



Department for
Business, Energy
& Industrial Strategy

RESEARCH ON ENERGY AUDITS AND REPORTING, INCLUDING THE ENERGY SAVINGS OPPORTUNITY SCHEME (ESOS)

Phase 2 Final Report

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OGL

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Glossary

CCA – Climate Change Agreement

CCL – Climate Change Levy

CRC - CRC Energy Efficiency Scheme (formerly known as the “Carbon Reduction Commitment”)

DEC – Display Energy Certificate

EED – EU Energy Efficiency Directive

EPC – Energy Performance Certificate

ESOS – Energy Savings Opportunity Scheme

EU ETS – EU Emissions Trading System

ROI – Return on Investment

SECR – Streamlined Energy and Carbon Reporting

SME – Small and Medium-sized Enterprises

Executive Summary

Key findings

This evaluation has found that:

- 38% of all energy efficiency measures implemented or planned by organisations since starting the ESOS process were attributed at least in part to the scheme. ESOS was most commonly associated with encouraging improvements to lighting or process-related measures.
- 32% of all the fuel efficiency measures that had been implemented or planned by organisations since ESOS were attributed at least in part to the scheme.
- The energy and fuel efficiency improvements were modelled to have resulted in central estimates of 1.65TWh of energy efficiency savings from buildings, 1.51TWh savings for industrial processes, and 0.52TWh of fuel efficiency savings across the ESOS population.
- As a new mandatory requirement, ESOS often encouraged audit activity in organisations for the first time. For some organisations, ESOS was attributed with encouraging collation and discussion of data across the business and increasing awareness of energy or fuel consumption and cost.
- Case study visits to organisations showed that in some cases, ESOS identified entirely new energy saving opportunities. While this was not universal, in other cases the audit remained valuable where it provided external validation of measures that were already planned.
- 37% of organisations agreed that 'changes made as a result of ESOS had already led to net cost savings' for their organisation by the time of the survey. A number of organisations also reported some wider benefits such as increased staff productivity and reputational benefits.
- The scope for ESOS to have impact is more limited in organisations with existing high levels of energy maturity, such that ESOS-driven action was lower where prior energy management certification, goals or plans were already in place.
- ESOS compliance generated significant volumes of work for the assessor market around the December 2015 compliance deadline, but there was limited evidence of its influence driving the development of a stable market in the longer-term.
- Based on the evidence collected in this study it is suggested that additional support and levers may help organisations to go further in implementing energy efficiency measures. These could include sharing of best practice and publication of benchmarks, public reporting of recommended measures, promoting or incentivising ISO 50001 certification, and maximising synergies with other policies, such as Streamlined Energy and Carbon Reporting (SECR).

Background, objectives and methodology

Background

This research was commissioned by BEIS to inform how best to promote greater energy efficiency in buildings and industry and so support an objective to minimise business energy costs by converting cost-effective energy efficiency potential.

Article 8 (4-6) of the [EU Energy Efficiency Directive](#) (EED) required all member states to establish an energy audits regime for large enterprises. Energy audits involve the various activities and processes that make up an organisation's energy consumption being audited by a trained assessor, who then makes tailored energy savings recommendations based on the audit.

In the UK the Energy Savings Opportunity Scheme (ESOS) was introduced in 2014 to implement Article 8 (4-6) of the Directive. Under ESOS, energy audits are mandatory for all large undertakings¹ in the UK. Equivalent schemes have also been implemented in all other Member States².

This research has considered the effectiveness of energy audits across the non-domestic sector, predominantly focusing on businesses. An evaluation of ESOS is central to the research, with ESOS being the key policy mechanism driving uptake of audits in the UK by mandating this activity among non-SMEs (small and medium-sized enterprises). However, the wider role of audits across the non-domestic sector has also been explored.

The research also considers the effectiveness of energy reporting, another mechanism that can be used to encourage energy efficiency action in non-domestic organisations. Energy reporting can take the form of internal reporting of energy use from one part of an organisation to another, or public external reporting in annual reports and/or directly to government.

The findings in this report build further on an [interim process and early impact evaluation of ESOS](#) carried out from 2015 to 2017 by Ipsos MORI and University College London (UCL).

¹ Large undertakings refer to those with at least 250 employees, or both a turnover in excess of €50m and a balance sheet total greater than €43m, i.e. non-SMEs according to the EC definition

² The Directive requires all qualifying undertakings to carry out an audit of their energy consumption and identify energy saving opportunities by December 2015, and every four years thereafter.

Objectives

Four key research questions about energy audits and reporting, and ESOS in particular, have been addressed through this study:

RQ1: Energy audits and reporting: To what extent (in which ways and in which contexts) are energy audits and reporting effective in identifying and delivering energy efficiency savings across organisations?

RQ2: ESOS influence and impact: To what extent (in which ways and in which contexts) has ESOS influenced organisational energy efficiency policy and practice? What impact has ESOS had on energy efficiency in organisations?

RQ3: ESOS lessons for future policy: What are the lessons learned from implementing ESOS that could feed into future policies?

RQ4: Wider learning: What is the wider learning from this research for BEIS policy making?

Methodology

This study involved the following workstrands, delivered across two main phases of activity:

Phase 1 consisted of:

- A literature review of the implementation of Article 8 (4-6) of the EED in other EU member states, of energy efficiency schemes based on energy audits in non-EU countries, and of success factors for audits delivered in other sectors;
- Stakeholder workshops and interviews with ESOS-obligated organisations, SMEs, public sector organisations and trade bodies to understand appetite for, and experiences of, energy audits and reporting across the UK non-domestic sector (including but not limited to ESOS).

The detailed findings of Phase 1 are reported separately³, although are summarised within this report as relevant.

This report primarily focuses on **Phase 2** which consisted of:

- A quantitative telephone survey of 503 compliers from the first phase of ESOS, including 282 that took part in a baseline survey in 2016;
- 10 qualitative organisational case studies with ESOS organisations (8) and SMEs (2); involving multiple interviews across the organisations to gather a range of perspectives;
- 20 in-depth interviews with ESOS Lead Assessors;
- 13 in-depth interviews with representatives of the energy efficiency supply chain;
- Linking of ESOS compliance data with secondary data on firm-level outcomes such as energy consumption and capital investment; and,

³ <https://www.gov.uk/government/publications/energy-audits-and-reporting-research-including-the-energy-savings-opportunity-scheme>

- Modelling of the energy and emissions savings attributable to ESOS based on reported implementation of energy efficiency measures by surveyed compliers.

The primary focus of the research was an impact evaluation of ESOS involving a theory-based approach grounded in a theory of change. Multiple perspectives were gathered through the research strands set out above to explore a set of hypotheses about how ESOS might achieve its intended outcomes, and the relative contribution of ESOS compared with external factors.

This work was carried out in accordance with the requirements of the international quality standard for market research, ISO 20252.

Summary of main findings

Influence and impact of ESOS on organisational energy and fuel efficiency

The [ESOS Impact Assessment](#) predicted an overall saving of approximately 3.0TWh per year could be achieved in the non-domestic sector through compliance with the ESOS policy. This included savings from buildings, industrial process and transport. By modelling self-reported data on energy and fuel efficiency measures implemented by organisations as a result of ESOS, this research has estimated savings broadly in line with the 2014 Impact Assessment estimate, with some variation across sectors.

Nearly all ESOS compliers surveyed reported their organisations to have implemented or planned an energy efficiency improvement in at least one category⁴ (90%) since the start of the ESOS process. Four in five (83%) reported taking at least one fuel efficiency action over the same period. ESOS is one of a range of factors driving these actions with 38% of energy efficiency measures and 32% of fuel efficiency measures installed or planned by complier organisations attributed at least in part to ESOS. Almost two-fifths (37%) of organisations agreed that ‘changes they made as a result of ESOS’ have already led to net cost savings for their organisation.

Alternative drivers for energy and fuel efficiency action, beyond ESOS, were commonly reported to be end-of-life equipment replacements, or re-location or refurbishment related upgrades. Improvements to lighting were the most commonly reported energy efficiency actions, and among the measures most commonly attributed to ESOS. The most commonly implemented or planned fuel efficiency measure was the introduction of infrastructure or policies that supported reduced numbers of journeys. Adjustments to journeys or loading practices and adjustments to existing fleet vehicles were less commonly implemented, but were the transport measures most likely to be attributed to ESOS by those who had made these improvements.

In addition to effective audits, this study identified several organisational contexts associated with action on fuel or energy efficiency measures; having energy-related action plans or goals; board-level priority placed on energy efficiency; and wider staff engagement and training on energy efficiency.

Notably, ESOS-driven action was lower where prior certification, goals or priorities were already in place. This suggests energy-mature organisations may have less unrealised energy

⁴ Organisations were asked if they had implemented (or planned to implement) energy efficiency improvements from a list of eight broad categories (heating, lighting, cooling, computers & IT, processes, hot water, building fabric and ventilation).

efficiency potential, meaning the scope for ESOS to have an impact on energy efficiency has been more limited in some cases.

