr><td>Printing</td><td>9%</td><td>45%</td><td>27%</td></tr>
<tr><td>Chemicals (not elsewhere specified)</td><td>23%</td><td>42%</td><td>33%</td></tr>
<tr><td>Pharmaceuticals</td><td>23%</td><td>42%</td><td>33%</td></tr>
<tr><td>Rubber & plastic</td><td>31%</td><td>1%</td><td>16%</td></tr>
<tr><td>Non-Metal Mineral products</td><td>7%</td><td>9%</td><td>8%</td></tr>
<tr><td>Basic metals</td><td>32%</td><td>28%</td><td>30%</td></tr>
<tr><td>Electronics</td><td>5%</td><td>5%</td><td>5%</td></tr>
<tr><td>Motor vehicles</td><td>64%</td><td>22%</td><td>43%</td></tr>
<tr><td>Other transport equipment</td><td>5%</td><td>17%</td><td>11%</td></tr>
</table>
</td><td></td></tr>
<tr><td>Energy savings attributable to the CCA scheme –</td><td>The findings from micro-econometric analysis were applied to energy consumption from scheme data, for individual CCA sectors. The savings were calculated separately for each type of CCA sector:

• For min-met sectors (whether EPR or EI), savings of 4.05% in electricity use were assumed relative to min-met sites that left the CCA scheme. (This is</td><td>The electricity consumption reported in scheme data includes a small element of onsite renewables that cannot be identified.</td></tr>
</table>

Element	Assumptions	Caveats
lower estimate	equivalent to min-met leavers having energy consumption 3.9% higher than sites remaining in the scheme, as per the micro-econometric findings). • For other EPR sectors, savings of 4.1% in electricity use were assumed (relative to non-CCA sites that were not eligible for the scheme, which would have been subject to full CCL). • For other EI sectors, savings of 11.4% in electricity use and 12.6% in gas use were assumed (relative to non-CCA sites that were not eligible for the scheme, which would have been subject to full CCL). For the lower estimate, the calculations were based only on those sectors actually included in the micro analysis. The energy savings were adjusted downwards to exclude 15% of consumption (on the grounds that approximately 15% of TUs, with buy-out > 20%, were excluded from the micro analysis). The estimated reduction in delivered electricity use per year in TP3 was 874.15 GWh (across EPR, min-met and EI sectors), while the estimated reduction in gas use per year in TP3 was 340.4 GWh per year (for EI sectors only) (see below for details of consumption by sector group). The value of energy savings was calculated using the Long Run Variable Cost of energy supply for 2018 (Treasury Green Book, Central case, Industrial sector): • 7.8 p/kWh for electricity • 2.14 p/kWhr for gas This gave a value of: • electricity saving = 0.078 x 874.15= £68.18 million • gas saving = 0.0214 x 340.4 = £7.28 million	Energy savings have been valued at the Long Run Variable Cost for electricity and gas, which may be lower than the prices actually paid for electricity and gas. Electricity price analysis undertaken by Verco in March 2019 used the following figures (p/kWhr): • Small 12.5 • Medium 10.7 • Large 8.7 (extra large 7.4; moderately large 9.7)

Element	Assumptions	Caveats
	This is the estimate of the annual energy bill savings that were attributable to the CCA scheme (not the total bill savings).	
Energy savings attributable to the CCA scheme – upper estimate	For the upper estimate, the findings from micro-econometric analysis were applied to all CCA sectors, including sectors that were not included in the micro-analysis for technical reasons. These sectors were excluded from the micro-analysis not because savings were found to be insignificant but because the pre-treatment conditions between CCA sites and comparison sites were not satisfied. As above, the figures were adjusted downwards to exclude 15% of consumption (on the grounds that approximately 15% of TUs, with buy-out > 20%, were excluded from the micro analysis). Estimated reduction in delivered electricity use per year in TP3 was 1895.13 GWh (across EPR, min-met and EI sectors), while estimated reduction in gas use per year in TP3 was 424.32 GWh per year (EI sectors only) (see below for details of consumption by sector group). Applying the Long Run Variable Cost of energy supply for 2018, as above, this gave a value of: • electricity saving = 0.078 x 1895.13= £147.82 million • gas saving = 0.0214 x 424.32 = £9.08 million Again, this is the estimate of the annual energy bill savings that were attributable to the CCA scheme (not the total bill savings).	The same caveats apply as for the lower bound for energy savings.

<table>
<tr><th>Element</th><th>Assumptions</th><th>Caveats</th></tr>
<tr><td>Electricity and gas use by CCA sector group – for TP3</td><td>
<table>
<tr><td>Fuel use reported for CCA purposes during TP3 (from scheme data) – covering both 2017 and 2018</td><td>Min-met sectors (irrespective of EPR or EI entry route)</td><td>Other EPR sectors</td><td>Other EI sectors</td><td>Total</td></tr>
<tr><td>Delivered electricity[25] – for CCA sectors used in micro analysis (GWhr)</td><td>8,264</td><td>27,429</td><td>4,159</td><td>39,852</td></tr>
<tr><td>Delivered electricity – all CCA sectors (GWhr)</td><td>8,264</td><td>37,423</td><td>19,509</td><td>65,196</td></tr>
<tr><td>Gas consumption – for CCA sectors used in micro analysis (GWhr)</td><td>5,360</td><td>12,704</td><td>5,556</td><td>23,620</td></tr>
<tr><td>Gas consumption – all CCA sectors (GWhr)</td><td>5,360</td><td>32,459</td><td>6,925</td><td>44,745</td></tr>
</table>
</td><td></td></tr>
<tr><td>Carbon savings</td><td>Carbon savings were calculated by applying carbon emissions factors to estimates of electricity and gas savings. The emissions factors used were the long-run marginal consumption-based factors for industrial consumers from the Treasury Green Book:
electricity: 318tCO2/GWhr in 2017 and 307 tCO2/GWhr in 2018. The average for TP3 was 312.5 tCO2/GWhr.
gas: 184.04 tCO2/GWhr.</td><td>Delivered electricity was used for these calculations.

Long run marginal emissions factors for industrial consumers were used, to reflect small changes to consumption. The analysis does not use CCA scheme assumptions for grid</td></tr>
</table>

[25] Delivered electricity is secondary electricity. As advised by the EA, this was calculated by dividing primary electricity figures (as reported for CCA purposes) by a factor of 2.6.

<table>
<tr><th>Element</th><th>Assumptions</th><th>Caveats</th></tr>
<tr><td></td><td>The upper and lower estimates of carbon savings from electricity (for each year in TP3) were based on the upper and lower estimates of electricity saved (calculated from savings in delivered electricity). The range of carbon savings from electricity during TP3 was estimated as: 273,172 – 592,228 tCO2e per annum.

Similarly the estimated carbon savings arising from gas savings were based on the upper and lower estimates of gas saved. The range of carbon savings from gas during TP3 was estimated as: 62,647 – 78,092 tCO2e per annum.

Total carbon savings during TP3 were estimated to be in the range 335,819 – 670,320 tCO2e per annum (i.e. 0.3 to 0.7 million tonnes of CO2e per year).</td><td>carbon nor the grid average at the time.

No savings are assumed in non-metered fuels as a result of the CCA scheme.</td></tr>
<tr><td>Value of carbon</td><td>The price of carbon was based on Treasury Green book assumptions for use in UK public policy appraisal in 2018. The analysis used the central scenario for short-term traded carbon values, as follows:

<table><tr><td>Year</td><td>Carbon price (£/tonne CO2e)*</td></tr><tr><td>2013</td><td>3.49</td></tr><tr><td>2014</td><td>4.48</td></tr><tr><td>2015</td><td>5.94</td></tr><tr><td>2016</td><td>4.18</td></tr><tr><td>2017</td><td>4.13</td></tr><tr><td>2018</td><td>12.76</td></tr><tr><td>2019</td><td>13.15</td></tr></table></td><td></td></tr>
</table>

Element	Assumptions	Caveats
	2020: 13.84 2021: 20.54 2022: 27.24 2023: 33.94 2024: 40.64 2025: 47.33 2026: 54.03 2027: 60.73 2028: 67.43 2029: 74.13 2030: 80.83 *Note: prices up to 2017 are historic prices. From 2018 onwards, prices are quoted at 2018 price levels, excluding inflation.	

7. Overall evaluation synthesis process

Contribution analysis was the overarching method used to bring together and test the evidence across all the evaluation workstreams, particularly to assess the additionality and attribution within the ToC. 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 steps involved in the contribution analysis were as follows:

- An initial ToC was developed, based on scoping work during Phase 1 of the evaluation, that summarised the causal explanations that the contribution analysis sought to test. As explained in Chapter 2, the Phase 1 scoping work included two stakeholder workshops, one with BEIS, the EA, other Government Departments and one with a wide cross-section of representatives from sector associations.

- The ToC and detailed evaluation questions informed the detailed design of the research, including the quantitative survey of CCA participants, online survey of sector associations, topic guides for qualitative interviews, the analysis of scheme data and the design of micro-econometric and macro-economic work. The aim was to ensure that the research generated findings that would test and refine the candidate theory and would provide insights into alternative hypotheses. For example, care was taken to ensure that surveys and interviews gathered information about the influence of other factors (e.g. energy prices, .regulation) and other relevant policies (e.g. EU ETS, CRC, ESOS) as well as the CCA scheme. The micro-econometric and macro-econometric work also took account of potential external factors, including other policies.

- Iterative review of emerging findings across all workstreams was undertaken throughout the evaluation, through a series of quarterly cross-team telephone meetings and face-to-face synthesis workshops. Initial synthesis workshops were structured around the emerging findings from each workstream; latterly, the workshops were structured around the evidence against the evaluation questions and key points in the ToC. These workshops were also used to cross-check findings between workstreams, to explore the validity of alternative hypotheses that might explain emerging findings 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. The cross-team workshops ensured that the team undertaking each workstream were able to use insights from other workstreams to inform their work and were aware of the strengths and limitations of evidence available from the other workstreams.

- A technical expert from Verco and an evaluation expert from Strategy Development Solutions were also involved as peer reviewers at key points throughout the evaluation, participating in most of the cross-team workshops, providing challenge around alternative hypotheses, providing guidance on emerging issues and identifying ways that analysis could be strengthened.

- In late July 2019, an interim synthesis of emerging results was developed through cross-team working, drawing together emerging findings from internal notes developed by each workstream. This was presented to a wider stakeholder workshop, including representatives from BEIS and other Government departments. This workshop

considered challenges to the emerging overall findings and contribution stories, and identified areas where further analysis was needed. For example, the workshop helped to identify the variables that could most usefully be used to test theory in bespoke analysis of quantitative survey data. It also identified scheme data analysis tasks that would test support for emerging findings from the micro-econometric analysis.

- An interim assessment of the workstream evidence against the ToC was made in July 2019, following the interim synthesis workshop. A spreadsheet was used to assess each assumption in the ToC using emerging evidence from each workstream, insofar as evidence was available at that stage. This assessment was shared with BEIS and the EA and was revised in response to their comments.

- Further in-depth analysis was undertaken during September and October, across all workstreams, in response to the areas and opportunities identified during the interim synthesis in July. Cross-team calls were held as and when needed to ensure that this analysis was well-coordinated and made best use of available evidence. Cross-team working helped to ensure that the macro-economic modelling made use of the latest micro-econometric findings and that scheme data analysis could be used to help assess the share of model sectors covered by the CCA and CRC schemes.

- During November, findings from all workstreams were reviewed in detail by CAG Consultants and were collated in spreadsheet format against the detailed evaluation questions. This evidence was reviewed and probed against the evaluation questions, in the light of potential alternative hypotheses.[26] Where necessary, additional insights were sought from the EA or from the technical peer reviewer. The evaluation team's qualitative assessment of the evidence informed the content of the main report.

- During November, a formal assessment of evidence supporting each of the ToC assumptions was also made, as presented in Appendix 2 of the main report. Again, this assessment was tested with BEIS and the EA. Assessment of the ToC provided 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 the main report, alongside the assessment of overall impact.

- During November, the cost-effectiveness analysis was also prepared, pulling together findings from across all workstreams. Cross-team working was used to ensure that the assumptions used for this analysis were as reliable as possible, given the constraints of the research. Several iterations were made to estimates of CCL and CRC. The analysis

[26] For example, the micro-econometric finding that electricity consumption had been reduced was considered against the alternative hypothesis that this could be explained by an increase in renewable electricity at CCA sites. The alternative hypothesis was discounted for reasons explained in the main report. Similarly, another possible alternative explanation was ruled out after discussion with the EA: this was the possibility that micro-econometric findings for EPR sectors could be explained by changes in EPR regulations affecting CCA but not comparison sites (during the first four years of the second CCA scheme). This was ruled out because changes to EPR regulations had been introduced after the period examined by the micro-econometric analysis, and would have affected all those subject to EPR regulations, not just CCA firms.

was tested and refined on an iterative basis, in collaboration with BEIS and with supporting workstreams.

- High-level synthesis findings, based on all these preceding steps, were presented to BEIS, the EA and representatives from other Government Departments in mid-November 2019.
- After comment and discussion, the findings were then presented to a wide cross-section of sector association representatives towards the end of November 2019. Both of these workshops provided opportunities for challenge and testing of findings.

The synthesis report was drafted during November and December, as the culmination of this synthesis process.

Appendix A: References used in the Literature Review

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Appendix B: Qualitative Research Instruments

Table 30: Online survey for sector associations

Introduction
This survey is being sent to you as a sector body involved in the Climate Change Agreements (CCA) scheme. If your body represents more than one sector in the scheme, the survey is designed to allow you to repeat the first section of the survey for each one, i.e. you only need to respond regarding one sector at a time. **The Department for Business, Energy & Industrial Strategy (BEIS) has appointed a CAG Consultants-led consortium to carry out an evaluation of the second Climate Change Agreements (CCA) scheme which started in 2013.** **This short survey forms an important part of that evaluation and complements other forms of activity including scheme data analysis and a series of more in-depth telephone interviews with sector bodies and scheme participants, which you may also be asked to take part in.** **The findings will be used for research purposes only. Your responses will be shared with BEIS in an anonymised format. We will not pass on interview responses identifying you or your organisation to organisations outside of the research team (CAG Consultants, Winning Moves, UCL and Cambridge Econometrics) without your explicit consent. Any interview findings that we use in the research may be linked to other surveys or datasets but the information you provide will be anonymised before inclusion in published outputs. For further information about how your data will be handled and used in this project, please see this privacy notice.** **This short survey should take no more than 15-20 minutes to complete for each sector that you represent. It includes questions about the specific measures that were envisaged for each sector and used as the justification for the targets agreed. It may save time if you are able to gather the information on this in advance. You should have received a PDF copy of the survey with your invitation email, so that you can see the information we are asking for.** **In this survey, we are interested to hear the views of your sector association rather than the views of CCA participants in your sector. You can omit any questions you are unable to answer. Winning Moves will be undertaking a separate telephone survey with a representative sample of CCA participants, in parallel with this survey.** **We would encourage you to respond within 3 weeks, by Friday 31st May. If this timing is an issue, please let us know.** **Thank you for taking the time to complete this survey.**
Your details
1. Please enter your name
2. Please enter your email address We will only use your email address for the purposes of the CCA evaluation being undertaken on behalf of BEIS
3. Please enter the name of the organisation you represent. We ask about the sector body (if different) in the next question.
We need a separate survey response for each of the sectors included in the second CCA scheme. You will be given the opportunity to return to this page, so that you can complete a further set of responses if you represent more than one sector.
Sectors
4. Which sector do the next set of responses relate to?

	CONF - Sawmills		CPI - Paper
	BATC - Textiles		BCGA - Compressed Gases
	BATE - Textiles Energy Intensive		BEPA - Egg Processing
	BCC - Ceramics		BTMA - Tyres
	KABC - Kaolin and Ball Clay		AWM - Wallcoverings
	NMI - Semiconductors		BNMA - Geosynthetics Non-Woven
	SGS - Slag Grinding		CAST - Foundries
	NFU1 - Pigs		ADS - Aerospace
	NFU4 - Horticulture		SMMT - Motor Manufacturing
	NFU5 - Eggs & Poultry Meat		SEEC - Spirits
	AFED - Aluminium		BCCF - Calcium Carbonate
	UKLF - Leather		CIA - Chemicals
	BLA - Lime		FDF1 - Food and Drink
	BCA - Cement		FDFS - Supermarkets
	DATC – Data Centre		BPIF - Printing
	NFA - Non-Ferrous Metals		MPMA - Metal Packaging
	CBM - Metalforming		BGMC - Glass
	TSA - Laundries		BMPA - Meat
	DIAL - Dairy		BPC1 - Poultry Meat Rearing
	AIC - Agricultural Supply		BPC2 - Poultry Meat Processing
	NAMB - Bakers		BPF - Plastics
	FABRAUK - Rendering		PIFA - Packaging & Industrial Films
	WPIF - Wood Panels		BLRA - Brewing
	CSDF - Cold Storage		UKSA - Steel
	MAGB - Malting		GPDA - Gypsum Products
	SEA - Surface Engineering		EUR - Eurisol / Mineral Wool
	SEHT - Surface Engineering Heat Treatment		

Participation in the second CCA scheme

5. On a scale of 1-5 where 1 is ‘unimportant’ and 5 is ‘important’, rate the importance of the different reasons for your sector participating in the second CCA scheme

	Unimportant				Important
	1	2	3	4	5
Savings on Climate Change Levy (CCL)	☐	☐	☐	☐	☐
Savings on Carbon Reduction Commitment (CRC)	☐	☐	☐	☐	☐
Demonstrating your sector's commitment to carbon targets	☐	☐	☐	☐	☐
Demonstrating your sector's 'green' credentials	☐	☐	☐	☐	☐

Driving energy efficiency in your sector	☐	☐	☐	☐	☐
Maintaining/growing the competitiveness of your sector	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐
If you rated 'Other', please specify					

6. What approximate percentage of eligible operators in the sector are participants in the scheme?

0% ----------100%

7. Do non-participant operators in this sector tend to share any common characteristics? Please tick all that apply.

	No
	Yes, they tend to be bigger operators
	Yes, they tend to be smaller operators
	Yes, they tend to be less energy-intensive operators
	Yes, they tend to be those covered by the mineralogical/metallurgical exemption
	Yes, they tend to share other common characteristics (please specify)

Benefits of the CCA scheme

8. How significant are CCA benefits (i.e. CCL discounts and CRC exemptions) relative to overall energy costs for businesses in this sector?

Not at all significant	Not so significant	Somewhat significant	Very significant	Extremely significant
☐	☐	☐	☐	☐

Please explain what types of operators find the benefits significant or less significant

9. How significant are CCA benefits in terms of retaining sector activities within the UK?

Not at all significant	Not so significant	Somewhat significant	Very significant	Extremely significant
☐	☐	☐	☐	☐

Please explain what types of operators find the benefits significant or less significant

Targets in the CCA scheme

10. How challenging would you say the CCA targets were for your sector?

Not at all challenging	A little challenging	Reasonably challenging	Very challenging
☐	☐	☐	☐

Please explain briefly which types of operators find the sector targets more challenging and which do not

11. Please briefly describe how you decided whether or not to challenge the suggested target and, if relevant, how you went about challenging it (e.g. explaining who you consulted and what types of data you used to inform the process)?

12. Please briefly describe how you decided the type of target for your sector (e.g. Energy/Carbon, Absolute/Relative/Novem)	
13. Are all operators in your sector assigned the same overall target?	
	Yes
	No
If no, please briefly describe how the target is allocated between operators, and any challenges you experience with this	
14. How might the target setting process be improved in any future schemes? This could be changes to the approach by BEIS or by sector bodies, or both	
Performance in the second CCA scheme	
15. What do you think the main reason(s) would be if businesses in your sector generated surplus in any given TP? Please tick all that apply.	
	Energy efficiency improvements made
	Changes in production levels
	Other changes to business activities
	Wider economic factors
	Type of target (e.g. Energy/Carbon, Absolute/Relative/Novem)
	Target not stretching enough
	Don't know
	Other (please specify)
16. What do you think the main reason(s) would be if businesses in your sector failed to meet their targets in any given TP and had to use surplus or buy-out? Please tick all that apply.	
	Cheaper to use buy-out than meet targets through implementing energy efficiency measures
	High level of surplus available
	Meeting the targets was too disruptive
	Meeting the targets was too expensive
	Other business priorities took precedence over implementing energy efficiency measures
	Type of target (e.g. Energy/Carbon, Absolute/Relative/Novem)
	Target was too stretching
	Wider economic factors
	Don't know
	Other (please specify)

Costs of participation in the second CCA scheme

The questions on this page specifically relate to our assessment of the cost-effectiveness of the CCA scheme, which is a key element of the evaluation.

17. Please provide an estimate of the costs per annum to your sector body of administering the umbrella agreement and CCA process for this sector.
The data gathered in response to this question will remain confidential and will be reported in such a way that it cannot be associated with any individual sectors or organisations.

18. Please provide an estimate of the revenue which you generate per annum from the CCA fees charged to your members.
The data gathered in response to this question will remain confidential and will be reported in such a way that it cannot be associated with any individual sectors or organisations.

19. Please provide details of the fee structure used for members to participate in your CCA scheme.

Effectiveness and efficiency of the delivery of the CCA scheme

20. In addition to the role defined in the umbrella agreement, what do you see as your role as the sector body for this sector? Please tick all that apply

	Promoting energy efficiency within the sector
	Encouraging achievement of CCA targets
	Promoting the competitiveness of the sector, i.e. helping members to cut costs
	Other (please specify)

21. In addition to the basic services of managing the umbrella agreement, handling new entrants and reporting biennial sector emissions to the EA, which of the following types of support does your sector body provide to participants? Please tick all that apply, even if the services are not solely focused on CCA or funded wholly by CCA fees

	More regular monitoring of energy consumption/emissions
	Written advice/information/guidance on ways to improve energy efficiency
	Events/workshops available to all operators
	Remote (e.g. phone) support for individual operators
	Face-to-face support for individual operators
	Providing referrals to, or a directory of, consultants or advisers
	Support when making changes to TU agreements
	Encouraging knowledge transfer between participants
	Other (please specify)

22. Please briefly describe any elements of the CCA process that you consider to be particularly onerous for the sector association
23. Please briefly describe any elements of the CCA process that you consider to be particularly onerous for operators
24. Do you employ the services of a consultancy to help administer the CCA in this sector?
☐ Yes
☐ No
Effectiveness and efficiency of the delivery of the CCA scheme
25. Please list the services that the consultancy provides in this sector
26. Why do you utilise a consultancy to help administer the CCA in this sector?
Outcomes from the second CCA scheme
27. What types of measures have and have not been implemented as part of meeting the CCA target for this sector? Please add lists of measure types (e.g. lighting, variable speed drives, insulation, high efficiency motors, boiler replacements etc) in each of the categories below.
Measures which have been widely implemented
Measures which have been quite commonly implemented
Measures which have been rarely implemented
Measures which were envisaged or considered but which have not been implemented
28. For measures which have been rarely or never implemented, what is your understanding of the reasons for this? Please deal with each measure separately in your explanation if possible
Further sectors
29. Do you need to provide survey responses for another sector?
☐ Yes
☐ No
Effectiveness and efficiency of the CCA scheme (contd.)
30. How effective is the CCA audit and enforcement process?
Not at all effective Not so effective Somewhat effective Very effective Extremely effective

☐	☐	☐	☐	☐
Please explain your answer				
31. To what extent would you agree with this statement: "The second CCA scheme has been implemented effectively"?				
Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
☐	☐	☐	☐	☐
Please briefly explain your answer				
32. Do you have any suggestions on how a future CCA-type scheme could be made more effective in terms of:				
a) encouraging energy efficiency				
b) protecting competitiveness				
c) streamlining scheme administration				
33. Do you have any other comments that you would like to make about the second CCA scheme?				
Thank you for completing this survey.				

Table 31: Topic Guide for Sector Bodies

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
General guidance and resources			
	Protocol if interviewee is located in 'sub-optimum' location Includes any situation in which the location of the interviewee is likely to result in sub-optimum interview (e.g. because of distractions or other interference). This will include situations when an interviewee is: outside, driving, or inside but in a distracting environment (e.g. due to significant noise). In these cases, our plan is to: - Ask if the interviewee can move to a quiet location, if possible (if driving, we will ask if they are able to pull over for the duration of the interview) - If they are not able to do this, then we will ask if we can reschedule the interview Our rationale for postponing is that it is better to risk the interviewee opting-out (i.e. not being available for a rearranged interview), than conducting an interview which doesn't give us the opportunity to collect the data we need.		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Before the interview: the interviewer should review: - the online survey response for this sector body/organisation (ref 4. Sector responses - if available) - the targets for this sector (ref final page of umbrella agreement in 5. Scheme data) - relevant TP1, TP2 and TP3 sector performance data (ref TP performance file in 5. Scheme data) - the evidence template used in the target setting process (ref 9. Evidence templates, if available for this sector) - statistics on leavers and joiners for this sector (ref 5. Scheme data) - any questions raised in 'Queries' tab within leavers and joiners file (ref 5. Scheme data)		
Introduction			
Aim: To introduce the research, ensure the interviewee is aware of and set the context for the proceeding discussion			5

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Keep the intro as brief as possible to leave room for the interview proper	• Introduce yourself and CAG Consultants [very brief] • State that the evaluation has been commissioned by BEIS [no need to provide more detail than this] • Explain that the interviews are intended to complement other research activities being undertaken as part of the evaluation, including the online survey that they may or may not already have completed. The interview will explore some of the same topics as the online survey but in greater depth and also covers other topics. If they have not completed the online survey, please ask them to do so as soon as possible. • Introduce the study: - Overall objective of the research is to assess the extent to which the CCA scheme is achieving its objectives of improving energy efficiency whilst maintaining the competitiveness of energy-intensive industries - Findings will inform government policy development and the design of any future similar schemes • Talk through key points about the interview: - Length of interview [estimated 60-70 minutes]		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Data handling, privacy, recording - Tell respondent that the Interview data will be stored securely in accordance with the GDPR - Check they received information regarding the privacy notice - Explain that we would like to record the interview and explain that the recording will not be shared outside of the research consortium - Any published findings or quotes from the interview will be fully anonymised - We would like to share anonymised interview transcripts/notes with BEIS. However, given potential difficulties in fully anonymising the interview, we will check at the end of the interview whether they are comfortable with the transcript being shared - Check that they consent to you recording the interview [if they don't, still go ahead with interview, just take notes] [if the participant says they would prefer for any element of the transcript not to be shared with BEIS, record this, tell them that we will respect this wish, and proceed with interview anyway]		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Ideally the person we speak to would have been involved in the target-setting negotiations, as well as in managing the scheme. However, the target-setting took place some years ago now so some people may have moved on. If it is a choice between the person involved in target-setting or the person who manages the scheme today, then the latter is preferable.	Before you begin: - Confirm that they are the person within the sector body/organisation who is best placed to comment on the operation of the CCA scheme - Emphasise that there are no wrong or right answers. We want to hear their experiences and views. We want to hear what they have to say, in their own words - Ask the interviewee if they have questions before they start		
Application background			
Aim: to help research participants 'warm-up' and to confirm and ascertain key background information			(included above)
	What is the name of the sector body?	Confirm the name of the sector body or organisation that they represent (note that some respondents may be consultants employed to represent one or more sector bodies)	
	Which sectors do you represent in the CCA scheme?	Some sector bodies or consultants represent more than one sector in the CCA scheme	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	What is the nature and extent of the your involvement in the CCA scheme?	This will enable us to gain an understanding of the extent to which the interviewee will be able to comment on the various aspects of the process Explore the extent to which they were/are involved in: - liaising with DECC regarding the inclusion of the sector(s) within the second CCA scheme - the target-setting negotiations with DECC - assessing the eligibility of participant firms - assigning the targets to participant firms - liaising with the Environment Agency regarding the umbrella agreement for the sector(s) - providing support/advice to participant firms to enable targets to be met (might include dealing with changes to baselines, bubbling, change of target type (e.g. relative energy to Novem energy) etc) - other?	
Evaluation Question 2: What has been the impact of the CCA scheme and how did the CCA generate any attributed effects?			
Purpose: To provide evidence of the impact attributable to the CCA scheme, including further exploration of the findings from the econometrics work which is comparing performance by CCA and non-CCA firms			
2.1 Impact on energy efficiency			15

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Really important to probe the importance of other drivers and policies relative to the CCA (e.g. CRC, EII, EU ETS) . Make sure they answer the question broadly enough - we're not just asking about the CCA scheme here.	What are the main influences on business energy efficiency in this sector?	For the sectors covered by this interviewee: - Explore what are the main drivers of energy efficiency decisions in the sector - Explore the relative significance of CCA in the context of other drivers (e.g. energy prices, regulation, CSR, other policies - including EU ETS, CCL, CRC and the Energy Intensive Industries exemption) - Ask for rough proportion of energy costs within running costs for firms in this sector	
	To what extent has the CCA influenced energy behaviour and attitudes?	Explore the extent to which CCA has impacted on energy behaviours and attitudes across participant firms, and why? (e.g. any influence on implementation of measures or their scale/timing?) Are there particular types of businesses that tend to be more influenced by CCA than others? Is the influence confined to particular individuals, e.g. energy manager? Does the influence extend to senior management? Is there any evidence of culture change or institutional learning with regard to energy efficiency, which can be attributed to the influence	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
		of the CCA? (e.g. adoption of energy management systems) Has the CCA influenced activity outside of the scheme itself? E.g. in firms with units inside and outside of the scheme, has the influence extended to activities in the units outside of the scheme?	
This is the most important question - have the targets really influenced action on energy efficiency? [Moved here to improve flow]	What has been the influence of CCA participation on target behaviour?	There are three key aspects to explore here: 1) Whether firms responded to the targets - To what extent were participant firms motivated to meet their target? 2) The extent to which meeting the targets was beyond Business-As-Usual on energy efficiency: were the targets stringent enough to require participant firms to take action that they wouldn't have undertaken in the absence of those targets? To what extent did this differ between different participant firms, and why? 3) When operators are at risk of failing their targets, what sorts of actions do they take? (e.g. installing measures; renegotiating target type with EA).	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Rely on online survey to collect detailed information on measures. Use this to probe the degree to which CCA participation has or has not influenced implementation of measures, and the reasons for this. Interviewer to check online survey and (where available) evidence templates for lists of measures	What has been the influence of CCA participation on the measures installed?	Briefly discuss the measures that originally underpinned the CCA targets for this sector, the degree to which they have been implemented within the sector and the reasons behind this (to the interviewee's knowledge).	
2.1 Impact on competitiveness			8

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Really important to probe the importance of other drivers and policies relative to the CCA (e.g. Brexit, regulation, land availability etc - could be v broad). Make sure they answer the question broadly enough - we're not just asking about the CCA scheme here. e.g. what other regions/ countries are investors considering and why? EU or non EU?	What have been the main influences on the competitiveness of sites and on investment decisions for this sector (particularly investment in energy-intensive processes)?	For the sectors covered by this interviewee: - Explore what have been the main influences on the competitiveness of sites in this sector, since the beginning of the second CCA scheme - Explore what have been the main drivers of investment location decisions in the sector (i.e. choice of UK vs other locations) since the beginning of the second CCA scheme - Explore the relative significance of CCL/CRC discounts available to CCA participants, in the context of other drivers (e.g. Brexit, regulation, other elements of energy prices, international competition, economic climate, changes within the sector etc..)	
	To what extent has the CCA influenced decisions about new investment by participant firms (particularly energy-intensive investments being made in the UK)?	Probe for evidence and reasoning to back up perceptions/assertions How does this compare with energy intensive investments in other countries?	
Evaluation Question 1: What have been the outcomes observed during the second CCA scheme?			
Aim: to explore the sector body's understanding of outcomes observed in CCA scheme data for participant firms			10