ESOS-driven action was higher when ESOS was reported to have led to the introduction or update of energy efficiency goals or priorities. This suggests ESOS has had most impact on organisations that had not previously had these policies in place. Where ESOS encourages their introduction this can result in a positive feedback loop to also encourage uptake of specific energy efficiency measures.

Wider organisational impacts of ESOS

This research identified some wider impacts of ESOS, beyond the implementation of specific energy and fuel efficiency measures.

ESOS has helped organisations to become more aware of their energy consumption, including understanding their aggregate consumption (across different organisational activities or sites, including transport) and energy costs; often revealing this for the first time. In some cases, ESOS has also led to improved monitoring and reporting processes, particularly for fuel data, which tended to be poorly understood pre-ESOS.

This research also identified examples of the ESOS process leading to organisational commitments being made: one in five surveyed ESOS compliers had introduced or updated an energy efficiency related policy or target as a result of the ESOS process.

Additional benefits of ESOS were reported by a small proportion of organisations; 16% reported reputational benefits from the process, and 8% believed the ESOS-driven action they had taken had improved staff productivity.

Influence and impact of ESOS on the wider market for energy efficiency services and products

The research also considered the extent to which ESOS impacted on the assessor market and the supply chain for energy efficiency services and products.

ESOS generated significant volumes of work for the assessor market (comprising around 900 accredited Lead Assessors). However, evidence to date suggests the scheme has not yet supported the development of a stable market as demand for assessor services was highly concentrated around the Phase 1 deadline. There is some evidence of commissioning follow-on services post-compliance, but only 26% of organisations who commissioned an external assessor to conduct their Phase 1 audit reported doing so. While many ESOS Lead Assessors were providing similar services prior to ESOS, the scheme has attracted new entrants to the market and has expanded the skills of some assessors in transport auditing.

Research with the energy efficiency supply chain suggested product manufacturers and installers have experienced limited impact to date from ESOS. Some representatives had used ESOS as a hook to attract customers, however, they considered recent growth in the energy efficiency market to be due to other factors such as the availability of business loans and corporate social responsibility drivers.

Appetite for audits and reporting across non-domestic sector

Although ESOS mandates energy auditing for large organisations, there is no such requirement on SMEs (who are not part of a group containing a large organisation) or public

sector organisations. This research has found that audits are not widely used by organisations outside of legal requirements to do so.

Where audits had been commissioned outside of mandatory requirements, these have tended to be more narrowly focused than ESOS audits, for example, assessing the feasibility of a specific process change, equipment upgrade or diagnosing the cause of unexpected energy bill spikes.

Audit activity by SMEs, in particular, tended to be driven by the availability of free auditing services, and the implementation of recommended energy efficiency measures has tended to rely on concessional finance being available. Where audits had been commissioned by either SMEs or public sector organisations, this was often driven by senior-level leadership and, in the public sector, tended to be used to understand where best to focus constrained budgets in achieving energy (and cost) savings.

Reporting on energy efficiency also tends to be most widespread when mandatory. Nevertheless, examples of voluntary reporting were identified, including reporting against private carbon reduction schemes or charitable commitments. Some participants in such schemes believed reporting can help to raise the importance of energy management within their organisation. There is also some evidence that linking reporting to ESOS, for example public reporting on the recommendations identified in the report, could lead to reputational risk of inaction, and therefore increase the likelihood of ESOS raising the profile of energy efficiency and leading to implementation of improvements.

Lessons learned: supporting better organisational energy management

Energy audits can lead to action to improve energy or fuel efficiency in organisations in the right circumstances. This research found they are most effective when:

- the audit is high quality and carried out by a skilled auditor;
- assessors have carried out detailed pre-audit scoping work such that they can tailor the report and recommendations to be relevant and engaging for clients' contexts;
- there is buy-in from senior management, which can be improved with a presentation of recommendations to key decision makers; or
- recommendations contain quantifiable energy savings that can be understood by those from a financial rather than energy background.

1. Introduction and background

Background to this research

Policy context

The Government's [Clean Growth Strategy](#) sets out policies and proposals for driving down carbon emissions while at the same time growing the economy. The strategy includes a commitment to supporting businesses to improve their energy efficiency. This research in turn seeks to support the evidence behind the Government's objectives to minimise business energy costs, improve productivity and reduce carbon emissions by converting cost-effective unrealised energy efficiency potential. This research has focused on tools that can encourage improved energy efficiency in organisations.

The main tool at the centre of the research is **energy auditing**. This involves an internal or external assessor auditing an organisation's energy consumption, broken down by different activities and processes. Based on this, the assessor identifies specific and tailored energy saving opportunities. The most effective audits provide detailed costs and potential energy savings for each recommendation to help organisations make energy efficiency investment decisions appropriate to their business. Audits are mandatory for most large organisations and their associated undertakings through ESOS, but are also conducted voluntarily by some organisations. ESOS is the key policy mechanism driving uptake of energy audits in the UK and is therefore be the central focus of this report.

A second tool for encouraging energy efficiency in organisations will also be considered: **energy reporting**. This has two forms. Internal reporting is the reporting of energy use from one part of an organisation to another, for example different sites or subsidiaries may be required to report to a head office or parent. External reporting is the public reporting of energy use and activities, which can be published directly by an organisation in its annual report and/or be provided to government. This usually takes place when mandated by policy, such as under the CRC Energy Efficiency Scheme⁵ or Mandatory Greenhouse Gas Reporting (MGHG)⁶. For both types, the intention of reporting is that it encourages organisations to reduce their energy use between reporting periods and/or compete on energy efficiency with other entities and provide information of interest to external stakeholders.

This research aims to help BEIS to understand the effectiveness of energy audits and reporting and what alternatives and complementary policies could be developed to promote further energy savings. A goal to support businesses to improve their energy efficiency by at least 20 per cent by 2030, as set out in the Clean Growth Strategy, presents a challenging ambition.

Energy efficiency is often a low investment priority, particularly for businesses/industries where energy bills constitute only a small fraction (approximately 3% for most sectors⁷) of their total expenditure. Consequently, legislation has to play a vital role in encouraging take-up, particularly important given that most businesses are not well versed in energy use and

⁵ The CRC Energy Efficiency Scheme (CRC) was closed following the 2018-19 compliance year.

⁶ From 1st April 2019, Streamlined Energy and Carbon Reporting (SECR) replaced MGHG, extending reporting requirements for quoted companies and introducing new requirements for large unquoted companies.

⁷ [Business energy statistical summary: How energy is used and by whom in the non-domestic sector](#) (BEIS, 2018).

management. Audits and reporting therefore are key targets for policymakers wanting to spur action in the commercial sector.

ESOS Policy context

The ESOS Regulations (SI 2014/1643) came into force in July 2014 to implement Article 8 (4-6) of the Energy Efficiency Directive (2012/27/EU). ESOS is an energy audit scheme that is mandatory for all large undertakings⁸, (hereafter 'qualifying organisations').

It requires qualifying organisations to measure their total energy consumption and carry out audits⁹ of the energy used by their buildings, industrial processes and transport. They must do this at least once every four years. It is intended that the audits will identify and recommend reasonably practicable and cost-effective energy saving opportunities, the implementation of which is voluntary.

Qualifying organisations are required to notify the scheme administrator, the Environment Agency, that they have conducted their energy audit and complied with the scheme. The first deadline for notifying compliance was 5th December 2015. The Environment Agency, along with the other UK compliance bodies¹⁰, are empowered to monitor and enforce compliance with ESOS.

The objectives of ESOS are to:

- Provide large undertakings with enterprise-specific information about how they can make energy savings;
- Stimulate the take-up of cost-effective energy efficiency measures;
- Minimise the cost to businesses of complying with the regulations; and
- Maximise the synergies with existing policies.

Ipsos MORI and UCL carried out an [interim process and early impact evaluation](#) of ESOS between 2015 – 2017. This report makes reference to findings from that evaluation.

In March 2019, Government published [Environmental Reporting Guidelines](#) which included the requirements for Streamlined Energy and Carbon Reporting (SECR). SECR requires all UK large businesses and limited liability partnerships, and all quoted UK companies, to report specified energy and carbon information in annual reports from April 2019. This included a requirement to report on energy efficiency action in the last year and organisations are encouraged in the guidance to use their ESOS audit to inform this requirement, reporting on any progress made towards implementing their ESOS recommendations.

⁸ Including small or medium undertakings which are group undertakings with respect of a large undertaking, with specified exceptions.

⁹ Or measures designated as alternative routes to compliance, such as the ISO 50001 energy management system

¹⁰ SEPA (Scottish Environment Protection Agency), NRW (Natural Resources Wales) and NIEA (Northern Ireland Environment Agency)

Aims and objectives of this research

The main aim of this study is to provide evidence on the effectiveness of energy audits and reporting in driving energy and fuel efficiency savings across organisations. It will consider how energy audits and reporting can be applied and what alternative and complementary policies could be developed to promote further energy savings.

The research also aims to build on the findings of the interim process evaluation of ESOS. It assesses the impacts and benefits of ESOS around three to four years after compliance activity was commenced in obligated organisations and considers the extent to which the scheme's objectives have been achieved.