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
This is probably the most important of all of the sections so needs to be given adequate time (since the wider rationale for CCA participation should have emerged in the questions above, this is mainly about the sector body's own motivations)	What is the sector body's motivation to continue to represent its sector in the second CCA scheme?	Explore the principal motivations for the sector body wanting to join the second CCA scheme (differentiating between different sectors if the interviewee covers more than one): Probe for: - financial, i.e. cost-savings for participant firms - competitiveness of the sector (e.g. CCL discounts; CRC discounts) - environmental/carbon motivations - concerns about energy security and/or costs - new technologies becoming available - other benefits to the sector body (e.g. revenue raising, demonstrating their value to their members) Were particular firms pushing for the sector(s) to be included in the scheme? Or was it primarily the initiative of the sector body?	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Interviewer to check scheme data statistics on leavers/joiners (probe any obvious patterns in the data - exact numbers don't matter)	What were the reasons behind firms joining or leaving the scheme?	If significant numbers of operators have joined the scheme recently, ask why this is (and what types of firms in this sector/these sectors have joined in recent years) Are there any common triggers for operators joining the scheme? If significant numbers of operators have left the scheme recently, ask why this is (and what types of firms in these sectors/this sector have tended to leave since the start of the second CCA scheme) Are there any common triggers for operators leaving the scheme? How much have apparent leavers and joiners been due to TUs changing legal ownership rather than old sites leaving and new sites joining?	
Interviewer to check sector performance (target achievement, surplus generated, use of buy-out in TP3 and earlier TPs) (This is an important question as the answers should help us to	What have been the reasons behind the observed performance in this sector?	For each of the sectors covered by this interviewee: - Explore the reasons behind the overall level of target achievement by operators in this sector (for TP3 and, if possible, earlier TPs) - Explore what type of operators met their targets (for TP3 and, if possible, earlier TPs) - Explore what type of operators generated surplus, and why (for TP3 and, if possible, earlier TPs) - Explore what type of operators used buy-out, and why (for TP3 and, if possible, earlier TPs)	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
interpret the scheme performance data)			
(This is an important question as the answers should help us to interpret the scheme performance data)	What have been the reasons for the use of buy-out within the sector?	Explore the principal reasons for the use of buy-out by participant firms. Probe for: - buy-out price relatively low - meeting targets too disruptive to business - meeting targets too costly - wider market changes - other?	
Evaluation Question 3: Is the CCA scheme offering value for money?			
Aim: to explore the cost-effectiveness of the CCA scheme from the perspective of the sector body			5

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Rely on online survey to capture current costs and use this question to ensure that we have information on original time burden at the start of the scheme, and which tasks are most burdensome now	Which elements of CCA-related activities have been most burdensome for the sector body?	Explore which aspects of sector body activities are most cost/time intensive, and if possible relate their answers to the estimates provided in their online response: At the start of the scheme (if known to interviewee) - ask for rough estimate in person-months: - initial negotiations with DECC about entry to the scheme - the original target-setting negotiations with DECC - assigning the targets to participant firms Ongoing (covered in online survey response so only ask for relative burden..): - assessing the eligibility of participant firms (initial/ongoing) - liaising with the Environment Agency regarding the umbrella agreement for the sector(s) - providing support/advice to participant firms to enable targets to be met - TP reporting to the EA - other support to operators (please specify) - other	
Try to get at whether the sector body gains members or kudos by being part of the scheme.	To what extent do you think CCA-related activities are cost-effective for the sector body?	Explore the extent to which the sector body can recover these costs through the CCA fees that they charge to participants. Are there any wider benefits to the sector body of being involved in the CCA scheme (e.g. increased profile; increased membership, other)?	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Have there been any unintended effects associated with the delivery of the CCA scheme in this sector?	Is the sector body aware of any unintended effects associated with the CCA scheme? For example, do the targets discourage or restrict any types of activity that would be beneficial for the environment or competitiveness? is there any evidence of a rebound effect (firms increasing production or using more energy for other activities in response to energy efficiency measures)? Have any energy efficiency measures disrupted operational activity? Have energy saving efforts impacted on productivity?	
Evaluation Question 4: How effective and efficient has the delivery of the scheme been?			
Aim: to explore how the CCA scheme has been delivered, how effective and efficient it has been and opportunities for improvement			10
In the intro section, you will already have established the extent to which the interviewee was involved in the target-setting process. If they were not, and they do not have knowledge of the process, see instead if it is possible to get contact details for someone else who would be in a position to comment on this	How was the target for this sector arrived at?	Assuming that the interviewee has some knowledge of this, explore: - whether or not the sector body challenged the target suggested by DECC - if so, how they went about that - data used, who was involved - in deciding whether or not to challenge the DECC target - what was the extent of engagement with firms in the sector during the process, any internal or external expertise utilised during the process	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	How did you find the target setting process?	Explore perceptions of the effectiveness and efficiency of the process. Did they and DECC have access to the data and expertise needed? Were appropriate targets set? If not, when was this apparent? How might the process have been improved?	
Moved to improve flow	How effective was the process of recruiting CCA participants?	What works well? Are sufficient numbers being recruited to allow targets to be met? Are some types of firms harder to recruit than others? E.g. Are bigger/smaller firms harder to recruit? Are there any barriers to recruitment to the CCA scheme for their sector(s)?	
Refer to types of support flagged in online survey (where available). Probes made more specific to issues in ToC that we want to explore	What works well or less well in your role supporting CCA participants?	Are there any issues with negotiating changes with the EA, and if so why? As part of the CCA scheme support, or as part of their wider activities, do they actually provide advice/support to CCA participants on how to meet energy efficiency targets? Are there any other barriers to information sharing	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
		within the CCA scheme (e.g. distrust between operators that are competitors)	
	Tell me about how CCA reporting processes work for your sector body.	How frequently do they require participants to report energy use to the sector body, and why do they choose this frequency? (some sectors require reporting more frequently than biennial TP reports) What works well? Are there any issues about TP reporting?	
	How effective are the CCA audit and enforcement processes (including both sector body and participant audits)?	Explore perceptions of the effectiveness and efficiency of these processes. Is the approach robust, fair and reasonable? How might the process be improved?	
Evaluation Question 5: What can we learn for any future iterations of the CCA scheme and future policy?			
Aim: to explore general lessons from the experience of the CCA scheme and opportunities for improvement			5

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Do you have any suggestions for improving the CCA scheme?	Opportunities for improvement in terms of: 1) encouraging energy efficiency 2) protecting competitiveness 3) streamlining scheme administration Are there alternative approaches which might be more cost-effective? E.g. how does it compare with CRC?	
The change from CRC to higher rates of CCL is the real driver behind this question - important to probe the effect of this.	How significant do you think the CCA will be in future?	How important will CCAs be in future in this sector, particularly now that higher rates of CCL have replaced CRC?	
Interview close and thank you			
			2
	Ask if interviewee would like to say anything else about their experiences in relation to the CCA		
	Thank the participant for their time. Reiterate that their anonymity will protected in our reporting. Tell them they are welcome to contact members of the study team to ask questions at a later date if they wish Check whether they are happy for the transcription to be shared with BEIS		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	unanonymised or (if needed) anonymised as far as possible.		
	Check if they are happy to be contacted for future research on business energy efficiency		
	END INTERVIEW		

Table 32: Topic guide for Participants

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
General guidance and resources			
	Protocol if interviewee is located in 'sub-optimum' location Includes any situation in which the location of the interviewee is likely to result in sub-optimum interview (e.g. because of distractions or other interference). This will include situations when an interviewee is: outside, driving, or inside but in a distracting environment (e.g. due to significant noise). In these cases, our plan is to: - Ask if the interviewee can move to a quiet location, if possible (if driving, we will ask if they are able to pull over for the duration of the interview) - If they are not able to do this, then we will ask if we can reschedule the interview Our rationale for postponing is that it is better to risk the interviewee opting-out (i.e. not being available for a rearranged interview), than conducting an interview which doesn't give us the opportunity to collect the data we need.		
	Before the interview: the interviewer should review: - review scheme data on the participant, particularly for questions relating to Evaluation Question 1		
Introduction			
Aim: To introduce the research, ensure the interviewee is aware of and set the context for the proceeding discussion			3

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Keep the intro as brief as possible to leave room for the interview proper	• Introduce yourself and CAG Consultants [very brief] • State that the evaluation has been commissioned by BEIS [no need to provide more detail than this] • Explain that the interviews are intended to complement other research activities being undertaken as part of the evaluation, including the online survey that they may or may not already have completed. The interview will explore some of the same topics as the telephone survey by Winning Moves, but in greater depth and also covers other topics. • Introduce the study: - Overall objective of the research is to assess the extent to which the CCA scheme is achieving its objectives of improving energy efficiency whilst maintaining the competitiveness of energy-intensive industries - Findings will inform government policy development and the design of any future similar schemes • Talk through key points about the interview: - The purpose of the interview is to explore their experience of the CCA scheme, and their perspectives on the energy efficiency and competitiveness of their firm's energy-intensive activities - Length of interview [estimated 60-75 minutes]		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Data handling, privacy, recording - Tell respondent that the Interview data will be stored securely in accordance with the GDPR - Check they received information regarding the privacy notice - Explain that we would like to record the interview and explain that the recording, will not be shared outside of the research consortium, without their explicit consent - Any published findings or quotes from the interview will be fully anonymised - We would like to share anonymised interview transcripts/notes with BEIS. However, in case there are any difficulties in fully anonymising the interview, we will check at the end of the interview whether they are comfortable with the transcript being shared - Check that they consent to you recording the interview [if they don't, still go ahead with interview, just take notes] [if the participant says they would prefer for any element of the transcript not to be shared with BEIS, record this, tell them that we will respect this wish, and proceed with interview anyway]		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Before you begin: - Confirm that they are the person within the organisation who is best placed to comment about the business' approach to meeting their CCA obligations - Unless otherwise stated, we are interested in your organisation's views in relation to the questions we cover, so it would be helpful if you could highlight where you are answering questions from a personal viewpoint only. - Emphasise that there are no wrong or right answers. We want to hear their experiences and views. We want to hear what they have to say, in their own words - Ask the interviewee if they have questions before they start		
Background			
Aim: to help research participants 'warm-up' and to confirm and ascertain key background information			5
Aim to be brief in this section	Could you briefly explain the nature, size and scope of the business?		
	And can you also briefly describe the nature of activities covered by the CCA scheme?		
	To what degree are your sales from UK operations competing with imports to the UK?		
	What is your role in the business?	Probe whether they have a dedicated energy manager	
	What are your responsibilities in relation to the CCAs and energy management more broadly?	How long have they had responsibilities in relation to CCA?	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	What other energy policies cover (or have covered) your organisation's energy use in the UK?	Probe for extent of coverage of all the following: - CRC (phases 1 and 2) - up to end March 2019 - EU ETS (Phases I, II, III); - Energy Intensive Industries exemption - Climate Change Levy (CCL) - Carbon Price Floor - ESOS - Mandatory GHG reporting	
	How important are CSR/environmental motivations for the organisation?	e.g. do they have corporate energy/carbon targets?	
Evaluation Question 2: What has been the impact of the CCA scheme and how did the CCA generate any attributed effects?			
Purpose: To allow exploration of factors affecting energy-efficiency and competitiveness, including the role of the CCA scheme			
Influences on energy efficiency (including CCA influence)			10
We are less interested in building-related measures than in process-related measures	What actions have you taken that have improved the energy-efficiency or carbon-efficiency of your energy intensive activities (including those covered by the CCA) since April 2013?	Actions/measures may include replacement of process/production equipment; behavioural measures; investment in specific measures; fuel-switching; adopting an energy management system; general business rationalisation etc.	
	What have been the main drivers for these actions?	Probe for: end of equipment life; new products; reducing energy bills; reducing EU ETS payments; meeting energy/carbon targets; business efficiency etc...	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	In rough terms, what was the payback period for these various actions?	Probe: is there a minimum rate of return that such investments need to meet? Probe for: - what payback periods are sought 'in general' and/or for the most significant energy efficiency activities if they can't provide specifics - differences in payback periods for revenue spend (e.g. for controls, behaviour measures) vs capital spend (e	
	In rough terms, how important were these actions relative to your organisation's energy and carbon use?	Probe: what proportion of energy and carbon savings did these actions lead to, relative to the organisation's overall energy use and carbon footprint	
	To what extent did the CCA targets or rules have any influence on these actions, or their timing/scale?	Probe: - Do they know what their CCA targets are? - Do they know the CCA buyout price? - If so, were any of these actions motivated by or informed by CCA targets or the buyout price? Probe if the answer contradicts the 'main drivers' response in any way.	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	If you hadn't been in the CCA scheme, is there anything you would have done differently in relation to energy efficiency (and why)?	Probe: do they treat their non-CCA sites any differently from CCA sites, and if so why? Probe: any differences in scope, timing or nature of energy efficiency activities? Probe: was there any information benefit from being part of the CCA scheme?	
Influences on competitiveness and location of energy-intensive activities			8
	How important are energy costs for the competitiveness of your energy-intensive activities?	Probe: what proportion of their overall costs are energy costs? Is this different for their energy-intensive activities?	
	How much of their energy use is liable to CCL (and, in the past, CRC) charges, and why?	Probe: how are they affected by the new higher rate of CCL?	
	What are the other factors that have affected competitiveness over this period and how important have they been relative to energy costs?		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Has the firm moved any energy-intensive activities away from the UK since the current CCA scheme began in 2013?	If so, what was moved and what were the key drivers of locational decisions How did other locations compare with the UK? And what was the relative significance of CCA in the context of these other drivers What else influenced decisions about investment in the UK?	
	Has the business made any decisions about locating new or expanded energy-intensive activities being located in the UK since April 2013?	If so, what were the investment and what were the key drivers of these investment decisions And what was the relative significance of CCA in the context of these other drivers	
	If your organisation hadn't been in the CCA scheme, is there anything it would have done differently in relation to these types of investments?	Probe: How much difference would it have made to their competitiveness and investment decisions if their energy-intensive activities had been subject to CCL (and CRC, where relevant)?	
Evaluation Question 1: What have been the outcomes observed during the second CCA scheme?			
Aim: to explore the company's knowledge and perceptions of the influence of the second CCA scheme on the behaviours and attitudes of participant firms			15