Research Questions

Four high-level research questions were set by BEIS for this research:

RQ1: Energy audits and reporting

To what extent (in which ways and in which contexts) are energy audits and reporting effective in identifying and delivering energy efficiency savings across organisations?

RQ2: ESOS influence and impact

To what extent, (in which ways and in which contexts) has ESOS influenced organisational energy efficiency policy and practice?

What impact has ESOS had on energy efficiency in organisations?

RQ3: ESOS lessons for future policy

What are the lessons learned from implementing ESOS that could feed into future policies?

RQ4: Wider learning

What is the wider learning from this research for BEIS policy making?

Purpose of this report

This is the final report from this study exploring energy auditing and reporting, including the first phase of ESOS. It collates evidence against all the research questions set out above.

It is preceded by the [Interim Process and Early Impact evaluation report](#) published in October 2017. It is accompanied by a report for Phase 1 of this study (further explained below) which provides learning from energy efficiency schemes delivered outside the UK, the approaches taken to transposing Article 8 (4-6) of the Energy Efficiency Directive in other Member States and the uptake of audits and reporting outside of the ESOS regulations¹¹.

¹¹ <https://www.gov.uk/government/publications/energy-audits-and-reporting-research-including-the-energy-savings-opportunity-scheme>

Methodology

Evaluation approach

This study has taken a theory-based approach to the evaluation of the outcomes and impacts achieved through ESOS. This approach was adopted following an earlier impact evaluation feasibility study which identified significant challenges in undertaking a quasi-experimental evaluation i.e. an evaluation which generates a quantitative assessment of impact, often through comparing outcomes achieved by a policy to the counterfactual (what would have happened in the absence of such a policy).

The ESOS-obligated population lacks a natural comparison group to form this counterfactual given compliance is a universal requirement for large organisations. While various approaches were considered during the feasibility study, these were found to either lack comparability to the ESOS population (for example, SMEs were considered to be fundamentally too different to large organisations to provide a valid comparator group) or to involve significant analytical hazards or implementation risks. A full exploration of these considerations is available in the published [evaluation scoping study](#).

This means that while quantitative and longitudinal approaches were used to measure the realisation of key outcomes in the ESOS population as far as possible, an assessment of the extent to which ESOS had influenced the realisation of these outcomes was explored using a synthesis approach.

To support future policy decisions, the evaluation considered not only the extent to which energy audits and reporting in general, and ESOS specifically, had led to energy efficiency savings, but also focussed on “in which ways and in which contexts” they had done so. Principles of a realist approach – specifically developing a Context Mechanism Outcome framework alongside a theory of change – were therefore adopted as a useful framework for designing a data collection approach to best answer the full range of evaluation questions.

These were used to help determine:

- Which stakeholders were relevant to engage in data collection activities;
- Which organisational contexts were interesting to sample, which in turn informed questionnaire design to assign contexts based on survey responses;
- What issues to cover in the survey, interviews and case-studies, including what external influencers to seek evidence about beyond the ESOS scheme itself; and
- Which organisational contexts should form the basis of subgroup analysis within both the qualitative and quantitative data.

Overall, this approach supported a wide-ranging evaluation that gathered multiple perspectives on ESOS and explored how the influence of ESOS varies and in what ways, depending on the context in which audits were delivered and recommendations received.

The analysis involved considering the extent to which evidence supported the theory of change being realised, or not, by triangulating the evidence from the various strands of research in order to assess whether or not ESOS had been an influencing factor in the outcomes observed. For example, the theory of change identified a trusted assessor market as being

needed to drive trust in the audit recommendations. Thus, part of the analysis explored the extent to which ESOS had generated such a market.

Data collection approach

This study comprised two main phases of research activity. Phase 1 consisted of a review of existing evidence and qualitative research to gather further evidence on the influence and impact of ESOS and the effectiveness of audits and reporting more generally. Phase 2 explored energy audits and reporting in greater depth, focussing on the longer-term impact of ESOS on complier organisations, building on the 2017 process evaluation through a mixed methods approach. This report presents findings from both phases.

Research activities

The Phase 1 research activities primarily consisted of a literature review (researching energy efficiency schemes and policies outside the UK) and qualitative research with ESOS obligated organisations, SMEs, public sector organisations and representatives of the assessor market. Further detail of the research activities involved in Phase 1 are presented within that accompanying report.

The Phase 2 research activities consisted of:

- A **quantitative telephone survey** of a representative sample of 503 organisations who complied with ESOS, carried out in November and December 2018. The key aim of this was to gain understanding of the impact of the ESOS process¹² on these organisations. A similar telephone survey was conducted in summer 2016 as part of the interim evaluation of ESOS. Some findings from this survey are also included in this report for comparative purposes and will be referred to as the baseline survey. A total of 282 of the organisations previously interviewed in the baseline survey were re-contacted and interviewed again as part of the 2018 survey. The 2018 survey therefore provided longitudinal data for 56% of the sample on key metrics related to energy efficiency and energy management, including the influence of the ESOS process. Interviews were usually carried out with the organisational representative responsible for energy management.¹³
- 10 **qualitative organisational case studies**¹⁴, complementing the survey findings to gain further detailed understanding of how and why audits and reporting have been undertaken and the impact of these on organisational action around energy and fuel efficiency as well as approaches to energy and fleet management.

¹² Throughout the survey, participants were asked if they had undertaken various actions since, or attributed them to, going through the ESOS **process**, rather than since they **complied** with ESOS. This was to capture the possibility that other elements of the process before notifying compliance could lead to energy efficiency and energy management impacts. For example, the collation of data for the audit may have increased organisational awareness of energy consumption before compliance had been completed.

¹³ For organisations that took part in the baseline survey, the follow-up interview was carried out with the same participant where possible. If this was not possible, for example if the previous participant had left the organisation, and for boost organisations that did not take part in the 2016 survey, the person responsible for energy management was interviewed.

¹⁴ 8 with ESOS compliant organisations, and 2 with SMEs. Each involving multiple in-depth interviews with representatives in different roles within the organisation depending on the organisation's structure e.g. a Board member, Energy Manager, Facilities Manager, Fleet Manager.

- **20 in-depth interviews with ESOS Lead Assessors**, qualified and practising under ESOS Phase 1. These aimed to explore which types of recommendations were made in audits and why, and to understand the response of the auditing market to ESOS specifically.
- **13 in-depth interviews with representatives of the energy efficiency supply chain**, including firms involved in consulting, designing and/or implementing a range of energy efficiency solutions. This explored awareness of ESOS and the extent to which the scheme was impacting on demand for supply chain services.
- **Energy and emissions saving modelling** to estimate the energy savings attributable to ESOS based on measures implemented and planned (as reported in the complier survey) as well as other data on energy usage, potential energy savings and floor area.
- **Linkage of scheme data to business databases**. This workstream aimed to provide longitudinal data on firm-level metrics such as energy expenditure, however the analysis was inconclusive: the lack of a suitable comparison group meant that it was not possible to robustly attribute any changes in outcomes of interest to ESOS. Scheme data was also linked to **raw metered energy data**. It was intended to use this to compare actual recorded changes in energy consumption from meter data with estimates generated in the energy saving analysis below. However, successive reductions in sample resulting from meter matching, company level consolidation and floor area data availability produced a very small sample of companies, from which it was not possible to robustly make such a comparison. Findings from these two strands of research have therefore not been included in this report. Further details are set out in the technical report.

Evidence from these research activities has been collated in this report to enhance understanding of the impact of ESOS and the effectiveness of energy auditing and reporting. Further information about all the research activities under Phase 2 of the study is available in the Phase 2 technical report, along with further information on how the impact evaluation of ESOS has been undertaken and how evidence has been synthesised against a theory of change, a set of evaluation hypotheses and Context-Mechanism-Outcome sets.

Limitations to the evaluation

The following limitations should be taken into consideration when reviewing the evaluation findings:

- **No central collection of ESOS energy audit reports as part of the scheme** restricted an assessment of the quality and relevance of energy efficiency recommendations made; an important process and impact issue as uptake of recommendations will be influenced by the quality and appropriateness of reports. This is also important given the scheme's flexibility around report format, length and range of content. Views on the quality and relevance of the ESOS reports and recommendations were gathered from complier organisation and assessors. A small sample of energy audit reports undertaken by complier organisations were accessed through the case study visits providing some insight into these issues. Those participating in the research were asked if they were willing to share their ESOS reports, but none were received.