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Explore in-depth	What were the organisation's reasons for joining and remaining in the second CCA scheme?	Explore the principal motivations for the organisation wanting to join the second CCA scheme. Was there any particular trigger? Probe for: - financial, i.e. cost-savings - competitiveness - environmental/carbon/CSR motivations - concerns about energy security and/or costs - new technologies becoming available	
Don't ask if it's obvious that only one sector is relevant.	If there was a choice, why did you join this particular sector agreement(s)?	Probe for any element of choice (or 'target shopping')	
A 'Novem' target is a weighted-average target based on a basket of several target units	What is the organisation's perception of the targets for the CCA(s) you are in participating in?	To what extent to does the participant think their targets are fair and reasonable (and why) To what extent are they challenging to meet (and why)? What was their rationale for choosing targets that were absolute, relative or Novem?	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Only ask if the organisation has a TU with 'bubbled' facilities in the CCA (i.e. scheme data shows that their TU has more than 1 facility or site).	Why do you group multiple facilities into one TU, using a 'bubbled' CCA agreement?	e.g. '- lower admin costs - averaging of performance across different facilities - reduce visibility of individual site data to competitor organisations	
The 70:30 rule means that all energy use on a site is covered by the CCA, provided 70% of the energy use on that site relates to processes eligible for the relevant sector CCA (flagged in scheme data).	Were you able to make use of the 70:30 rule? (and if not why not?)	Probe what non-CCA processes are co-located with CCA processes, on the same site, and why they were or were not able to include them in the CCA.	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Interviewer to review performance data for relevant TU(s) before the call.	Can you explain why your organisation's met (or didn't meet) its target in TP3? What about TP2? What about TP1?	For each TP, probe why: - the target was met - significant surplus was generated - buy-out was used	
Explore in depth	What was your approach to meeting your targets vs using buy-out?	Probe to understand: - whether the organisation generally expected to meet its targets - the role played by changes in economic activity (for absolute targets) - the balance between fixed and variable energy costs (for relative/Novem targets) - the extent to which use of buy-out was a strategic decision, and if so why -- the extent to which performance depended on adjustment to targets or baselines (e.g. adoption of 'Novem' targets - and if so, why was this done) -the extent to which the buy-out price influenced the organisation's incentive to meet its targets	
Evaluation Question 3: Is the CCA scheme offering value for money?			
Aim: to explore the cost-effectiveness of the CCA scheme from the perspective of the CCA participant			8
	How much CCL/CRC does the organisation save through participating in the CCA scheme?	separate estimates for CRC and CCL (pre-March 2019)	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	For the energy-efficiency measures that the organisation has taken to meet (or nearly meet) CCA targets, what have been the financial benefits?	Probe to understand -approx. scale of energy bill savings in £ pa - any other financial benefits that have arisen or are predicted to arise - any non-financial benefits e.g. CSR / marketing benefits and how valued such benefits are to them.	
	And how has this affected your competitiveness in the UK?		
The quant survey will help us capture exact costs. Here were are interest in types and broad costs	What types of costs has your organisation incurred to participate in the CCA scheme?	Probe for : - cost of fees to sector body - membership fee for sector body (if different) - fee to EA - other external costs (e.g. energy consultants - CCA element only) - time inputs for initial participation - time inputs for TP reporting - other time inputs (please explain)	
	To what extent does the organisation think CCA compliance activities are cost-effective?	Explore the extent to which CCA participation resulted in benefits in terms of cost savings, competitiveness, carbon savings and other benefits If there are other benefits, beyond those already described, ask participant to describe what they are	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	To what extent does the organisation think the CCA scheme has any unintended effects?	e.g. - Any evidence of a rebound effect (the organisation increasing production or using more energy for other activities in response to energy efficiency measures) - Have CCA targets disincentivised any actions/measures that would otherwise have benefited the environment or competitiveness? - Have any energy efficiency measures disrupted operational activity? - Have energy saving efforts impacted on productivity?	
Evaluation Question 4: How effectives and efficient has the delivery of the scheme been?			
Aim: to explore how the CCA scheme has been delivered, how effective and efficient it has been and opportunities for improvement			5
	What involvement did you and your organisation have in the target-setting process at the start of the second CCA scheme?		
	What are your perceptions of the target-setting process	Explore perceptions of the effectiveness and efficiency of the process. Were appropriate targets set? If not, why, when was this apparent? How might the process have been improved?	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Can you tell me more about the support you have received from your sector body?	What role does the sector body provide? Does the sector body promote good practice in energy efficiency in the sector, and if so how? Does the sector body have appropriate capability and capacity to administer the umbrella agreement for this sector?	
	Overall, how do you view your organisation's experience of the CCA process in terms of interaction with BEIS, the EA and the sector body/bodies?	Explore perceptions of the effectiveness and efficiency of the process. Which elements of the CCA process are most onerous? Is the approach to scheme implementation robust, fair and reasonable? How might the process be improved?	
	What is your experience of CCA audit or enforcement processes? And to what extent has this influenced your organisation's activity/behaviour?		
Evaluation Question 5: What can we learn for any future iterations of the CCA scheme and future policy?			
Aim: to explore general lessons from the experience of the CCA scheme and opportunities for improvement			5

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	What is your view of the overall effectiveness and efficiency of the CCA scheme?	Perceptions of the effectiveness and efficiency of the scheme overall. What works well? Opportunities for improvement in terms of: 1) encouraging energy efficiency 2) protecting competitiveness 3) streamlining scheme administration	
	Would you participate in a future CCA-type scheme?	What factors would affect this?	
Interview close and thank you			
			2
	Ask if interviewee would like to say anything else about their experiences in relation to the CCA		
	Thank the participant for their time. Reiterate that their anonymity will protected in our reporting. Tell them they are welcome to contact members of the study team to ask questions at a later date if they wish Check whether they are happy for the transcription to be shared with BEIS unanonymised or (if needed) anonymised as far as possible.		
	Check if they are happy to be contacted for future research on business energy efficiency		
	END INTERVIEW		

Table 33: Topic guide for leavers

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
General guidance and resources			
	Protocol if interviewee is located in 'sub-optimum' location Includes any situation in which the location of the interviewee is likely to result in sub-optimum interview (e.g. because of distractions or other interference). This will include situations when an interviewee is: outside, driving, or inside but in a distracting environment (e.g. due to significant noise). In these cases, our plan is to: - Ask if the interviewee can move to a quiet location, if possible (if driving, we will ask if they are able to pull over for the duration of the interview) - If they are not able to do this, then we will ask if we can reschedule the interview Our rationale for postponing is that it is better to risk the interviewee opting-out (i.e. not being available for a rearranged interview), than conducting an interview which doesn't give us the opportunity to collect the data we need.		
Introduction			
Aim: To introduce the research, ensure the interviewee is aware of and set the context for the proceeding discussion			3

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Keep the intro as brief as possible to leave room for the interview proper	• Introduce yourself and CAG Consultants [very brief] • State that the evaluation has been commissioned by BEIS [no need to provide more detail than this] • Introduce the study: - Overall objective of the research is to assess the extent to which the CCA scheme is achieving its objectives of improving energy efficiency whilst maintaining the competitiveness of energy-intensive industries - Findings will inform government policy development and the design of any future similar schemes • Talk through key points about the interview: - The purpose of the interview is to explore their experience of the CCA scheme, their perspectives on the energy efficiency and competitiveness of their firm's energy-intensive activities, and their reasons for leaving the scheme - Length of interview [estimated 50 minutes]		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Data handling, privacy, recording - Tell respondent that the Interview data will be stored securely in accordance with the GDPR - Check they received information regarding the privacy notice - Explain that we would like to record the interview and explain that the recording, will not be shared outside of the research consortium, without their explicit consent - Any published findings or quotes from the interview will be fully anonymised - We would like to share anonymised interview transcripts/notes with BEIS. However, in case there are any difficulties in fully anonymising the interview, we will check at the end of the interview whether they are comfortable with the transcript being shared - Check that they consent to you recording the interview [if they don't, still go ahead with interview, just take notes] [if the participant says they would prefer for any element of the transcript not to be shared with BEIS, record this, tell them that we will respect this wish, and proceed with interview anyway]		
	Before you begin: - Confirm that they are the person within the organisation who is best placed to comment about the business' approach to meeting their CCA obligations - Unless otherwise stated, we are interested in your organisation's views in relation to the questions we cover, so it would be helpful if you could highlight where you are answering questions from a personal viewpoint only. - Emphasise that there are no wrong or right answers. We want		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	to hear their experiences and views. We want to hear what they have to say, in their own words - Ask the interviewee if they have questions before they start		
Background			
Aim: to help research participants 'warm-up' and to confirm and ascertain key background information			5
Aim to be brief in this section	Could you briefly explain the nature, size and scope of the business?		
	And can you also briefly describe the nature of your business activities that were covered by the CCA scheme?		
	To what degree are your sales from UK operations competing with imports to the UK?		
	What is your role in the business?	Probe whether they have a dedicated energy manager	
	What were your responsibilities in relation to the CCAs and energy management more broadly?	How did they have responsibilities in relation to CCA?	
	What other energy policies cover (or have covered) your organisation's energy use in the UK?	Probe for extent of coverage of all the following: - CRC (phases 1 and 2) - up to end March 2019 - EU ETS (Phases I, II, III); - Energy Intensive Industries exemption - Climate Change Levy (CCL) - ESOS	
	How important are CSR/environmental motivations for the organisation?	e.g. do they have corporate energy/carbon targets?	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Reasons for leaving the scheme			5
Interviewer to review scheme data beforehand	Can you confirm that XX eligible facilities were part of the CCA?	Briefly confirm/check information available from scheme data	
	Can you confirm how long the eligible facilities were part of the CCA?	Briefly confirm/check information available from scheme data	
	Can you also confirm that the business left the CCA in YYYY year?	Briefly confirm/check information available from scheme data	
Explore in-depth	What were the organisation's reasons for leaving the scheme?	Explore the principal motivations for the organisation wanting to leave the second CCA scheme. Was there any particular trigger? Probe for: - eligibility for mineralogical/metallurgical exemption Other reasons: - change to eligibility - cost of participation (e.g. fees) - cost of buy-out - targets too challenging - other... Ask the participant to explain the factors behind	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
		their key reasons for leaving (e.g. their size; the nature of the CCA scheme for their sector) Are there any changes to a future CCA scheme that would prompt them to re-join?	
Explore actions and attitudes to energy-efficiency and competitiveness (including any influence of CCA on these, and any differences since leaving the scheme)			
Purpose: To allow exploration of factors affecting energy-efficiency and competitiveness, including the role of the CCA scheme			
Influences on energy efficiency (including CCA influence)			10
We are less interested in building-related measures than in process-related measures	What actions have you taken that have improved the energy-efficiency or carbon-efficiency of their energy intensive activities (including those covered by the CCA) since April 2013?	Actions/measures may include replacement of process/production equipment; behavioural measures; investment in specific measures; fuel-switching; adopting an energy management system etc.	
	What have been the main drivers for these actions?	Probe for: end of equipment life; new products; reducing energy bills; reducing carbon payments; meeting energy/carbon targets; business efficiency etc...	
	In rough terms, what was the payback period for these various actions?	Probe: is there a minimum rate of return that such investments need to meet? Look to understand what payback periods are 'in	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
		general' and/or for the most significant energy efficiency activities if they can't provide specifics	
	In rough terms, how important were these actions relative to your organisation's energy and carbon use?	Probe: to understand what proportion of energy and carbon savings these actions led to, relative to the organisation's overall energy use and carbon footprint	
	To what extent did the CCA targets or rules have any influence on these actions, or their timing/scale?	Probe: were any of these actions motivated by or informed by CCA targets? Probe if the answer contradicts the 'main drivers' response in any way.	
Probes are important here, to understand whether the CCA scheme had any influence	If they hadn't been in the CCA scheme previously, is there anything they would have done differently in relation to energy efficiency (and why)?	Probe: has their approach to energy efficiency changed since they left the CCA scheme? Probe: do they treat their non-CCA sites any differently from CCA sites, and if so why? Probe: have there been any lasting effects of their participation in the CCA scheme (e.g. better monitoring or information about energy use)?	
Influences on competitiveness and location of energy-intensive activities			5
	How significant are energy costs for the competitiveness of your energy-intensive activities?	Probe: what proportion of their overall costs are energy costs? Is this different for their energy-intensive activities?	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	How much of their energy use is liable to CCL (and, in the past, CRC) charges, and why?	Probe: how are they affected by the new higher rate of CCL?	
	Has the firm moved any energy-intensive activities away from the UK since April 2013?	If so, what was moved and what were the key drivers of locational decisions How did other locations compare with the UK? And what was the relative significance of CCA in the context of these other drivers What else influenced decisions about investment in the UK?	
	Has the business made any decisions about locating new or expanded energy-intensive activities being located in the UK since April 2013?	If so, what were the investment and what were the key drivers of these investment decisions And what was the relative significance of CCA in the context of these other drivers	
	Since your organisation left the CCA scheme, has your competitiveness in the UK been affected? And has your decision-making changed in relation to energy-intensive investment in the UK?	Probe: how well can their non-CCA sites compete with other sites that are still within the CCA? Explore the reasons why any change in investment attitudes has occurred - what factors have influenced these changes OR explore the reasons why there has been no change	
Evaluation Question 3: Is the CCA scheme offering value for money?			

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Aim: to explore the cost-effectiveness of the CCA scheme from the perspective of the CCA leaver			10
	How much CCL/CRC did the organisation save (in absolute terms) through participating in the CCA scheme?	separate estimates for CRC and CCL (pre-March 2019)	
	For any measures that the organisation implemented as part of the CCA, what were the relative costs and benefits of these?	Probe to understand -approx. scale of energy bill savings in £ pa - any other financial benefits that arose	
	When you were part of the CCA scheme, did these financial benefits affect your competitiveness in the UK, and if so how?	Did these benefits persist on leaving the CCA scheme?	
	What types of costs did you incur to participate in the CCA scheme?	Probe for : - cost of fees to sector body - membership fee for sector body (if different) - fee to EA - other external costs (e.g. energy consultants - CCA element only) - time inputs for initial participation - time inputs for TP reporting - other time inputs (please explain)	
	To what extent did your organisation think that ongoing CCA participation was cost-effective?	Explore the extent to which CCA compliance activities resulted in benefits in terms of cost savings, competitiveness, carbon savings and other benefits Probe the factors affecting their perception of balance between costs and benefits, which led to them deciding to leave the CCA scheme - did something change? did their understanding of CCA	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
		requirements change? or did they always expect to leave?	
	To what extent does the organisation think the CCA scheme has any unintended effects?	e.g. - Any evidence of a rebound effect (the organisation increasing production or using more energy for other activities in response to energy efficiency measures) - Did CCA targets disincentivised any actions/measures that would otherwise have benefited the environment or competitiveness? - Did energy efficiency measures disrupt operational activity? - Did energy saving efforts impact on productivity?	
Evaluation Question 5: What can we learn for any future iterations of the CCA scheme and future policy?			
Aim: to explore general lessons from the experience of the CCA scheme and opportunities for improvement			3
	What is your view of the overall effectiveness and efficiency of the CCA scheme?	Perceptions of the effectiveness and efficiency of the scheme overall. What works well? Opportunities for improvement in terms of: 1) encouraging energy efficiency 2) protecting competitiveness 3) streamlining scheme administration	
Interview close and thank you			
			2

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Ask if interviewee would like to say anything else about their experiences in relation to the CCA		
	Thank the participant for their time. Reiterate that their anonymity will protected in our reporting. Tell them they are welcome to contact members of the study team to ask questions at a later date if they wish Check whether they are happy for the transcription to be shared with BEIS unanonymised or (if needed) anonymised as far as possible.		
	Check if they are happy to be contacted for future research on business energy efficiency		
	END INTERVIEW		

Table 34: Topic guide for non-participants

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
General guidance and resources			
	Protocol if interviewee is located in 'sub-optimum' location Includes any situation in which the location of the interviewee is likely to result in sub-optimum interview (e.g. because of distractions or other interference). This will include situations when an interviewee is: outside, driving, or inside but in a distracting environment (e.g. due to significant noise). In these cases, our plan is to: - Ask if the interviewee can move to a quiet location, if possible (if driving, we will ask if they are able to pull over for the duration of the interview) - If they are not able to do this, then we will ask if we can reschedule the interview Our rationale for postponing is that it is better to risk the interviewee opting-out (i.e. not being available for a rearranged interview), than conducting an interview which doesn't give us the opportunity to collect the data we need.		
Introduction			
Aim: To introduce the research, ensure the interviewee is aware of and set the context for the proceeding discussion			3

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Keep the intro as brief as possible to leave room for the interview proper	• Introduce yourself and CAG Consultants [very brief] • State that the evaluation has been commissioned by BEIS • Introduce the study: - Overall objective of the research is to assess the extent to which the CCA scheme is achieving its objectives of improving energy efficiency whilst maintaining the competitiveness of energy-intensive industries - Findings will inform government policy development and the design of any future similar schemes • Talk through key points about the interview: - The purpose of the interview is to explore their perspectives on the energy efficiency and competitiveness of their firm's energy-intensive activities, and their views of the CCA scheme - Length of interview [estimated 45 minutes]		
	Data handling, privacy, recording - Tell respondent that the Interview data will be stored securely in accordance with the GDPR - Check they received information regarding the privacy notice - Explain that we would like to record the interview and explain that the recording, will not be shared outside of the research consortium, without their explicit consent - Any published findings or quotes from the interview will be fully anonymised - We would like to share anonymised interview transcripts/notes with BEIS. However, in case there are any		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	difficulties in fully anonymising the interview, we will check at the end of the interview whether they are comfortable with the transcript being shared - Check that they consent to you recording the interview [if they don't, still go ahead with interview, just take notes] [if the participant says they would prefer for any element of the transcript not to be shared with BEIS, record this, tell them that we will respect this wish, and proceed with interview anyway]		
	Before you begin: - Confirm that they are the person within the organisation who is best placed to comment about the business' approach to meeting their energy efficiency obligations - Unless otherwise stated, we are interested in your organisation's views in relation to the questions we cover, so it would be helpful if you could highlight where you are answering questions from a personal viewpoint only. - Emphasise that there are no wrong or right answers. We want to hear their experiences and views. We want to hear what they have to say, in their own words - Ask the interviewee if they have questions before they start		
Background			
Aim: to help research participants 'warm-up' and to confirm and ascertain key background information			5
Aim to be brief in this section	Could you briefly explain the nature, size and scope of the business?		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	To what degree are your sales from UK operations competing with imports to the UK?		
	What is your role in the business?	Probe whether they have a dedicated energy manager	
	What are your responsibilities in relation to energy management more broadly?		
	What energy policies cover (or have covered) your organisation's energy use in the UK?	Probe for extent of coverage of all the following: - CRC (phases 1 and 2) – up to end March 2019 - EU ETS (Phases I, II, III); - Energy Intensive Industries exemption - Climate Change Levy (CCL)	
	What are your organisation's main drivers in your decisions about energy?	Probe for cost savings, carbon/energy reductions, capacity constraints at times of peak demand, productivity improvements, public image/reputation, staying close to perceived Government priorities, compliance with legislation, energy security, etc.	
	How important are CSR/environmental motivations for the organisation?	e.g. do they have corporate energy/carbon targets?	
	Do you currently have an energy management plan and/or energy/carbon reduction targets?		
	To what extent are any of your activities eligible for one or more CCA sectors? (if known)	check our understanding of their eligibility	
Evaluation Question 1.2 What have been the participant (or non-participant) behaviours and attitudes during the scheme?			
Aim: to explore the non-participants perceptions about the second CCA scheme			5