- **A focus on parent-level organisations¹⁵ leading ESOS compliance activity in the complier telephone survey.** While the majority of ESOS compliance notifications were submitted at ultimate parent level, this limits the generalisability of the evaluation findings on the impacts of the scheme across the wider non-domestic sector. An [earlier evaluation scoping study](#) conducted by Ipsos MORI and UCL discussed the feasibility of data collection across corporate groups to capture subsidiary level impacts and concluded this was not a viable or efficient approach. This limitation has been mitigated where possible by including subsidiary level organisations in the case study research.
- **The self-reported nature of the attribution of the impact of ESOS** may mean the impact of the scheme is not estimated accurately. Survey participants were asked at various points if changes in their organisation, including changes in the level of priority placed on energy efficiency, introduction of relevant plans or policies and the implementation of energy or fuel efficiency measures were as a result of going through the ESOS process. Therefore, the accuracy of this attribution cannot be verified, although follow-up case study research with organisations provided an opportunity to further explore how and why the ESOS process may have influenced the organisation compared to other factors.
- **Participant recall of key information.** Across all primary data strands, participants were required to recall information from around the time of ESOS compliance onwards. The most detailed information was requested of ESOS organisations that took part in the survey, including detail of energy and fuel efficiency measures implemented since going through the ESOS process. Participants may not have recalled accurately whether improvements have been made before or after this point, and/or whether these measures were implemented as a result of ESOS or not.
- **Limited detail of information gathered about the implementation of energy efficiency measures to prevent overburdening respondents.** The telephone survey length was limited to 25 minutes to prevent overburdening respondents and maximise response rates. Rather than request detailed information about all energy efficiency measures installed since the start of the ESOS process, survey participants were instead asked to indicate whether they had implemented measures in up to eight energy efficiency categories. Further detail was then requested about measures implemented in a maximum of two categories. The data directly gathered on these measures is therefore incomplete. This has meant that:
 - Where possible, scaling up has been done based on average responses of those asked. Where this has not been possible, a minimum has been reported. All statistics which this affects have been flagged in the report.
 - The modelling of energy savings that resulted from ESOS was not based on complete data. Therefore, for categories where participants indicated they had implemented measures since starting the ESOS process but were not asked about implementation in detail, survey averages were substituted for missing individual values.

Further details of this limitation and how it has been addressed in the data analysis and reporting are provided in the technical report.

¹⁵ Parent level organisations refer to the highest UK parent, which acted as the 'responsible undertaking' for ESOS compliance of the overall group as a whole. In a majority of cases, ESOS notifications were submitted by parent-level organisations.

- **Floor area data could only be matched to around half the addresses across all the companies responding to the survey.** Energy savings in the modelling can only be calculated for those addresses with floor area since the method is floor area (m²) times energy saving rate (kWh/m²). Where there were missing values, the lower of the measures was used: average floor area per address or average sector floor area.
- In addition to the incomplete data on measures and floor area, there were further limitations to the modelling of energy savings that are set out in detail in the technical report.

Interpreting quantitative findings

The following points should be considered when interpreting findings from the survey of compliers presented in this report.

- A sample of 503 organisations rather than the entire complier population was interviewed. This means that the percentage results are subject to **sampling tolerances**, i.e. we cannot be certain that the figures obtained are exactly those we would have received if all organisations had been interviewed (the ‘true’ values). We can, however, predict the variation between the sample results and the ‘true’ values from knowledge of the size of the samples on which the results are based and the number of times that a particular answer is given. As such, at the 95% confidence interval, the true values for questions based on all 503 compliers will (with 95% probability) lie within a range of plus or minus 3-4%¹⁶ of the survey estimate.
- Throughout the report, only differences in subgroups that are **statistically significant** at the 5% level are referred to. As above, a sample of 503 organisations was interviewed: this means that differences between subgroups (such as those that participate in other energy efficiency schemes, compared with those that don’t) observed through the survey could be due to chance given only a sample was interviewed. Statistically significant differences means there is only a 5% chance that the difference is due to sampling error, rather than actual differences between these groups.
- Figures presented in tables or charts may not sum to 100% due to **rounding**. Similarly, the sum of proportions for two individual answers (e.g. “strongly agree” and “tend to agree”) may not be equal to the proportion for a combined answer (in this case “agree”) due to rounding.

¹⁶ This range varies depending on the proportion in the survey giving a particular response, i.e. it is +/- 3% if 10% or 90% give a particular response, but +/- 4% if 50% give a particular response

2. Influence and Impact of ESOS on organisations

This section explores the level of energy and fuel efficiency action among ESOS complier organisations since they started the ESOS process. It considers the extent to which this action can be attributed to the ESOS process as opposed to other factors. This is based on self-reporting around the influence of the ESOS process by complier organisations themselves.

This section contributes evidence to one of the key research questions set for this study:

RQ2: To what extent (in which ways and in which contexts) has ESOS influenced organisational energy efficiency policy and practice? What impact has ESOS had on energy efficiency in organisations?

Key findings

Nearly all complier organisations surveyed (90%) reported their organisations to have implemented or be planning¹⁷ an energy efficiency improvement in at least one category¹⁸ since starting the ESOS process. The implementation (or planning) of 38%¹⁹ of all energy efficiency measures²⁰ across all organisations was attributed directly or partly to ESOS. Lighting measures were the most commonly implemented or planned measures, and among the improvements most commonly attributed to the scheme: across all lighting measures installed or planned, almost half (46%²¹) were attributed to ESOS. By contrast, only 13% of ventilation improvements that had been implemented or planned²² were attributed to the scheme.

Most organisations with a transport fleet (83%) reported at least one fuel efficiency improvement to have been made since beginning the ESOS process, or were planning such improvements.²³ 32%²⁴ of all fuel efficiency measures were reported to be a result of ESOS, and 31% of organisations with a fleet attributed implementing or planning²⁵ at least one related action to ESOS.

37% of organisations reported net cost savings had been achieved by their organisation as a result of changes made due to ESOS.

¹⁷ 82% of organisations reported they had implemented an energy efficiency improvement (and may also have planned others); 8% had only planned improvements

¹⁸ Organisations were asked if they had implemented (or planned to implement) energy efficiency improvements from a list of eight broad categories (heating, lighting, cooling, computers & IT, processes, hot water, building fabric and ventilation).

¹⁹ 39% of implemented measures

²⁰ See footnote 18

²¹ 47% of installed lighting measures

²² 9% of installed ventilation measures

²³ 75% had implemented such improvements (and may have also been planning others); 8% had planned improvements but not implemented any

²⁴ 32% of fuel efficiency measures implemented were as a result of ESOS, as were 32% of all measures both implemented and planned

²⁵ 28% had implemented at least one fuel efficiency measure as a result of ESOS

Modelling of the energy and fuel efficiency improvements made and attributed to ESOS across the entire ESOS population resulted in central estimates of 1.65TWh of savings realised as a result of buildings-related energy efficiency measures (88% of which come from lighting or heating measures), 1.51TWh of savings from changes made to industrial processes, and 0.52TWh savings from fuel efficiency improvements.

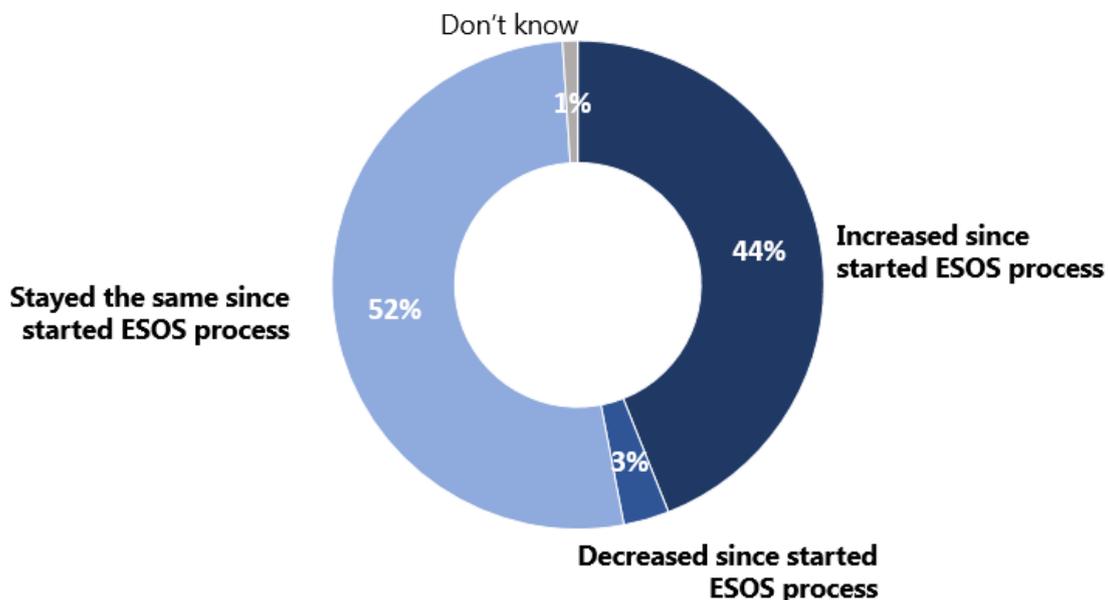
However, there are analytical caveats around how this modelling was conducted (see the technical report for further details of the methodology and associated limitations) and these should be borne in mind when comparing to the predicted savings from the original ESOS Impact Assessment: 1.3TWh savings from buildings, 1.0TWh savings from industrial processes, and 0.7TWh savings from fuel efficiency improvements.

The proportion of reported energy efficiency actions increased from 2016 (around six months to a year after most organisations had notified ESOS compliance) to about two years later in 2018. In 2018, 90% of organisations reported implementing or planning an energy efficiency improvement in at least one category since they first began the ESOS process, an increase from 85% in the baseline survey. However, the surveys suggest fewer organisations have implemented or planned fuel efficiency measures: 83% of those with a fleet reported this in 2018, compared with 87% in 2016. This may reflect problems with recall in the survey.

2.1 Organisational uptake of energy efficiency measures

Surveyed organisations were asked whether the level of action their organisation had taken on energy and fuel efficiency had increased, decreased or stayed the same since the start of the ESOS process. Overall, 44% of those surveyed reported their organisation’s action on energy and/or fuel efficiency to have increased since they started the ESOS process (likely to have been during 2015 for most organisations). While only 3% reported such actions to have decreased over this time period, around half (52%) believed there had been no change in their organisation’s actions on energy or fuel efficiency.

Figure 1: Amount of energy and/or fuel efficiency action taken by organisations since starting the ESOS process



Source: ESOS complier survey, 2018, Base: 503 organisations

The next sections provide further detail on the types of energy and fuel efficiency measures that had been implemented or were planned, the types of organisations most likely to report these actions and to what extent they were attributed to the ESOS process.

2.1.1 Uptake of energy efficiency measures

The vast majority of ESOS complier organisations (90%) reported implementing or planning²⁶ energy efficiency improvements in at least one category since they first began the ESOS process; most commonly lighting improvements.

During the survey, respondents were asked to report (from a given list²⁷) which energy efficiency measures their organisations had implemented since they started the ESOS process (likely to have been during 2015 for most organisations).

Overall, nine in ten (90%) organisations reported implementing or planning²⁸ an energy efficiency improvement in at least one of the listed categories in this period. Organisations had implemented or were planning 5.71 measures^{29 30} on average. This is an increase from the baseline survey where 85% of organisations reported having made or planned an improvement in at least one of the same list of categories by late 2016.

Figure 2 provides further detail on the types of measure implemented.³¹

²⁶ See footnote 18

²⁷ Organisations were first asked if they had implemented (or planned to implement) energy efficiency improvements from a list of eight broad categories (heating, lighting, cooling, computers & IT, processes, hot water, building fabric and ventilation). If they said they had implemented or were planning to implement measures in a given category, they were then asked about more specific measures in that category. For example, an organisation that indicated they had implemented cooling measures would be asked specifically about cooling plant upgrade/ replacement, cooling control systems and replacing air conditioning with free/ evaporative cooling. There were between two and five specific measures on the list for each category. It is important to note that given the time restrictions of the questionnaire, respondents were only asked about specific measures in a maximum of two categories. Therefore, if they indicated they had implemented or were planning to implement measures in more than two of the eight categories, they would be assigned two at random to discuss specific measures.

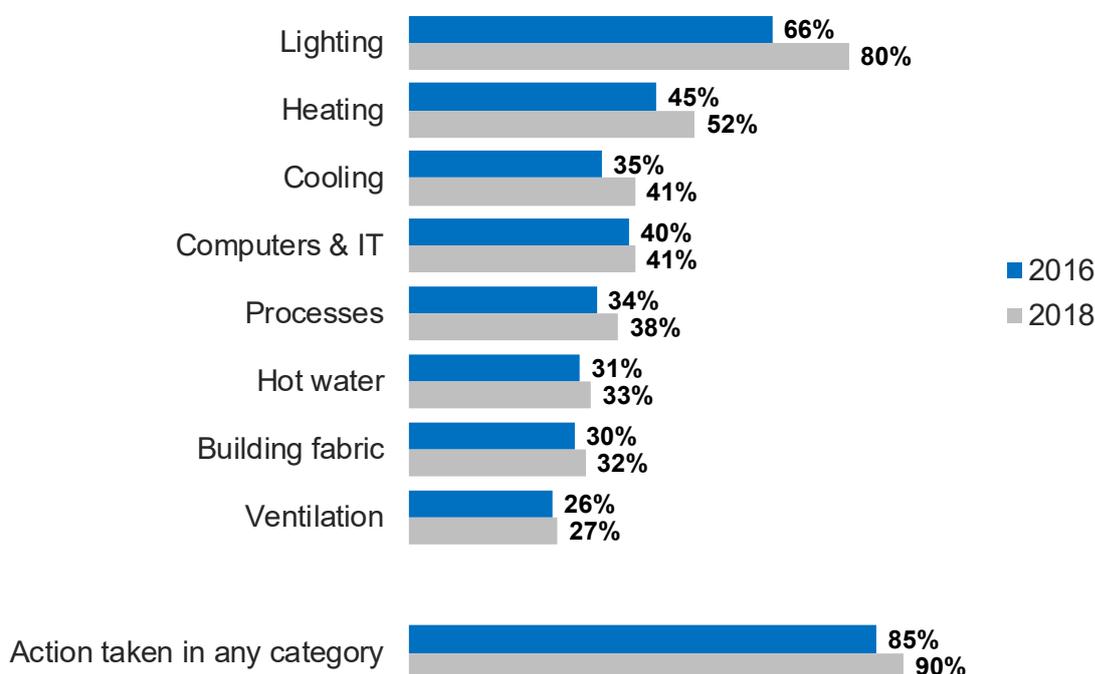
²⁸ See footnote 18

²⁹ This is an estimate – as described above, organisations were only asked about measures in up to 2 categories. However, it is reasonable to assume organisations would have implemented some of the listed measures in categories they were not asked about. This average of 5.71 assumes that organisations each implemented the average number of measures (based on participants for which data is available) for categories not asked about (but where they had indicated they had implemented some measures in that category).

³⁰ Organisations had implemented 5.05 measures on average

³¹ As can be seen in figure 2, fewer organisations reported implementing some measures in Computers/ IT and Ventilation in 2018 than 2016, despite more time having elapsed for measures to have been implemented. This may suggest a challenge with participant recall: participants in 2018 may have struggled to remember if earlier energy efficiency improvements had been made at all, or if these took place before or after the ESOS process. This will have been exacerbated in cases where the survey participant was not personally involved at the time of ESOS (i.e. they are newer in post). By contrast, participants in 2016 were more likely to have been personally involved since ESOS, and only had to recall if improvements had been made over a period of approximately 18 months. Therefore, the same organisation may have reported they made changes in a given category from early 2015 to summer 2016 in the baseline survey, but not reported changes since going through the ESOS process in this same category in the 2018 survey.

Figure 2: Proportion of ESOS complier organisations reporting their organisation to have implemented or planned at least one energy efficiency measure since they started the ESOS process



Source: ESOS complier survey, 2018, Base: 503 organisations; ESOS interim evaluation survey, 2016, Base: 821 complier or intend to comply organisations

Across all categories of measure, the proportion of organisations that had implemented at least one measure was at least 10 percentage points higher among those that place a medium or high priority on energy efficiency, than those placing a low priority³². This difference was particularly large for process measures or changes to building fabric.

A higher proportion of organisations reported implementing or planning lighting measures (80%) than any other type of energy efficiency improvement, up from 66% in the baseline survey. In contrast, uptake or planning of measures related to ventilation systems were far less likely to be reported (27%) and this remains unchanged since 2016 (26%).

Respondents could also indicate how likely (out of 10) their organisation was to implement planned measures within a year. The mean response across all planned measures was 6.6, with plans most commonly in place for lighting measures.

Respondents who took part in the baseline survey were asked to indicate whether they had now implemented measures they said they were planning back in 2016. Overall, 63% of these were reported to have been implemented, and 13% are still planned for the future.

³² Level of priority is derived from Q8 in the survey: “And what level of priority would you say your organisation as a whole currently places on energy efficiency? Please use a scale of 1 to 10 where 1 means a very low level of priority and 10 means a very high level”. Respondents answering 1-3 are defined as ‘low’, 4-7 as ‘medium’, and 8-10 as ‘high’.

2.1.2 Energy efficiency savings attributed to ESOS

Organisations attributed 38%³³ of all energy efficiency measures implemented or planned directly or partly to ESOS. Modelled to represent the full ESOS population, the policy resulted in energy efficiency savings of 1.65TWh (improvements to buildings) and 1.51TWh (industrial processes). The organisational case-studies suggested that ESOS had driven these savings through improving awareness of energy efficiency opportunities and, more indirectly, by encouraging implementation by providing external validation to strengthen the case for previously identified opportunities. However, higher levels of implementation, and therefore associated energy savings, were restricted by the extent to which the ESOS process itself was able to highlight new opportunities.

Organisations were asked whether actions they had taken or were planning were a result of going through ESOS, or other factors outside the scheme. Table 1 shows that overall, 38% of all individual energy efficiency measures implemented or planned since organisations started the ESOS process were influenced at least in part by the scheme, and that 6%³⁴ were directly influenced. It also shows how this varied considerably by category of energy efficiency measure: for example, 48% of process measures and 46% of lighting measures were attributed to ESOS, compared with 13% of ventilation measures.