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	How would you describe the organisation's awareness of the CCA?	Probe to understand - the interviewee's own understanding of the CCA - the extent of awareness of the CCA at senior management level in the organisation - the factors that have influenced the extent of senior management awareness - role of energy consultants or other external bodies in alerting the organisation to CCA opportunities	
	And can you also briefly describe which, if any, of the business' activities are eligible for the CCA scheme?		
Interviewer to have identified most suitable CCA sector body for this organisation	What engagement, if any, has the organisation had with any of the CCA sector bodies that manage CCA agreements?	Probe to understand -which one(s) - the perceived effectiveness of engagement activities by the sector body/bodies, and reasons for their views	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Explore in-depth	What were your organisation's reasons for not joining the CCA?	Explore the principal motivations for the organisation not joining the CCA scheme Probe for: - lack of eligible activities - financial - competitiveness - scheme design - other factors (e.g. targets too challenging; fees too high; management time needed too high) Ask the participant to explain the factors behind their key reasons for not joining (e.g. nature or scale of activities, size of company, organisational capacity, awareness) What changes, if any, to a future CCA scheme would prompt them to join?	
2.1. Are the energy/ carbon savings at CCA units greater than those for the counterfactual scenarios?			
Purpose: To develop an understanding of the organisation's energy efficiency activity and the factors that have influenced it, for counterfactual purposes			5
We are less interested in building-related measures than in process-related measures	What actions has your organisation taken that have improved the energy-efficiency or carbon-efficiency of its energy intensive activities since April 2013?	Actions/measures may include replacement of process/production equipment; behavioural measures; investment in specific measures; fuel-switching; adopting an energy management system etc.	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	What have been the main drivers for these actions?	Probe for: end of equipment life; new products; reducing energy bills; reducing EU ETS payments; meeting energy/carbon targets; business efficiency etc...	
	In rough terms, what was the payback period for these various actions?	Probe: is there a minimum rate of return that such investments need to meet? Look to understand what payback periods are 'in general' and/or for the most significant energy efficiency activities if they can't provide specifics	
	In rough terms, how important were these actions relative to your organisation's energy and carbon use?	Probe: to understand what proportion of energy and carbon savings these actions led to, relative to the organisation's overall energy use and carbon footprint	
Note: interviewee may not be able to answer this fully, depending on their awareness of the CCA	If your organisation had joined the CCA scheme, do you think you would have done anything differently in relation to energy efficiency?	Probe: did they think through what they would need to do to meet the targets in their sector? Would this have involved any change to 'business as usual' or existing plans? Would their attitude to energy management be different (e.g. senior managers)?	
Evaluation Question 2.3 Did the CCA scheme influence decisions about investment in the UK?			
Purpose: To develop an understanding of the organisation's decisions about investment in the UK, for counterfactual purposes			8

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	How significant are energy costs for the competitiveness of your energy-intensive activities?	Probe: what proportion of their overall costs are energy costs? Is this different for their energy-intensive activities?	
	How much of their energy use is liable to CCL (and, in the past, CRC) charges, and why?	Probe: how are they affected by the new higher rate of CCL?	
	Has the firm moved any energy-intensive activities away from the UK since April 2013?	If so, what was moved and what were the key drivers of locational decisions How did other locations compare with the UK? And what was the relative significance of CCL/CRC in the context of these other drivers What else influenced decisions about investment in the UK?	
	Has the business made any decisions about locating new or expanded energy-intensive activities being located in the UK since April 2013?	If so, what were the investment and what were the key drivers of these investment decisions And what was the relative significance of CCL/CRC in the context of these other drivers	
Note: interviewee may not be able to answer this fully, depending on their awareness of the CCA	If your organisation had been in the CCA scheme, is there anything it would have done differently in relation to these types of investments?	Probe: How much difference would it have made to their competitiveness and investment decisions if their energy-intensive activities had not been subject to CCL (and CRC, where relevant)?	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Evaluation Question 3: Is the CCA scheme offering value for money?			
Aim: to explore the cost-effectiveness of the CCA scheme from the perspective of a non-participant			3
	To what extent does your organisation think the CCA has resulted in any unintended effects?	e.g. - To their knowledge, have CCA targets disincentivised any actions/measures that would otherwise have benefited the environment or competitiveness? - Does competition with CCA firms cause problems for non-CCA firms?	
Interview close and thank you			
			2
	Ask if interviewee would like to say anything else about their views about the CCA scheme and related policies		
	Thank the participant for their time. Reiterate that their anonymity will protected in our reporting. Tell them they are welcome to contact members of the study team to ask questions at a later date if they wish Check whether they are happy for the transcription to be shared with BEIS unanonymised or (if needed) anonymised as far as possible.		
	Check if they are happy to be contacted for future research on business energy efficiency		
	END INTERVIEW		

Table 35: Topic guide for Energy Consultancies

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
General guidance and resources			
	Protocol if interviewee is located in 'sub-optimum' location Includes any situation in which the location of the interviewee is likely to result in sub-optimum interview (e.g. because of distractions or other interference). This will include situations when an interviewee is: outside, driving, or inside but in a distracting environment (e.g. due to significant noise). In these cases, our plan is to: - Ask if the interviewee can move to a quiet location, if possible (if driving, we will ask if they are able to pull over for the duration of the interview) - If they are not able to do this, then we will ask if we can reschedule the interview Our rationale for postponing is that it is better to risk the interviewee opting-out (i.e. not being available for a rearranged interview), than conducting an interview which doesn't give us the opportunity to collect the data we need.		
Introduction			
Aim: To introduce the research, ensure the interviewee is aware of and set the context for the proceeding discussion			3

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Keep the intro as brief as possible to leave room for the interview proper	• Introduce yourself and CAG Consultants [very brief] • State that the evaluation has been commissioned by BEIS • Introduce the study: - Overall objective of the research is to assess the extent to which the CCA scheme is achieving its objectives of improving energy efficiency whilst maintaining the competitiveness of energy-intensive industries - Findings will inform government policy development and the design of any future similar schemes • Talk through key points about the interview: - The purpose of the interview is to explore their understanding of why some non-eligible firms don't join the CCA scheme, and whether these firms approach energy efficiency in different ways from CCA firms		
	Data handling, privacy, recording - Tell respondent that the Interview data will be stored securely in accordance with the GDPR - Check they received information regarding the privacy notice - Explain that we would like to record the interview and explain that the recording, will not be shared outside of the research consortium, without their explicit consent - Any published findings or quotes from the interview will be fully anonymised - We would like to share anonymised interview transcripts/notes with BEIS. However, in case there are any difficulties in fully anonymising the interview, we will check at the end of the interview whether they are comfortable with the transcript being		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	shared - Check that they consent to you recording the interview [if they don't, still go ahead with interview, just take notes] [if the participant says they would prefer for any element of the transcript not to be shared with BEIS, record this, tell them that we will respect this wish, and proceed with interview anyway]		
	Before you begin: - Confirm that they are the person within the organisation who is best placed to comment about business perspectives on the CCA scheme. - Unless otherwise stated, we are interested in your organisation's views in relation to the questions we cover, so it would be helpful if you could highlight where you are answering questions from a personal viewpoint only. - Emphasise that there are no wrong or right answers. We want to hear their experiences and views. We want to hear what they have to say, in their own words - Ask the interviewee if they have questions before they start		
Background			
Aim: to help research participants 'warm-up' and to confirm and ascertain key background information			5
Aim to be brief in this section	Can you briefly outline the CCA services you provide to clients?	Probe: - what types of services they offer in relation to the CCA - to what extent are they generally already within a company and/or playing an energy management role? - or simply dealing with compliance, reporting to a	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
		firm's energy manager? - do they service any of the sector bodies, as well as participants?	
	How do CCA services fit within your wider offer to clients?	Probe: - are CCA services linked to wider energy management support? - are their energy management services linked to any particular energy monitoring software or kit? - are their energy management services linked to energy procurement?	
	What types of companies do you have as CCA clients?	Probe: - which sectors are their CCA clients in, mainly? - how big are their clients (any minimum threshold for CCA?)	
	What energy policies cover (or have covered) your CCA clients' energy use in the UK?	Probe for extent of coverage of all the following: - ESOS - CRC (phases 1 and 2) – up to end March 2019 - EU ETS (Phases I, II, III); - Energy Intensive Industries exemption - Climate Change Levy (CCL)	
	What are their CCA clients main drivers in decisions about energy?	Probe for cost savings, carbon/energy reductions, capacity constraints at times of peak demand, productivity improvements, public image/reputation, staying close to perceived Government priorities, compliance with legislation, energy security, etc.	
	How important are CSR/environmental motivations for their CCA clients?	e.g. do they have corporate energy/carbon targets?	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Do their CCA clients tend to have an energy management plan and/or energy/carbon reduction targets?	Probe: '- do they generally have ISO 50001 or 14001? - do they generally have an energy manager?	
Evaluation Question 1.2 What have been the participant (or non-participant) behaviours and attitudes during the scheme?			
Aim: to explore the non-participants perceptions about the second CCA scheme			5
	How would you describe the level of awareness of the CCA scheme amongst eligible (or possibly eligible) firms that haven't joined the scheme?	Probe to understand - the extent of awareness of the CCA at senior management level within firms that appear eligible but have not joined the CCA - the factors that have influenced the extent of senior management awareness - role of energy consultants or other external bodies in alerting the organisation to CCA opportunities Probe for differences between firms that don't employ an energy consultant and those that do.	
Explore in-depth	Thinking about eligible firms that haven't joined the scheme, do they tend to be different in any respects from those that have joined?	Probe for: - size (in terms of employees or energy use) - level of priority attached to CSR - energy intensity - sector - organisational capacity for energy management - energy monitoring Probe for I between firms that don't employ an energy consultant and those that do.	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Explore in-depth	Where firms could have joined the scheme but haven't done so, why do you think this is?	Explore the principal motivations for the organisation not joining the CCA scheme Probe for: - energy use too low for CCA participation to be cost-effective, particularly using a consultancy - lack of eligible activities - other exemptions from CCL (e.g. min-met, CHPQA, use of fossil fuels as feedstock) - CCA closed to new entrants - other factors (e.g. targets too challenging; fees too high; management time needed too high; interaction with other schemes/policies; already doing ISO 50001) Ask the participant to explain the factors behind the key reasons for eligible firms not joining (e.g. nature or scale of activities, size of company, organisational capacity, awareness)	
	Where eligible firms did decide to join the CCA scheme (when it was open to new entrants), were there typically any triggers for this?	Probe for: - ESOS requirements - interactions with ISO 50001 - reaching the threshold for CRC	
2.1. Are the energy/ carbon savings at CCA units greater than those for the counterfactual scenarios?			
Purpose: To develop an understanding of the organisation's energy efficiency activity and the factors that have influenced it, for counterfactual purposes			7

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
if involved with CCA clients (and not just with CCA sales…):	To what extent do you think the CCA influences organisational behaviours and activities for your CCA clients?	To what extent do they think it leads to energy and carbon savings above-and-beyond 'business-as-usual activity, for your CCA clients? Probe for the types of organisations that do/don't take their CCA energy targets seriously, and the factors that affect this: e.g. - how challenging or easy the targets are - general attitude to energy management - scale of CCL discount that is at risk - scale of potential buy-out payments - potential cost of taking action	
	Can you give any examples of ways in which you think the CCA has influenced energy management behaviours for your CCA clients?	Probe for: - energy monitoring - management focus on energy or carbon targets - actions taken to reduce buy-out or meet targets - energy efficiency investments	
	How would you characterise firms where the CCA hasn't prompted any action beyond BAU?	Probe whether these firms tend to be: - firms that were very committed to CSR and doing a lot anyway - firms that were very strong on cost management and were doing a lot anyway - firms that would easily meet their targets anyway - firms that always planned to buyout	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Do you think the energy management behaviour and practice of eligible non-joiners is different in any respects from your CCA clients, and if so how?	Probe for: - drivers for energy decisions - importance of CSR - capacity for energy management - level of energy monitoring - level of priority attached to energy management - level of investment in energy management - payback period required for energy efficiency investments	
Evaluation Question 2.3 Did the CCA scheme influence decisions about investment in the UK?			
Purpose: To develop an understanding of the organisation's decisions about investment in the UK, for counterfactual purposes			5
	Typically, how significant are energy costs for your CCA and non-CCA clients?	Probe: - what proportion of their overall costs are energy costs? (giving a range, if that's easier) - are there differences between CCA and non-CCA clients?	
	Typically, how much of their clients' energy use is liable to CCL (and, in the past, CRC) charges, and why?	Probe: - how were their clients affected by the CRC scheme ending? - and how far they affected by the new higher rate of CCL? - to what extent do CCA firms have other exemptions from CCL? - again, any systematic differences between CCA and non-CCA firms on these points? If so, what are the factors underlying these differences?	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
Note: interviewee may not be able to answer this fully, depending on their knowledge of energy-intensive industry	Have they observed any trends in firms moving energy-intensive activities away from the UK since April 2013?	If so, what types of activities have moved and what were the key drivers of locational decisions And what was the relative significance of CCL/CRC in the context of these other drivers	
Note: interviewee may not be able to answer this fully, depending on their knowledge of energy-intensive industry	Have they observed any trends in terms of firms making decisions to locate new or expanded energy-intensive activities in the UK since April 2013?	If so, what were the investment and what were the key drivers of these investment decisions And what was the relative significance of CCL/CRC in the context of these other drivers	
Note: interviewee may not be able to answer this fully,	Do they have any perception as to whether the CCA scheme has influenced these types of investments?	Probe: How much difference would it have made to the competitiveness and investment decisions of their clients their energy-intensive activities had not been subject to CCL (and CRC, where relevant)?	

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
depending on their knowledge of energy-intensive industry			
Evaluation Question 3: Is the CCA scheme offering value for money?			
Aim: to explore the cost-effectiveness of the CCA scheme from the perspective of a non-participant			3
	Typically, what is the threshold of energy use at which it becomes cost-effective for a firm to participate in the CCA?	Probe – is this different for firms that do or don't employ energy consultancies? - what might a firm have to pay for help to establish a CCA? - what might it have to pay for ongoing management of its CCA?	
	To what extent does your organisation think the CCA has resulted in any unintended effects?	e.g. - To their knowledge, have CCA targets disincentivised any actions/measures that would otherwise have benefited the environment or competitiveness? - Does competition with CCA firms cause problems for non-CCA firms?	
Evaluation Question 5: What can we learn for any future iterations of the CCA scheme and future policy?			
Aim: to explore general lessons from the experience of the CCA scheme and opportunities for improvement			5

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
If the interviewee is involved with CCA delivery…	What is your view – if any – of the overall effectiveness and efficiency of the CCA scheme?	Perceptions of the effectiveness and efficiency of the scheme overall. What works well? Opportunities for improvement in terms of: 1) encouraging energy efficiency 2) protecting competitiveness 3) streamlining scheme administration	
If not already covered…	What are the implications, if any, for your organisation in terms of the shift from CRC to higher CCL?	Will the carbon tax burden on the organisation change as a result of this, and if so how?	
	Do you have any suggestions on the value of a future CCA-type scheme?	What factors would affect this?	
Interview close and thank you			
			2
	Ask if interviewee would like to say anything else about their views about the CCA scheme and related policies		
	Thank the participant for their time. Reiterate that their anonymity will protected in our reporting. Tell them they are welcome to contact members of the study team to ask questions at a later date if they wish Check whether they are happy for the transcription to be shared with BEIS unanonymised or (if needed) anonymised as far as possible.		

Guidance for interviewer	Sub-topics	Prompts and probes	Indicative timing (mins)
	Check if they are happy to be contacted for future research on business energy efficiency		
	END INTERVIEW		

Appendix C: Quantitative Research Instruments

Recruitment Scripts

Table 36: Recruitment – if they opted in / provided contact details to us for use in the evaluation

Question type and instruction to researcher	Question	Options	Routing
If not obvious when they answer the phone, check it is the named contact speaking	Initial introduction for all Good morning/ afternoon [Is that <recall contact name>]?	Gatekeeper Target respondent	
Gatekeeper introduction	Introduction to gatekeeper where contact completing the online form has supplied a switchboard number My name is xxxx and I'm calling from a company called Winning Moves, on behalf of the Department for Business, Energy and Industrial Strategy (BEIS). Could you put me through to <recall contact name>? IF REQUIRED FOR GATEKEEPER: Winning Moves is part of a consortium of independent research consultants carrying out an evaluation of the second Climate Change Agreements Scheme on behalf of BEIS. The Environment Agency, who administer the scheme, made contact with <recall contact name> in April. In their response, <recall contact first name> said to contact them on this number to arrange an interview. Could you put me through to them or let me know when might be best to call back?	Proceed to recruitment of target respondent Arrange time to call back	If the person answering the phone is a gatekeeper
Confirm email address (most have supplied this already if they opted in) to send further details about the interview and the pre-interview questions. Confirm time for the interview if they are happy to proceed.	Introduction to CCA participant who completed the online form to supply contact details Good morning/ afternoon. My name is xxxx and I'm calling from a company called Winning Moves, on behalf of the Department for Business, Energy and Industrial Strategy (BEIS). The Environment Agency contacted you in April inviting you to provide your contact details to take part in interviews about your experience of the Climate Change Agreements (CCA) scheme. Thanks for providing these. We are contacting you to arrange an interview.	Arrange date and time for interview Arrange date and time to call back (e.g. if they want further information in writing first)	If the person answering the phone is the target respondent that opted in OR for use when transferred to that person

Question type and instruction to researcher	Question	Options	Routing
	Is there a convenient time in the next week or so for a conversation? We anticipate that the interview itself will take around 30 minutes. The interview will be strictly confidential, unless you give us permission otherwise, and used for research purposes only. It will not be possible to identify any individual or organisation in the published findings. The results will be used by the Department to inform decisions regarding future energy policy, so this is an opportunity for your organisation to feed into their decision making.		
Confirm or record email address	We'd like to send you some further information via email ahead of the interview, including a link to our privacy notice and some specific questions we'd like you to consider ahead of the call, if that's OK. Just a few questions that are easier to answer in a spreadsheet than over the phone. Related to this, can you confirm if you will be answering the questions for all your organisation's sites and TU's or only for those you are directly involved with? All sites (organisation level) Specific site/TU If you have time before the interview, could you consider questions 24-26 in the spreadsheet? We will ask these as part of the interview. Can I confirm your email address? Thanks for your time, we look forward to speaking with you further on <time> on <date>.		If agreed to an interview time/date Read the following If they state they can only provide information on specific sites

Table 37: Recruitment – if they didn't opt in / provide contact details

Question type and instruction to researcher	Question	Options	Routing
Gatekeeper introduction Use contact name if we have one (e.g. from LinkedIn). Use job title supplied by the Environment Agency Otherwise ask for the person responsible for energy management or dealing with their Climate Change Agreements if they know who does that.	Introduction to gatekeeper where contact completing the online form has supplied a switchboard number Good morning/afternoon. My name is xxxx and I'm calling from a company called Winning Moves, on behalf of the Department for Business, Energy and Industrial Strategy (BEIS). [if we have a contact name/job title] Could you put me through to <recall contact name/job title> [if we do not have a contact name/job title] Could you put me through to the person with responsibility for energy management, or whoever is best to speak to about your organisation's involvement in the Climate Change Agreements scheme? IF REQUIRED FOR GATEKEEPER: Winning Moves is part of a consortium of independent research consultants carrying out an evaluation of the second Climate Change Agreement Scheme on behalf of BEIS. I understand that your organisation has CCAs for one or more of your sites and want to talk to someone about your organisation's experience of the scheme and the impact it may have had.	Proceed to recruitment of target respondent Arrange time to call back	
Single response	Introduction for energy manager (or relevant person suggested by the gatekeeper) My name is xxxx and I'm calling from a company called Winning Moves, on behalf of the Department for Business, Energy and Industrial Strategy (BEIS). Winning Moves is part of a consortium of independent research consultants carrying out an evaluation of the second Climate Change Agreement Scheme on behalf of the BEIS. I understand that your organisation has CCAs for one or more of your sites and wanted to talk to you about your experience of the scheme and the impact it may have had. Are you the best person to talk to about the CCA for the following target units <recall unit names/codes from database>?	-Yes -No	
Find out who and repeat introduction	Who would be best to talk to about this?		If not the right person
Confirm time for the interview if they are happy to proceed.	Is there a convenient time in the next week or so for a conversation? We anticipate that the interview will take around 30 minutes. It will be strictly confidential, unless you give us permission otherwise, and used for research purposes only. It will not be possible to identify any individual or organisation in the published findings. The results will be used by the Department to inform decisions regarding future energy policy, so this is an opportunity for your organisation to feed into their decision making.	-Arrange date and time for interview -Arrange date and time to call back (e.g. if they want to review the information we send	When we have the right person

Question type and instruction to researcher	Question	Options	Routing
		before agreeing to participate)	
Confirm or record email address, thank respondent and close	We'd like to send you a bit more information via email ahead of the interview, including a link to our privacy notice and some specific questions we'd like you to consider ahead of the call, if that's OK? Just a few questions that are easier to answer in a spreadsheet than over the phone. Can I confirm your email address? Related to this, can you confirm if you will be answering the questions for all your organisation's sites and TU's or only for those you are directly involved with? All sites (organisation level) Specific site/TU If you have time before the interview, could you consider questions 24-26 in the spreadsheet? We will ask these as part of the interview. Thanks for your time, we look forward to speaking with you further on <time> on <date>.		

Pre-interview Questionnaire

Table 38: Pre-interview questionnaire

We would like to understand a bit about your energy consumption and the policies that apply to your energy. Please provide your best estimates when answering these questions

	Questions	
1	What are your total energy costs per annum (all UK sites) ? (Enter a number in £s)	
2	Only on the sites that are part of the CCA scheme, what proportion of your total operational costs (which includes staff costs, production costs, training, facilities etc) is spent on energy (electricity, gas, renewables)? Please provide as a percentage[27].	
3	What percentage of your energy consumption qualifies for participation in the: (For each enter a number between 0 and 100)	a) Climate Change Agreements scheme
		b) Carbon Reduction Commitment (CRC) (prior to it ending in March 2019)
		c) EU Emissions Trading System (EU ETS)
		d) Energy Intensive Industries exemption
4	How many of your sites hold a CCA? (Enter the number of sites)	
5	Do any of your CCA sites have: (Use the drop down menu in the response column)	a) CRC supplies on the same site
		b) EU ETS supplies on the same site
		c) both CRC and EU ETS supplies on the same site as CCA
6	What percentage of your non-CCA energy consumption is liable for the Climate Change Levy (CCL)? (Enter a number between 0 and 100)	
7	Which, if any, of the following reasons explain why some of your energy consumption is exempt from the CCL? (Only answer if any of your non-CCA energy consumption is not liable for CCL. Use the drop down menus in the response column to indicate (yes or no) which of the options a) to k) apply)	
		a) Supplies not for burning or consumption in the UK (exports)
		b) Supplies liquefied Petroleum gas and solid fuel intended for re-sale

[27] Originally, respondents were asked the following question about operational costs: Approximately, what percentage of your operational costs are energy for the facilities with CCAs? (Enter a number between 0 and 100). However, this question was unclear for respondents and led to inaccurate estimates of energy costs. WM decided to go back to respondents with the revised question. This resulted in more accurate estimates that were more in line with expected figures.

	Questions	
		c) Supplies used in forms of transport eligible for exemption
		d) Supplies to producers of taxable commodities other than electricity
		e) Supplies to electricity producers (other than combined heat and power (CHP) stations, small generating stations and stand-by generating stations)
		f) Supplies to CHP stations
		g) Supplies by small generating stations (other than CHPs) used to generate any electricity that's not self-supplies
		h) Supplies not used as fuel
		i) Electricity generated from renewable sources (before 1st August 2015)
		j) Supplies of electricity from Good Quality CHP stations
		k) Supplies for use in metallurgical and mineralogical processes
8	Thinking about your whole organisation, will your overall annual energy costs increase or decrease or stay the same as a result of CRC ending in March 2019? (Use the drop down menu in the response column)	
9	If you answered increase, please state why: (Only answer if costs will increase)	
10	If you answered decrease, please state why: (Only answer if costs will decrease)	
11	If you answered there is no change, please state why: (Only answer if costs will stay the same)	
12	At the beginning of your participation in the second CCA? (e.g. making arrangements for 'migration' from the first scheme, finding out about and understanding the CCA requirements and eligible processes, providing evidence of your baseline consumption, assessing whether non-CCA processes were covered by the 70:30 rule, making arrangements for multiple facilities within a TU, contributing to negotiation of sector targets, defining the throughput measures used for relative/Novem targets) (Enter number of days i.e. how much staff time was spent)	
13	For TP1? (e.g. collecting and collating energy consumption data, providing data to the sector body, dealing with data queries, negotiating changes to your TU agreement (e.g. for facilities leaving or joining the scheme)) (Enter number of days)	
14	For TP2? (Enter number of days)	

	Questions
15	For TP3? (Enter number of days)
16	Other than the EA and sector body fees, did your organisation incur any external costs as a direct result of CCA, that would not have been incurred anyway (this could include additional energy consultant support, external support with data provision, purchase of energy monitoring equipment or software)? (Use the drop down menu in the response column. If you answer 'No' to this question, please go to question 19)
17	What did you have to pay for? (Please describe)
18	What was the approximate total cost? (Enter a number in £s)
19	Did you incur any other costs for CCA participation other than fees to the EA, sector body fees and the external costs already covered? (Use the drop down menu in the response column) If you answer 'Yes' to this question, please go to question 20. If you answer 'No' to this question, please go to question 22.
20	What did you have to pay for? (Please describe)
21	How much does this cost per year? (Enter a number in £s)
22	Have you been audited by the EA during the second CCA scheme? (Use the drop down menu in the response column)
23	How much time did this take you? (Enter number of days)
	Can you also consider the following questions on 'Actions to improve energy efficiency' as these will be asked in the interview
24	On how many sites have you done any of the following since you became part of the second CCA scheme since April 2013? THIS IS A MULTIPLE RESPONSE QUESTION (Please enter number of sites for any of the relevant categories below. Use zero if not relevant for any of your sites. If needed, please consider and collate information from other colleagues in preparation for the interview)
	A major upgrade of your/an entire site
	Changes to improve the energy efficiency of your core processes: replacement of production or process equipment; improvements to production or process equipment; optimising controls and how you use existing production or process equipment)
	Changes to improve the energy efficiency of your auxiliary services that support your core processes (e.g. supply of air): Replacement of equipment used for these processes; Improvements to auxiliary equipment; Optimising controls to reduce auxiliary energy use)
	Measures to improve the energy efficiency of the space/building

	Questions
	Installation of additional metering
	Site closure and rationalisation of sites
	Change in fuel used for your core processes, including switching to renewables
	Change in fuel used for at least some secondary processes, including switching to renewables
25	Have you taken any other actions that have improved your energy efficiency? (Think about answers to these questions and consult with colleagues if needed. (If 'yes' please answer 25a and 26)
25a	What actions have you taken? (Think about answers to these questions and consult with colleagues if needed.
26	Approximately, how much have you invested in total to make these changes? (Enter a number in £s) (Think about answers to these questions and consult with colleagues if needed.

Telephone Survey

Table 39: Telephone Questionnaire

Introduction (1 minute)

Question type and instruction to researcher	Question	Options	Routing
Rearrange appointment	When would be a good time for me to call back?		Ask only if it isn't a good time to talk
Single response with verbatim	Just to recap before we start, everything you tell us will be treated as strictly confidential, unless you give us permission otherwise, and used for research purposes only. It will not be possible to identify any individual or organisation in the published findings. All of our calls are recorded for quality and training purposes. Data will be stored securely in accordance with data protection regulations, as detailed in the privacy notice we shared ahead of the call. Can I check that you are happy to continue?	-Yes -No	
Thank and close if they are not happy to continue, and capture reason verbatim	Could I ask why you are not happy to continue? Thank you for your time		Ask only in the (unlikely) event they are not happy to continue at this stage

Background (2 minutes)

Question type and instruction to researcher	Question	Options	Routing
I'd like to start by asking some background questions about your organisation…			
Capture verbatim for organisation overall	1.Could you briefly describe what your organisation does?		
Single response	2.In terms of your organisational structure – are you part of a group with a parent company?	-Yes -No -Don't know (do not prompt)	
Single response	3.Is the parent company based in the UK or outside the UK?	-In the UK -Outside the UK	Only ask if yes to q2
	3a. How many sites does your company have in the UK?		
Single response	4.Does your organisation have any sites outside the UK?	-Yes -No	
Capture number	5.How many sites do you have outside the UK?		Only ask if Yes at q4
Capture number (NB approximate estimate is fine if not sure)	6.How many people does your organisation employ outside the UK?		Only ask if Yes at q4
	7.Can I please confirm in which of the following your organisation has participated? The first CCA scheme, commencing in January 2001 and running until March 2013 The second CCA scheme, commencing in April 2013 and running until March 2023 The CRC Scheme (previously known as 'Carbon Reduction Commitment) EU Emissions Trading System (EU ETS) Energy Intensive Industries compensation and exemption schemes (EU ETS & CPS, RO & FITS)	[FOR EACH] -Yes -No -Don't know	

Energy intensive processes and general plans (3 minutes)

Question type and instruction to researcher	Question	Options	Routing
Thank you. I'd like to talk now about your energy intensive processes and general plans you have in place for investment in energy efficiency.			
Capture verbatim – just a broad description to get them talking about the kinds of process they have	8.To start with, just to give me a general understanding, could you briefly describe the processes you have that are energy intensive?		
Single response	9.Do you have a plan or strategy for ongoing investment in measures that reduce your energy consumption or carbon footprint?	-Yes -No -Unsure (Do not read aloud)	
Capture verbatim and code. Tailor wording according to how they refer to it (plan / strategy)	9a(i). Do you have specific targets, other than those in the CCA agreement? If so, please can you briefly describe the goals or targets of your plan or strategy?	-Has specific targets -Does not have specific targets	Only ask if yes to q9
Capture verbatim and code time period. Confirm if obvious from response to previous question	9a(ii) What period of time does your plan/strategy cover?	-Year ahead only -2-3 years -4-5 years -More than 5 years	Only ask if yes to q9
Capture verbatim	9b.Why don't you have a plan or strategy for investment?		Only ask if no to q9
Single response. Capture verbatim if any comments are offered around the responses, but this is a nice to have	10.I'm going to read out a list, and I'd like you to tell me if you take this into consideration when you make capital investment in energy efficiency measures? -The degree of alignment with your strategic plans to reduce your energy consumption or carbon footprint -Energy price forecasts -CCL rates -The payback period for the measure (i.e. in months or years) -Operational impacts of installation (e.g. downtime) -Whether the measure is tried-and-tested -Whether the measure would require third-party finance or could be self-financed -Contribution towards CCA targets	[FOR EACH] -Yes -No -Don't know -Not applicable	Eliminate option on alignment with their strategic plan if they do not have one Eliminate option on contribution to CCA targets if they have left