Table 1: Energy efficiency action by organisations, since ESOS

Category of energy efficiency improvement	% organisations who made or planned energy efficiency improvement since ESOS	Of which: % individual measures implemented or planned within category attributed to ESOS ³⁵	
		Directly attributed to ESOS	At least partly attributed to ESOS
Any category	90%	6%	38%
Lighting	80%	8%	46%
Heating	52%	4%	35%
Cooling	41%	7%	36%
Computers & IT	41%	1%	20%
Processes	38%	9%	48%
Hot water	33%	3%	29%
Building fabric	32%	1%	34%
Ventilation	27%	0%	13%

Source: ESOS Complier survey, 2018, Base: 503 organisations

³³ 39% of solely implemented measures were attributed to ESOS

³⁴ 6% applies to implemented measures only, as well as implemented and planned measures combined

³⁵ The percentages of measures directly or at least partly attributable to ESOS are calculated as a percentage of all the measures implemented in each category and overall across all participants in the sample. However, the second column shows the percentage of organisations that have made improvements in each category. This difference is due to the randomisation (described in the limitations), preventing the calculation of a percentage of organisations implementing measures as a result of ESOS in each category.

On average, organisations had implemented or planned 5.71 measures since ESOS, of which 2.16³⁶ were attributed at least partially to ESOS, and 0.32³⁷ were directly attributed to the scheme. The survey also provided indicative results of the proportion of organisations that have been prompted to take energy efficiency action: at least³⁸ 38% of organisations reported that they had implemented or planned³⁹ at least one energy efficiency measure as a result of ESOS, a minimum of 29% had implemented or planned two or more, and a minimum of 22% three or more. This suggests energy efficiency action as a result of ESOS was relatively common.

Modelled energy efficiency savings

This evaluation included detailed modelling work to estimate the energy efficiency savings that have been realised as a result of ESOS, drawing on the reported implementation of energy saving measures by survey respondents as described above. An initial calculation of the estimated savings realised, as a result of the actions reported by survey participants, has been scaled up to represent the estimated savings achieved overall as a result of ESOS across the total obligated population. Further detail of the approach applied in the modelling is included in the technical report.

However, there are analytical caveats around how this modelling was conducted (see the technical report for further details of the methodology and associated limitations) and these should be borne in mind when comparing to the predicted savings from the original ESOS Impact Assessment.

This modelling has estimated that ESOS resulted in central estimates of 1.65TWh of energy efficiency savings as a result of changes made to buildings and 1.51TWh from changes made to industrial processes, across the ESOS population⁴⁰. Table 2 below sets out these modelled estimates alongside lower and upper bounds for the estimated savings⁴¹. A range of modelled estimates are presented given that a number of assumptions and uncertainties apply to the modelled estimates. The estimated savings should be considered as indicative only and further details of the modelling approach and associated limitations are described in the technical report.

³⁶ As with the average number of measures implemented in section 2.1.1, the 2.16 and 0.32 averages assume that organisations attribute the average number of measures to ESOS partly and directly in categories for which they were not asked the follow up questions. Based on the responses provided by organisations and category averages imputed where follow up questions were not asked, it was calculated that on average each organisation attributed 2.16 measures in total at least partly due to ESOS and 0.32 measures directly to the scheme.

³⁷ 5.04 measures had been implemented on average: 1.97 attributable to ESOS and 0.29 directly so

³⁸ The proportion of organisations reporting one, two or three measures as a result of ESOS represent minimum estimates. See footnote 27 for further detail.

³⁹ 35% reported they had implemented at least one measure as a result of ESOS

⁴⁰ The modelling also estimated additional savings resulting from fuel efficiency measures which are discussed in section 2.2.2.

⁴¹ These bounds were calculated by imputing the 25th and 75th percentiles where there was missing data on sector address floor area, energy efficiency measures installed, and the percentage of sites that measures had been installed in. The central estimate used the respective means. Further detail of this is provided in the technical report.

Table 2: Estimated savings attributable to ESOS compared to predicted savings (in the original ESOS Impact Assessment)

Estimated savings as a result of measures implemented due to ESOS (results of modelling)	Impact Assessment prediction	Central Estimate	Lower Estimate	Upper Estimate
Industrial process changes	1.0TWh	1.51TWh	0.38TWh	4.04TWh
Buildings changes	1.3TWh	1.65TWh	0.47TWh	3.17TWh

Source: Energy savings modelling; 2014 ESOS Impact Assessment

The savings have also been compared with the estimated savings from the original ESOS Impact Assessment for illustrative purposes, whilst noting that the underlying methodology and assumptions used in the Impact Assessment differ from those used in the evaluation modelling. The [ESOS Impact Assessment](#) predicted energy efficiency savings of 1.0TWh from industrial processes and 1.3TWh from changes made in buildings. The central modelled estimates of savings realised across the ESOS population suggest the policy has performed well against these predictions. However, given the uncertainties associated with the modelling, in reality the savings are likely to fall somewhere between the lower and upper bounds presented in Table 2. The central estimates should be interpreted only in the context of these bounds.

Energy efficiency savings realised as a result of changes made to buildings varied significantly depending on the specific category of measure implemented, as shown in Table 3 below: 75% of the 1.65TWh estimated savings from building measures were estimated to have arisen from lighting measures and 13% from heating measures, with a much smaller proportion from cooling, hot water, computing, building fabric and ventilation measures. Table 1 highlighted that lighting measures were the most commonly implemented or planned and among the most likely to be attributed to ESOS, and the modelling results presented below confirms that these lighting measures dominate the overall buildings savings that result from ESOS. By contrast, the survey showed that cooling measures were relatively common (implemented or planned by 35% of organisations) and relatively likely to be attributed to ESOS (reported in 36% of cases), but were responsible for only a small proportion of the energy savings realised (24 GWh or approximately 1% of all building-related savings from the policy).

Modelling was also conducted to estimate future savings still to be realised from the first phase of ESOS compliance. This was based on survey responses around future planned actions as a result of ESOS and the likelihood of their implementation. This modelling estimated future savings from buildings of 0.05-0.68TWh, with a central estimate of 0.33TWh, and from industrial process of 0.01-0.49TWh (with a central estimate of 0.2TWh).

Table 3: Estimated building energy efficiency savings by measure category

Measure category	Estimated GWh savings	% of total buildings savings
Lighting	1234GWh	75%
Heating	206GWh	13%
Hot water	58GWh	4%
Ventilation	54GWh	3%
Computers/ IT	36GWh	2%
Building fabric	33GWh	2%
Cooling	24GWh	1%

Source: Energy savings modelling

Case study evidence on energy efficiency savings

The organisational case studies provided more detailed evidence around the contexts in which ESOS was either more or less likely to have driven additional energy efficiency savings.

These case studies showed that in some cases the information in the ESOS audit report had led directly to energy efficiency improvements, resulting in the types of savings captured in the energy modelling, and demonstrating that ESOS has led to its intended impacts in some organisations.

Case study evidence: energy efficiency measures installed and extent to which influenced by ESOS recommendations

In one religious organisation’s administrative headquarters, ESOS had led to the installation of new, more energy-efficient lighting arrangements. The respondents said that although they had already begun to think about replacing their lights, ESOS was directly responsible for their decision to choose LED lights as their replacements.⁴²

“ESOS made us think about implementing higher efficiency lighting ahead of the curve of industry... we had already been moving to CFD but next stage of LED was due to ESOS.”

⁴² Complied through audits, religious organisation

In addition, a facilities management company had installed new lighting and boilers as a result of recommendations in the ESOS report, which was an “eye opener”.⁴³

However, the case studies also confirmed that ESOS has not led to energy efficiency actions and therefore associated energy savings in some cases. For example, the evidence found that some organisations might not attribute energy efficiency measures to ESOS if they were generally already aware of the opportunities identified in the ESOS report, for example due to previous internal or external audits⁴⁴.

Case study evidence: energy efficiency measures installed and extent to which influenced by ESOS recommendations

In one secondary school, respondents reported that ESOS had not suggested any suitable energy efficiency opportunities that they were not already aware of. For example, the report recommended installing solar panels on the roof of the sports hall, but this was not deemed suitable by the organisation given the high capital expenditure required and long payback period. Although the school had implemented several energy saving measures over the last few years, the staff had become aware of these opportunities prior to receiving their ESOS audit, which mainly recommended these same measures (such as installing LED lights).⁴⁵

“We look at the payback period before going ahead with any big projects... we didn’t go ahead with solar panels because the payback period was about 20 years, and the saving on the electricity bill was minimal.”

A manufacturing company did not implement any new energy efficiency measures as a result of their ESOS audit. Their Environmental Health and Safety manager felt that the recommendations in the report covered opportunities that they had identified before the audit took place, including some they had already actioned. Most of these were to do with the replacement or purchase of equipment.⁴⁶

2.2 Organisational uptake of fuel efficiency measures

83% of organisations that own or lease vehicles reported implementing or planning⁴⁷ at least one fuel efficiency improvement since they first began the ESOS process. Organisations attributed the implementation of 32% of all fuel efficiency improvements directly or partly due to ESOS.

⁴³ Complied through audits, facilities management

⁴⁴ It is possible that organisations that took part in the case studies were particularly engaged in energy efficiency, and therefore may have been more likely to be aware of energy saving opportunities than other organisations that were auditing their consumption for the first time via ESOS.

⁴⁵ Complied through audits, school

⁴⁶ Complied through audits, manufacturing company.

⁴⁷ 75% had implemented at least one measure (and may also have planned measures); 8% had planned measures only

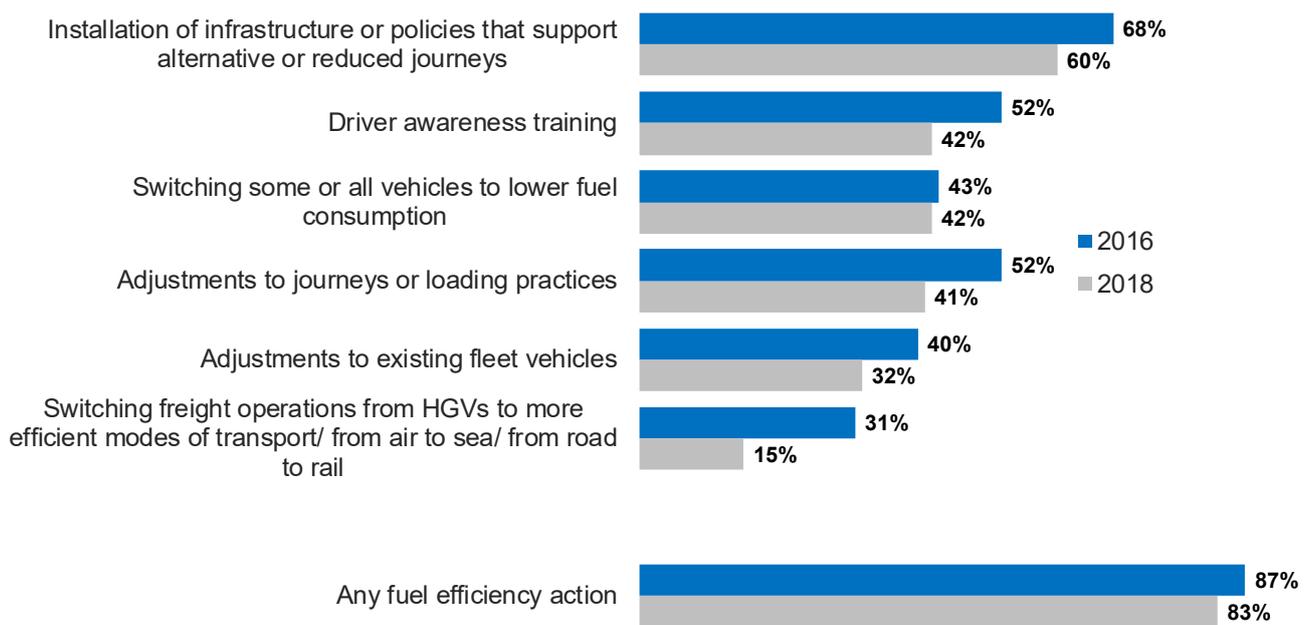
2.2.1 Uptake of fuel efficiency measures

There is limited evidence to suggest that organisations have invested significantly in making their fleets more fuel efficient since 2016. The proportion reporting their organisation’s car fleet to comprise some low carbon vehicles increased from 49% to 54%; however, the proportion that reported at least half of their fleet as low carbon declined from 14% to 11%.

As shown in Figure 3⁴⁸, the most frequently implemented or planned fuel efficiency measure was installing infrastructure or policies that support alternative or reduced journeys (60%). On average, organisations with a fleet had implemented or planned 2.27⁴⁹ fuel efficiency measures since ESOS.

For transport measures that are currently being planned⁵⁰, respondents were asked to indicate how likely (out of 10) their organisations were to implement them within a year. The mean across all planned measures was 6.8, meaning that the typical measure was more likely than not to be implemented.

Figure 3: Proportion of ESOS complier organisations who own or lease vehicles reporting their organisation to have implemented or planned each fuel measure, since ESOS



Source: ESOS Complier survey, 2018, Base: 388 organisations who own or lease vehicles for commercial use; ESOS interim Evaluation survey, 2016, Base: 608 complier or intend to comply organisations who own or lease vehicles for commercial use. ‘Not applicable’ responses excluded for ‘switching freight operations from HGVs to more efficient modes of transport’.

⁴⁸ As with figure 2 in section 2.1, for some measures there has been a decrease between survey waves which is likely to be due to recall problems in the 2018 survey.

⁴⁹ 1.92 measures had been implemented on average

⁵⁰ Data on the range of planned measure was collected but this is not reported at the level of each measure due to very low bases.

2.2.2 Fuel efficiency savings attributed to ESOS

Of all the fuel efficiency measures that had been implemented or planned by organisations since ESOS, 32% were attributed by organisations at least in part to ESOS and 4% were attributed directly to the scheme^{51,52}. These fuel efficiency measures implemented as a result of ESOS were modelled to have led to a central estimate of 0.52TWh of savings across the total ESOS population.

All organisations with a fleet were asked about the implementation of each specific fuel efficiency measure, and about attribution to ESOS for each measure they reported having implemented. This was possible for transport measures, unlike for buildings and industrial process measures (see footnote 27), due to the list of possible measures being considerably shorter. The survey found that 31% of organisations with a fleet reported implementing or planning⁵³ at least one fuel efficiency measure at least in part due to ESOS, and 6% reported doing so directly due to ESOS. One fifth (20%) reported implementing or planning two or more fuel efficiency measures at least in part as a result of the scheme.

Attribution to ESOS of specific fuel efficiency actions varied by improvement type. Adjustments to journeys or loading practices were most commonly attributed to ESOS, with 38% of organisations making or planning such improvements attributing this at least in part to ESOS.

Table 4: Fuel efficiency action by organisations who own or lease vehicles, since ESOS

Fuel efficiency improvements implemented or planned	% organisations implementing or planning since ESOS	Of which: % improvements attributed to ESOS	
		Directly attributed to ESOS	At least partly attributed to ESOS
Any improvement	83%	4%	32%
Installation of infrastructure or policies to support alternative/ reduced journeys	60%	3%	28%
Driver awareness training	42%	5%	31%
Adjustments to journeys or loading practices	41%	5%	38%
Switching some or all vehicles to lower fuel consumption	42%	2%	29%
Adjustments to existing fleet vehicles	32%	3%	37%
Switching freight operations from HGVs to more efficient modes of transport	10%	0%	23%

Source: ESOS complier survey, 2018, Base: 388 organisations who own or lease vehicles for commercial purposes

⁵¹ 32% of measures implemented were attributed to the scheme; 3% directly

⁵² 31% of organisations with a fleet reported implementing at least one fuel efficiency measure at least in part due to ESOS, and 6% reported doing so directly due to ESOS. This figure was 20% for two or more fuel measures.

⁵³ 28% had implemented at least one measure due to ESOS; 5% directly

The fuel efficiency measures reported in the survey were modelled in a similar way to the buildings and process measures discussed in section 2.1.2. This modelling yielded an estimate of the total fuel efficiency savings realised as a result of ESOS across the total ESOS population. As with the estimated savings from buildings and industrial processes, the estimates from the fuel efficiency modelling come with a number of caveats and should be considered indicative only (see the technical report for further details). Comparisons between the modelling and Impact Assessment should also be treated with caution⁵⁴.

This modelling estimated that ESOS has resulted in **0.52TWh** of savings across the population from the implementation of fuel efficiency measures (with an upper estimate of 0.68TWh and a lower estimate of 0.36TWh). The central estimate of energy savings from the modelling is lower than the 0.7TWh the ESOS Impact Assessment predicted could be achieved, although the upper limit of the range is similar.

The modelling also provides an estimated breakdown of the savings that have been realised as a result of the specific fuel efficiency measures asked about in the survey. Table 5 shows that, 30% of the fuel efficiency savings realised as a result of ESOS are from adjustments to existing fleet vehicles (despite not being among the most commonly implemented measures). By contrast, driver awareness training was estimated to have contributed 15% of the total fuel efficiency savings despite high prevalence, reflecting the lower saving rate it yields.

Table 5: Estimated fuel efficiency energy savings by measure

Measure	Estimated GWh savings	% of total fuel efficiency savings
Adjustments to existing fleet vehicles, e.g. improving aerodynamics, adjusting tyre pressure, speed restrictors or driver monitoring technology	154 GWh	30%
Adjustments to journeys or loading practices, to reduce mileage, time spent on the road, or load weights	135 GWh	26%
Installation of infrastructure or policies that support alternative or reduced journeys e.g. better cycling facilities, vehicle charging points, car sharing policy, video conferencing, home working	128 GWh	25%
Driver awareness training (eco-driving training, idling practices, etc.)	80GWh	15%

⁵⁴ Limitations to the estimated fuel efficiency saving in the Impact Assessment were also acknowledged when this estimate was produced, as there was no comprehensive data available on the potential for further energy efficiency improvements in the transport sector, or the proportion of this that might be in scope of existing policy.