Question type and instruction to researcher	Question	Options	Routing
	-Contribution towards your own targets for reducing energy consumption or carbon footprint		the CCA scheme

Actions to improve energy efficiency (8 minutes)

Question type and instruction to researcher	Question	Options	Routing
Thank you. I'd like to move to talking about actions you have taken to improve your energy efficiency since you became part of the second CCA scheme. I'd like to focus on facilities and processes that already existed when you joined the scheme, and only the activities covered by your CCA(s). [NB to researcher: If they were also part of the first CCA scheme, ensure we are only capturing information since the second scheme began in 2013]			
Prompted. Capture number of sites and code Auxiliary services are the secondary processes that support their core processes. CATI to show the researcher the number of facilities in the CCA scheme. Researcher to code as 'all of your sites' if they have taken action and have only one facility	11.(A) So, thinking only about activities covered by CCAs in the second CCA scheme… [On how many sites] have you done any of the following since you became part of the second CCA scheme i.e. since April 2013 Changes to improve the energy efficiency of your core processes: Replacement of production or process equipment Improvements to production or process equipment Optimising controls and how you use existing production or process equipment Changes to improve the energy efficiency of your auxiliary services that support your core processes (e.g. supply of air)… Replacement of equipment used for these processes Improvements to auxiliary equipment Optimising controls to reduce auxiliary energy use Measures to improve the energy efficiency of the space / building Installation of additional metering	[FOR EACH] -None of your sites -At least one of your sites -A few but less than half of your sites -Roughly half your sites - On a majority (i.e. more than half), but not all of your sites -On all of your sites -[DO NOT READ OUT] don't know	

Question type and instruction to researcher	Question	Options	Routing
	Site closure/rationalization of sites Change in fuel used for your core processes, including switching to renewables Change in fuel used for at least some secondary processes, including switching to renewables A major upgrade of your/an entire site		
Single response	12.Have you taken any other actions that have improved your energy efficiency?	-Other actions taken -No other actions taken	
Capture verbatim	12a. What actions have you taken?		Only ask if answer to q12 is other actions taken
Capture verbatim and code, unprompted	12b. Why haven't you taken any action?	-Barriers related to competencies (e.g. to identify inefficiencies or implement the action) -Informational barriers (e.g. on costs and benefits of action to make the business case) -Behavioural barriers in the organisation (e.g. general inertia, lack of interest in energy efficiency, other priorities) -Financial barriers (lack of capital) -Lack of time / resources other than finance -Other reasons	If no action taken in q11 AND q12
Numeric response (£) Recap on actions taken if necessary	13.Approximately how much have you invested in total to make these changes?		Only ask if action has been taken in q11 and/or in q12
Single response	14.Is this: an exact figure, or an approximate estimate?	-an exact figure -an approximate estimate	Only ask if action has been taken in q11 and/or in q12 and could provide figure in q13
Single response, prompted	15.Thinking about the changes we have just discussed, which of the following best describes what would have happened if you had not participated in the second round of Climate	-We would have taken all of the same actions anyway -We would have taken all of the same actions, but with different timing or not to the same extent	Only ask if action has been taken in q11 and/or in q12

Question type and instruction to researcher	Question	Options	Routing
	Change Agreements (CCAs) and had been fully exposed to CCL on these activities:	-We would have taken some, but not all of the actions -We would not have taken any of these actions at all	
Capture verbatim and code multiple response Make sure to probe for details where they mention other energy policies. Actions might have been taken because of revenue generation opportunities (e.g. flexibility services) as well as because of policy costs	15a. Why do you say that?	-Rising energy prices -Upgrading facilities anyway to expand production -Upgrading facilities anyway to improve productivity -Upgrading facilities to maintain business continuity (major upgrade was due) -Equipment needed to be replaced -Driven by wider restructuring or changes to business -Corporate commitment to carbon/energy targets (irrespective of CCA) -Influence of other energy policies – policy costs -Influence of other energy policies – revenue generation opportunity -Other	If they would have taken all of the same actions anyway in q15
Capture verbatim and code multiple response	15b(i). Is that not to the same extent, not as quickly or both?	-Not to the same extent -Not as quickly -Both	If they would have taken all of the same actions anyway, but with different timing or not to the same extent in q15
Capture how many years if they say more than 5 years	15b(ii)When would all of these actions have been completed in the absence of your CCAs?	-Would have taken up to 6 months longer -At least 6 months, but less than a year -At least a year, but less than two years -At least two years, but less than three years -At least three years, but less than five years -Five or more years later [O]	If not as quickly or both in q15b(i).
Confirm which actions would have been different (what) and then capture why in the verbatim box	15b(iii) You [also] said action wouldn't have been taken to the same extent. Which actions would have been different?	OPTIONS TO BE ACTIONS SELECTED IN q11 plus -Other actions in q12	Ask only if not to the same extent or both in q15b(i)

Question type and instruction to researcher	Question	Options	Routing
Capture verbatim and code. Unprompted	15b(iv) Why would it have been different?	-Lack of awareness (e.g. if particular course of action or technology recommended by sector body) -Barriers related to competencies (e.g. to identify inefficiencies or implement the action) -Informational barriers (e.g. on costs and benefits of action to make the business case) -Behavioural barriers in the organisation (e.g. general inertia, lack of interest in energy efficiency, other priorities) -Financial barriers (lack of capital) -Lack of time / resources other than finance -Other reasons	Ask only if not to the same extent or both in q15b(i)
Code which actions would not have been taken and record why in the verbatim box	15c. Which actions **would not** have been taken in the absence of the second round of CCAs and why?	OPTIONS TO BE ACTIONS SELECTED IN q13 plus -Other actions in q15	If they would have taken some but not all of the actions in q15
Capture verbatim why they would not have taken any of these actions at all in the absence of CCA	15d. Why not?	-Lack of awareness (e.g. if particular course of action or technology recommended by sector body) -Barriers related to competencies (e.g. to identify inefficiencies or implement the action) -Informational barriers (e.g. on costs and benefits of action to make the business case) -Behavioural barriers in the organisation (e.g. general inertia, lack of interest in energy efficiency, other priorities) -Financial barriers (lack of capital) -Lack of time / resources other than finance -Other reasons	If they would not have taken any of these actions at all in q15
Single response	16.When thinking about energy efficiency improvements, do you use the same approach across all of your business activities, or does it differ for CCA activities?	-Yes – the approach is same for all activities -No- the approach is different for activities covered by CCAs	Only ask if they have some UK sites where there are no CCAs
Code all that apply (multi response) and	16a. Why?	-Non-CCA activities are similar to those covered by CCAs -Targets/priorities for non-CCA sites are the same as for CCA sites	Ask only if the approach is the

Question type and instruction to researcher	Question	Options	Routing
capture other reasons in the verbatim box		-Developed an approach for use in the CCA scheme and have rolled it out elsewhere -Easier / more efficient to manage everything using the same approach -Other reasons [O]	same for all activities
Capture verbatim and code, unprompted	16b(i) Why is it different for activities covered by the CCA scheme?	More energy efficiency action on other activities because they are more energy intensive (e.g. those covered by EU ETS) they are liable for full CCL because they were liable for CRC Less energy efficiency action on other activities because they are less energy intensive do not contribute to CCA targets Other	If approach is different for activities covered by the CCA scheme Researchers will not be responsible for developing relevant codes. The Project Manager and Field Manager will constantly review responses and will be responsible for developing relevant codes as the responses come in
	16b(ii) Is that entirely due to the CCA scheme or just partly due to the CCA scheme?	-Entirely due to the CCA scheme -Partly due to the CCA scheme -Not due to the CCA scheme	If approach is different for activities covered by the CCA scheme
Single response	17.Industrial heat recovery is a process by which heat that otherwise would be wasted, is recovered and utilised. In the last 5 years has your organisation investigated the feasibility of	-Investigated -Implemented -Not undertaken any heat recovery	

Question type and instruction to researcher	Question	Options	Routing
Provide this information on the IHRS Programme if the respondent is not sure what it is.	or implemented any heat recovery process (including through the IHRS Programme)? The Industrial Heat Recovery Support (IHRS) programme supports investment in heat recovery technologies. Businesses can apply for a grant to partially fund a project to recover and reuse heat that would otherwise be wasted. You can find more information about IHRS by searching for the term on the gov.uk website.		

Location / relocation of energy-intensive processes (1-5 minutes)

Question type and instruction to researcher	Question	Options	Routing
Thanks. Still thinking about energy intensive facilities and processes in the UK that **existed at the time you joined the second CCA scheme, and only those covered by the second CCA scheme**			
Single response	18.…Have any of those energy-intensive business activities: Ceased entirely since April 2013? Been relocated since April 2013?	[FOR EACH] -Yes -No -Don't know	
Single response. Confirm this is still about activities in existence since April 2013 if respondent asks	19.And has your organisation considered or are you considering relocating any of the activities [in existence since April 2013]?	-Yes – considered it, but decided not to -Yes – considering it, but have yet to make a final decision -No -Don't know	Only ask if no to relocation in q18.
Single response. Only say [whether inside or outside the UK] if they said in earlier responses, they have sites outside the UK.	20.Was/Is that relocation: To an existing site from which you operate, [whether inside or outside the UK] To a new facility Both	-Existing site -New facility -Both -Don't know	Only if activities have been relocated (in q18) OR this has been considered / is being considered (q19) Tailor wording according to earlier response i.e. whether activities have been

Question type and instruction to researcher	Question	Options	Routing
			relocated or this is just under consideration
Multiple response	21.And was/is that relocation: To a site or facility elsewhere in the UK To a site or facility **outside** the UK, but in the EU / European Economic Area? To a site or facility outside the EU or European Economic Area?	-Elsewhere in the UK -Outside the UK, but in the EU/EEA -Outside the EU/EEA -Don't know	Only if activities have been relocated (in q18) or this has been considered / is under consideration (q19)
Capture verbatim and categorise multiple response, all that apply. Unprompted	22.What prompted you to <relocate / consider relocating> this/these business activities?	-Rising energy costs -Increases in other costs (e.g. raw materials, labour) -Carbon taxes -Decline in sales / demand -Opportunity to increase profitability by relocating -Wider business change (e.g. change in business ownership, merger, general corporate restructure) -Other	Only if activities have been relocated (in q18) or this has been considered / is under consideration (q19)
Capture verbatim and categorise multiple response, all that apply, unprompted	23.For the activities you mentioned had ceased since April 2013, why did these cease?	-Rising energy costs -Increases in other costs (e.g. raw materials, labour) -Carbon taxes -Decline in sales / demand -Opportunity to increase profitability by relocating -Something else (e.g. change in business ownership, merger, general corporate restructure)	Only if activities have been ceased (in q18)
Thanks. And thinking now about new sites or facilities since 2013…			
Single response	24.Has your organisation set up any new sites or facilities in the UK where you are undertaking energy-intensive activities?	-Yes -No -Don't know	
Capture number or don't know	24a. How many new sites or facilities have you set up in the UK since 2013 where you are undertaking energy-intensive activities?		Only ask if yes to q24
	25.Did you consider locating any of these sites, or the processes undertaken there, outside the UK, or was that not an option in your case?	-Yes, this was considered for the site (or for one or more of the sites)	Only ask if yes to q24

Question type and instruction to researcher	Question	Options	Routing
		-No, this was an option in principle, but it was not considered -No, this was not appropriate (e.g. these were new retail premises for UK customers)	
Capture verbatim and code multiple response, unprompted	26.Why was it decided to locate these sites or facilities in the UK specifically?	-Part of site expansion plans / organic growth of activity on existing site -Part of geographic expansion plans elsewhere in the UK -Entirely UK-based business so never considered locating them elsewhere -UK preferable due to proximity to suppliers -UK preferable due to proximity to skills base -UK preferable due to proximity to other necessary infrastructure -UK preferable due to proximity to customers -UK preferable due to CCAs -Other reasons	Only ask if yes to q25
	27.Are the core processes on your new site(s) eligible for the CCA scheme?	-All are eligible -Some are eligible -No	Ask only if yes to q24
Single response	28.Thinking about the sites with processes eligible for the CCA scheme. On a scale of 1-5, where 1 is very low importance and 5 is very high importance, how important was the CCA scheme in your decision to: Set up the site / new process at all? Set up the site / new process in the UK? If necessary – if it wasn't important at all you can rate it as 0.	[FOR EACH] 1 – Very low importance 2 – Low importance 3 – Medium importance 4 – High importance 5 – Very high importance 0 – Not important at all – for use only if required	Ask only if some or all are eligible in q27
	28a.Why do you say that?		Ask only if some or all are eligible in q27

Attitudes towards CCAs (5 minutes)

Question type and instruction to researcher	Question	Options	Routing
I'd like to move on to discuss your experience of the second CCA scheme.			
Capture verbatim This is just an initial question to get them thinking about the reasons they are participating	29.Why did you decide to take part in the second CCA scheme?		
Single response Probe to confirm is that very low/high importance.	30.On a scale of 1-5, where 1 is no importance at all and 5 is very high importance, how important were the following in your decision to participate in the second scheme: The reduction in CCL The reduction in CRC The cost of 'buy out' if targets were not reached The nature of the target for your sector(s) (e.g. absolute, relative, Novem) The likelihood of your organisation meeting the energy reduction target for your sector(s) Demonstrating green credentials	FOR EACH 1 – No importance at all 2 – Low importance 3 – Medium importance 4 – High importance 5 – Very high importance	Code 'not important at all' if they say it
Single response	31.On a scale of 1-5, where 1 is not at all and 5 is a great deal, to what extent, if at all, has the CCA scheme influenced your approach to energy management?	1 – Not at all 2 3 4 5 – A great deal Don't know	
Capture verbatim	31a Why do you say that?		
Single response	32.And, thinking about your organisation's investment in energy efficiency specifically, has the influence of the CCA scheme increased or decreased over time or has there been no change?	-increased a lot -increased a little -no change in level of influence -decreased a little -decreased a lot	
Capture verbatim	32a. Why do you say that?		

Question type and instruction to researcher	Question	Options	Routing
Single response [NB terms to be covered in researcher training. Novem targets are normalised relative targets rather than absolute targets]	33.Have there been any changes to your Target Unit agreement(s) since 2013? (e.g. introduction of Novem targets; entry/exit of individual facilities; changes to EU ETS coverage)	-Yes -No	
Capture verbatim and code, multiple response	Q33a. Why were these changes made?	-Policy scope changes (e.g. change to EU ETS participation) -Organisational changes (e.g. change in site ownership) -Process changes (e.g. changes in product specification) -Other	Only ask if yes to q33
Capture verbatim and code	Q33b. How have these changes affected performance against targets?	-Targets more difficult to reach -Targets easier to reach No difference	Only ask if yes to q33
Single response	34.On a scale of 1-5 where 1 is not at all confident and 5 is completely confident, When you first registered for the scheme, how confident were you that your organisation would be able to meet your CCA targets?	1 – Not at all confident 2 3 4 5 – Completely confident	
Capture verbatim	35.According to our records I understand you missed the target on one (or more) of your TUs in <TP1/TP2/TP3>. Is that correct?	-Yes -No	Only ask if missed target in TP1 or TP2 or TP3 (database)
Multiple response and capture verbatim, Capture details about which TU they are talking about if the reasons vary	36.Why did you miss the TP1 target?	-Increased production -Decreased production -Process changes -Product specification changes -Other reasons -Don't know	Only ask if missed target in TP1
Capture verbatim	37.Why did you miss the TP2 target?	As above	Only ask if missed target in TP2

Question type and instruction to researcher	Question	Options	Routing
Capture verbatim	38.Why did you miss the TP3 target?	As above	Only ask if missed target in TP3
Single response	39.According to our records I understand you generated a surplus on one (or more) of your TUs in <TP1/TP2/TP3>. Is that correct?	-Yes -No	Only ask if generated a surplus in TP1 or TP2 or TP3
Multiple response and capture verbatim	40.Why did you generate a surplus in TP1?	-Increased production -Decreased production -Process changes -Product specification changes -Other reasons -Don't know	Only ask if generated a surplus in TP1 (database)
Single response	41.Why did you generate a surplus in TP2?	As above	Only ask if generated a surplus in TP2 (database)
Single response	42.Why did you generate a surplus in TP3?	As above	Only ask if generated a surplus in TP3 (database)
Single response Reference database for information about buy-out use	43.How did the cost of the buy-out charges compare to the financial costs and risks/hassle costs you would have incurred in meeting targets?	-Costs of buy-out were much less -Costs of buy-out were a little less -Costs of buy-out were the same -Costs of buy-out were a little more -Costs of buy-out were a lot more -Don't know as we didn't undertake analysis to look at this	Only ask of those who paid buy out (database)
Single response Reference database for information about buy-out use	44.How did the cost of the buy-out charges compare to the costs of losing the CCL discount for the next 2-year period?	-Costs of buy-out were much less -Costs of buy-out were a little less -Costs of buy-out were the same -Costs of buy-out were a little more -Costs of buy-out were a lot more	Only ask of those who paid buy out (database)
Single response	45.Are you expecting to meet your targets in TP4?	-Yes -Maybe -No -Don't know	
Capture verbatim	45a.Why do you say that?		

Experience of engaging with sector bodies (4 minutes)

Question type and instruction to researcher	Question	Options	Routing
Single response, recall information from database	46. I understand that <recall sector body / sector bodies> manages your CCAs – is that correct?	-Yes -No	
Capture verbatim	47.Which sector body or sector bodies manage(s) your CCA(s)?		Only ask if no to q46
For each sector body. Single response with verbatim.	48. How efficient is <recall sector body>'s management of the [state CCA agreement name]?	-Very efficient -Efficient -Neither efficient nor inefficient -Inefficient -Very inefficient	
	48a. Why do you say that?		
Capture code and verbatim for each sector body.	49.Are there any aspects of the sector body's management of the CCA that could be improved?	-Yes -No	
Capture verbatim	49a. How?		If yes to q49
For each sector body, single response	50.On a scale of 1-5 where 1 is 'not at all' and 5 is 'to a great extent', to what extent has your sector body motivated you to meet your targets?	1- not at all 2 3 4 5 – to a great extent	
For each sector body, single response	51.On a scale of 1-5 where 1 is 'not capable at all' and 5 is 'very capable', how would you rate the capability of your sector body to support you to improve your energy efficiency or reduce your carbon emissions?	1- not capable at all 2 3 4 5 – very capable Don't know	
For each sector body. Capture verbatim	52.Are there any services not currently provided by your sector body/bodies that would be helpful to your organisation, as a CCA participant?	Yes No	Verbatim box on yes

Future plans (1 minute)

Question type and instruction to researcher	Question	Options	Routing
Single response	53.How likely is the firm to remain in the current CCA scheme and any potential future scheme?	-Very likely -Quite likely -Neither likely nor unlikely -Not very likely -Not at all likely	Do not ask if they have already left the scheme (database)
Capture verbatim	53a. Why do you say that?		Do not ask if they have already left the scheme

At this point, if we have received a completed spreadsheet from them close interview. If not, ask if they've had chance to fill it in and ask if they have a few minutes to go through it over the phone.

Interview close (1 minute)

Question type and instruction to researcher	Question	Options	Routing
Thank you for sparing time to speak with me today.			
	54.As part of our quality procedures our research manager might call you back to verify some of your answers, is this OK?	Yes No	
Confirm they are happy for their contact details and survey responses to be shared with CAG	55.CAG Consultants, who are leading the evaluation of the CCA scheme, will be speaking to a small number of organisations in further detail about their experience of the CCA scheme, the reasons underlying their CCA performance and the influence of the CCA on their organisation relative to other factors. Are you willing to be contacted by CAG Consultants for this purpose? Your contact details and responses to this survey will be shared with.	Yes No	

Table 40: Online questionnaire for CCA participants

Energy consumption
1. What are your total energy costs per annum? [Small open textbox]
2. Approximately, what percentage of your operational costs are energy for the facilities with CCAs? [Small open textbox]%
3. What percentage of your energy consumption qualifies for participation in the: • Climate Change Agreements scheme [Small open textbox] % • Carbon Reduction Commitment (prior to it ending in March 2019) [Small open textbox]% • EU Emissions Trading System (EU ETS) [Small open textbox]% • Energy Intensive Industries Exemption [Small open textbox]%
4. What percentage of your non-CCA energy consumption is liable for the Climate Change Levy (CCL)? [Small open textbox]%
5. If any of your non-CCA energy is not liable for the Climate Change Levy, which of the following reasons explain why? [Select all that apply] □ Supplies not for burning or consumption in the UK (exports) □ Supplies liquefied Petroleum gas and solid fuel intended for re-sale □ Supplies used in forms of transport eligible for exemption □ Supplies to producers of taxable commodities other than electricity □ Supplies to electricity producers (other than combined heat and power (CHP) stations, small generating stations and stand-by generating stations) □ Supplies to CHP stations □ Supplies by small generating stations (other than CHPs) used to generate any electricity that's not self-supplies □ Supplies not used as fuel □ Electricity generated from renewable sources (before 1st August 2015) □ Supplies of electricity from Good Quality CHP stations □ Supplies for use in metallurgical and mineralogical processes □ N/A
Background
6. How many sites does your organisation have outside of the UK? [Small open textbox]
7. Which schemes has your organisation participated in: [Select all that apply] □ The first CCA scheme, commencing in January 2001 and running until March 2013 □ The second CCA scheme, commencing in April 2013 and running until March 2023 □ The CRC Scheme (previously known as ‘Carbon Reduction Commitment’) □ EU Emissions Trading System (EU ETS) □ Energy Intensive Industries compensation and exemption schemes (EU ETS & CPS, RO & FITS)
Energy intensive processes and general plans

8. Do you have a plan or strategy for ongoing investment in measures that reduce your energy consumption or carbon footprint?
- Yes
- No

9. Do you have specific targets, other than those in the CCA agreement?
- Yes
- No (If no, please skip to question 12)

10. If so, please can you briefly describe the goals or targets of your plan or strategy? [Open textbox]

11. What period of time does your plan/strategy cover?
- [Drop down]
- Year ahead only
- 2-3 years
- 4-5 years
- More than 5 years
- N/A

12. Which of the following do you take into account when you make capital investment in energy efficiency measures?

[Select all that apply]

□ The degree of alignment with your strategic plans to reduce your energy consumption or carbon footprint
□ Energy price forecasts
□ CCL rates
□ The payback period for the measure (i.e. in months or years)
□ Operational impacts of installation (e.g. downtime)
□ Whether the measure is tried-and-tested
□ Whether the measure would require third-party finance or could be self-financed
□ Contribution towards CCA targets
□ Contribution towards your own targets for reducing energy consumption or carbon footprint

Actions to improve energy efficiency

13. For activities covered by CCAs in the second scheme, on how many sites have you done any of the following since you became part of the second CCA scheme (since April 2013)?

	None	At least one	A few but less than half	Roughly half	On a majority but not all	All of your sites
Changes to improve the energy efficiency of your core processes:						
Replacement of production or process equipment	□	□	□	□	□	□
Improvements to production or process equipment	□	□	□	□	□	□
Optimising controls and how you use existing production or process equipment	□	□	□	□	□	□

Changes to improve the energy efficiency of your auxiliary services that support your core processes (e.g. supply of air):						
Replacement of equipment used for these processes	□	□	□	□	□	□
Improvements to auxiliary equipment	□	□	□	□	□	□
Optimising controls to reduce auxiliary energy use	□	□	□	□	□	□
Other Changes:						
Measures to improve the energy efficiency of the space / building	□	□	□	□	□	□
Installation of additional metering	□	□	□	□	□	□
Site closure/rationalization of sites	□	□	□	□	□	□
Change in fuel used for your core processes, including switching to renewables	□	□	□	□	□	□
Change in fuel used for at least some secondary processes, including switching to renewables	□	□	□	□	□	□
A major upgrade of your/an entire site	□	□	□	□	□	□

14.Have you taken any other actions that have improved your energy efficiency? If yes, what?

- Yes
- No
- [Small open text box]

15. If you have not taken other actions, is this because:

[Select all that apply]
□ Barriers related to competencies (e.g. to identify inefficiencies or implement the action)
□ Informational barriers (e.g. on costs and benefits of action to make the business case)
□ Behavioural barriers in the organisation (e.g. general inertia, lack of interest in energy efficiency, other priorities)
□ Financial barriers (lack of capital)
□ Lack of time / resources other than finance
□ Other reasons
□ N/A

16. Approximately how much have you invested in total to make these changes?
£ [Small open textbox]

17. Which of the following best describes what would have happened if you had not participated in the second round of Climate Change Agreements (CCAs) and had been fully exposed to CCL on these activities:

[Multiple choice – drop down]
- We would have taken all of the same actions anyway
- We would have taken all the same actions but with different timing
- We would have taken all the same actions not to the same extent
- We would have taken some, but not all of the actions
- We would not have taken any of these actions at all

If you would not have taken any of these actions please skip to question 18

a. Why do you give this response?

[Drop down]
- Rising energy prices
- Upgrading facilities anyway to expand production
- Upgrading facilities anyway to improve productivity
- Upgrading facilities to maintain business continuity (major upgrade was due)
- Equipment needed to be replaced
- Driven by wider restructuring or changes to business
- Corporate commitment to carbon/energy targets (irrespective of CCA)
- Influence of other energy policies – policy costs
- Influence of other energy policies – revenue generation opportunity
- Other

b. Which actions would have been different? [if not to the same extent or with different timing]
[Open textbox]

c. Why would they have been different? [if not to the same extent or with different timing]
[Open textbox]

d. Which actions would not have been taken in the absence of the second round of CCAs and why? [if would have taken some but not all]
[Open textbox]

e. Why not? [if would have taken some but not all]
[Open textbox]

18.When thinking about energy efficiency improvements, do you use the same approach across all of your business activities, or does it differ for CCA activities?

- Yes - the approach is same for all activities
- No- the approach is different for activities covered by CCAs

a. If no, why is it different for activities covered by the CCA scheme?

[Drop down]
- More energy efficiency action on other activities because
- they are more energy intensive (e.g. those covered by EU ETS)
- they are liable for full CCL

- because they were liable for CRC
- Less energy efficiency action on other activities because they are
- less energy intensive
- do not contribute to CCA targets
- Other

19.Industrial heat recovery is a process by which heat that otherwise would be wasted, is recovered and utilised.

In the last 5 years has your organisation investigated the feasibility of or implemented any heat recovery process (including through the IHRS Programme)?

[Drop down]
- Investigated
- Implemented
- Not undertaken any heat recovery

Location / relocation of energy-intensive processes

20.Have any of your energy intensive business activities that existed at the time you joined the second CCA scheme been relocated since April 2013?

- Yes
- No

a. If not, has your organisation considered or are you considering relocating any of these activities?

[Drop down]
- Yes – considered it, but decided not to
- Yes – considering it, but have yet to make a final decision
- No (If no, please skip to question 22)
- Don't know

b. If you have relocated or considered relocating these activities energy intensive business activities, was that relocation to

[Select all that apply]
□ An existing site
□ A new facility
c. And was that:
Elsewhere in the UK Outside the UK but in the EU/EEA
Outside the EU/EEA
Don't know

21.What prompted you to relocate or consider relocating?

[Select all that apply]
□ Rising energy costs
□ Increases in other costs (e.g. raw materials, labour)
□ Carbon taxes
□ Decline in sales / demand
□ Opportunity to increase profitability by relocating
□ Wider business change (e.g. change in business ownership, merger, general corporate restructure)
□ Other

22.Have any of your energy intensive business activities that existed at the time you joined the second CCA scheme ceased entirely since April 2013?

Yes
No
If no, please skip to question 23

a. If yes, why did this cease?

□ Rising energy costs
□ Increases in other costs (e.g. raw materials, labour)
□ Carbon taxes
□ Decline in sales / demand
□ Opportunity to increase profitability by relocating
□ Something else (e.g. change in business ownership, merger, general corporate restructure)

23.Has your organisation set up any new sites or facilities in the UK where you are undertaking energy-intensive activities?

- Yes
- No
- Don't know

If no, please skip to question 26

24.How many new sites or facilities have you set up in the UK since 2013 where you are undertaking energy-intensive activities?

[Small open textbox]

25.Did you consider locating any of these sites, or the processes undertaken there, outside the UK, or was that not an option in your case?

- Yes, this was considered for the site (or for one or more of the sites)
- No, this was an option in principle, but it was not considered
- No, this was not appropriate (e.g. these were new retail premises for UK customers)

a. Are the core processes on your new site(s) eligible for the CCA scheme?

[Drop down]
- All are eligible
- Some are eligible
- No

If no, please skip to question 26

b. Thinking about the sites with processes eligible for the CCA scheme, how important was the CCA scheme in your decision to:

	Very low importance	Low importance	Medium importance	High importance	Very high importance
Set up the site / new process at all?	□	□	□	□	□
Set up the site / new process in the UK?	□	□	□	□	□

Attitudes towards CCAs

26.How important were the following in your decision to participate in the second scheme:

	Very low importance	Low importance	Medium importance	High importance	Very high importance
The reduction in CCL	□	□	□	□	□
The reduction in CRC The cost of 'buy out' if targets were not reached	□	□	□	□	□
The nature of the target for your sector(s) (e.g. absolute, relative, Novem)	□	□	□	□	□
The likelihood of your organisation meeting the energy reduction target for your sector(s)	□	□	□	□	□
Demonstrating green credentials	□	□	□	□	□

27. On a scale of 1-5, where 1 is not at all and 5 is a great deal, to what extent, if at all, has the CCA scheme influenced your approach to energy management?

	1	2	3	4	5	
Not at all	□	□	□	□	□	A great deal

a. Why do you say that?

[Open textbox]

28.Thinking about your organisation's investment in energy efficiency specifically, has the influence of the CCA scheme increased or decreased over time or has there been no change?

[Drop down]

- Increased a lot
- Increased a little
- No change in level of influence
- Decreased a little
- Decreased a lot

a. Why do you say that?

[Open textbox]

29.Have there been any changes to your Target Unit agreement(s) since 2013? (e.g. introduction of Novem targets; entry/exit of individual facilities; changes to EU ETS coverage)

- Yes
- No

a. If Yes, why were these changes made?

[Drop down]

- Policy scope changes (e.g. change to EU ETS participation)
- Organisational changes (e.g. change in site ownership)
- Process changes (e.g. changes in product specification)
- Other

b. How have these changes affected performance against targets?

- Targets more difficult to reach
- Targets easier to reach
- No difference

30.When you first registered for the scheme, how confident were you that your organisation would be able to meet your CCA targets?

	1	2	3	4	5	
Not at all confident	□	□	□	□	□	Completely confident

31.Did you miss your target in:
[Select all that apply]
□ TP1
□ TP2
□ TP3
□ None

32.How did the cost of the buy-out charges compare to the financial costs and risks/hassle costs you would have incurred in meeting targets?
[Multiple choice – drop down)

- Costs of buy-out were much less
- Costs of buy-out were a little less
- Costs of buy-out were the same
- Costs of buy-out were a little more
- Costs of buy-out were a lot more
- Don't know as we didn't undertake analysis to look at this

Experience engaging with sector bodies

33.Which sector body manages your CCA?
[Small open text box]

34.Are there any aspects of the sector body's management of the CCA that could be improved?

- Yes
- No
- If yes, how?

[Open textbox]

35.To what extent has your sector body motivated you to meet your targets?

	1	2	3	4	5	
Not at all	□	□	□	□	□	to a great extent

Future plans

36.How likely is the firm to remain in the current CCA scheme and any potential future scheme?

	1	2	3	4	5	
Not likely at all	□	□	□	□	□	Very likely

a. Why do you say that?
[Open textbox]

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

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