Measure	Estimated GWh savings	% of total fuel efficiency savings
Switching some or all vehicles to lower fuel consumption, electric, hybrids, or alternatively fuelled vehicles	19 GWh	4%
Switching freight operations from HGVs to more efficient modes of transport, or from air to sea, or from road to rail.	3 GWh	*

Source: Energy savings modelling

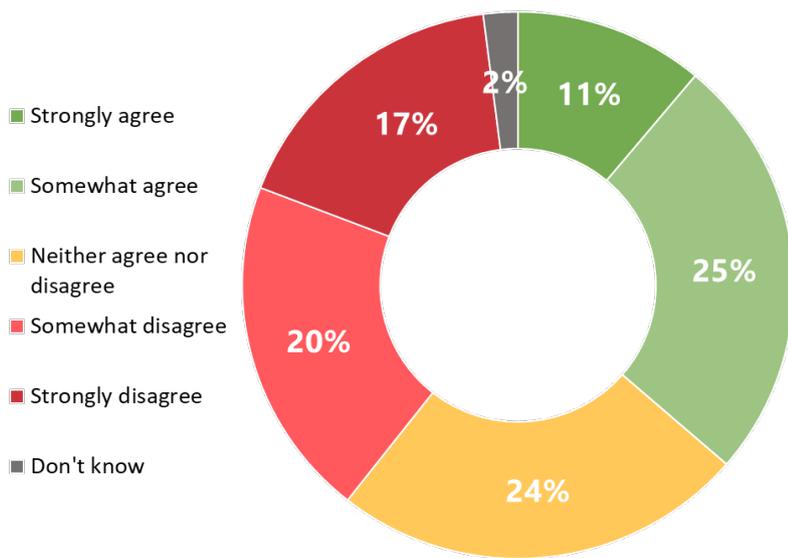
As with buildings and process savings, modelling was also conducted to estimate future savings still to be realised from the first phase of ESOS compliance, based on survey responses around future planned actions as a result of ESOS and the likelihood of their implementation. This modelling estimated future savings from transport of 0.02-0.03TWh (with a central estimate of 0.025TWh).

2.3 Impact of ESOS on organisational costs of doing business

More than one third (37%) of organisations agreed that ‘changes made as a result of ESOS have already led to net cost savings’ for their organisation.

Representatives of organisations themselves were not asked to estimate the actual savings that had resulted from ESOS, as it was not expected that they would be able to do so with any level of accuracy. Instead, participants were asked if they agreed with the statement ‘changes made as a result of ESOS have already led to net cost savings in the organisation’, with 37% agreeing that this was the case for their organisation. This represents an increase on the 27% reporting this in 2016, in the first year following the compliance deadline.

Figure 4: Agreement with the statement ‘Changes made as a result of ESOS have already led to net cost savings in the organisation’



Source: ESOS complier survey, 2018, Base: 503 organisations

3. Wider organisational impacts of ESOS

This section explores the extent to which the ESOS process has influenced approaches to energy management within organisations, beyond the installation of specific measures, including the ways in which organisations prioritise, structure and approach energy efficiency issues. While not set as objectives for the policy, there is some evidence to suggest ESOS is impacting on some organisations in this way. This section also considers the extent to which ESOS complier organisations have experienced any other outcomes as a result of their ESOS compliance activity, including the realisation of any other (non-energy saving related) benefits.

This section contributes evidence to one of the key research questions set for this study:

RQ2: To what extent, (in which ways and in which contexts) has ESOS influenced organisational energy efficiency policy and practice? What impact has ESOS had on energy efficiency in organisations?

Key findings

Around one in five had introduced or updated an energy efficiency related policy or target as a result of the ESOS process. Evidence from the qualitative case study interviews suggested that ESOS has made organisations more aware of how much energy they were using, where, and how much that was costing their business.

45% of organisations which were part of a wider corporate group reported that their ESOS audit report or recommendations had been shared with the group, with 29% sharing their full audit report.

Indirect benefits of ESOS, while not a stated goal for the policy, were reported by a small proportion of organisations – 16% said that it had improved their reputation, 8% said that it had improved staff productivity. Some case study organisations reported that ESOS had improved indoor conditions for staff, customers or clients.

3.1 Influence of ESOS on broader culture around energy efficiency within organisations

ESOS has led to the introduction or updating of an energy efficiency related policy or target in around one in five organisations. Organisations also reported the ESOS process to have made their organisation more aware of how much energy they were using, where, and how much that was costing their business. While not a core objective of the policy, it is noted that there is little evidence to suggest that ESOS has encouraged, so far, a shift in the approach to assigning responsibility for energy management within an organisation.

3.1.1 Influence of ESOS on energy and fuel data collation and management

In the qualitative research, assessors frequently highlighted that a challenging and time-consuming element of the ESOS audit process was obtaining energy, and in particular fuel, data from across different parts of an organisation and its fleet. This data was commonly found

to not be in one place, or to not be separated out from other business outgoings. Fuel data was often not available by vehicle making it difficult to understand the fuel efficiency of different parts of the fleet.

As a result, some of the recommendations made in ESOS reports focused on encouraging organisations to put better monitoring and reporting processes in place around energy and fuel data. These were also some of the recommendations that Assessors reported some of their clients to have taken-up as a result of the ESOS process:

“Organisations are getting better at looking at it, managing and bringing it [energy data] as part of normal reporting... some have better hold on their data” (ESOS Assessor)

“[One of our subsidiaries] created a new computer system to better capture their transport data. To be fair I think it was partly a Finance (team) push, but ESOS definitely helped them realise something was needed.” (Organisation, Property Management, Group level)

The importance of encouraging these types of impact within organisations was emphasised by some assessors who reported limited organisational interest in energy efficiency to sometimes stem from a lack of awareness or visibility of their energy spend or which parts or processes within the business were most and least efficient. One of the lessons learned by an assessor interviewed was to start the ESOS audit report or presentation with a statement of the total energy spend for the organisation, as they had found this to often be poorly understood by organisations, and to frequently generate surprise and then interest in how it could be reduced.

“I always started with a top 10 savings with monetary impact and cost of investment to show return, plus also always told them the cost being spent on energy currently as was often not known.” (ESOS Assessor)

Organisations involved in the case-studies also described an impact of ESOS – even where it was not felt to have driven uptake of specific measures – around making them generally more aware of how much energy they were using, where, and how much that was costing their business. This was particularly the case where it brought together data across their sites, or processes, for the first time (an impact of the regulations requirement to report on at least 90% of the organisation’s energy use). Greater awareness of energy use was also reported by organisations involved in the 2016 interim evaluation of ESOS.

“I think ESOS has driven our approach towards [energy certifications and actions] because it has armed us with information and knowledge that we can put in place in other areas of the business. It’s raised awareness but there isn’t a direct route between actions and ESOS.” (Organisation, Property Management, Group level)

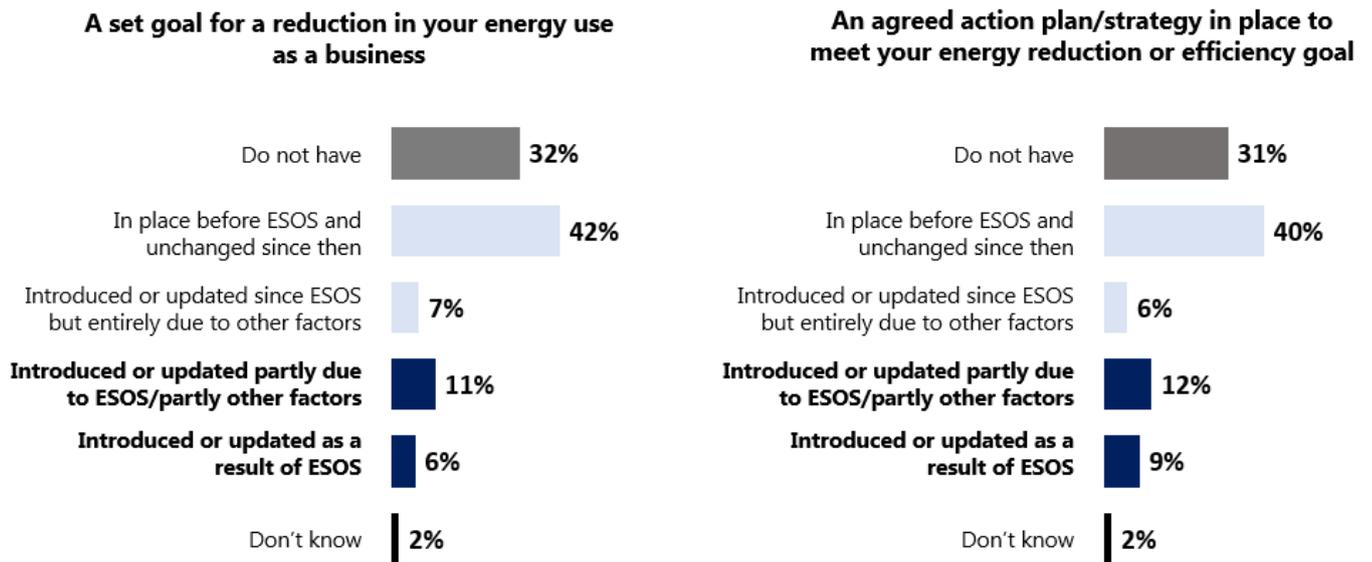
3.1.2 Influence of ESOS on energy efficiency policies and targets

Around one in five organisations have introduced or updated an energy efficiency related policy or target as a result of the ESOS process.

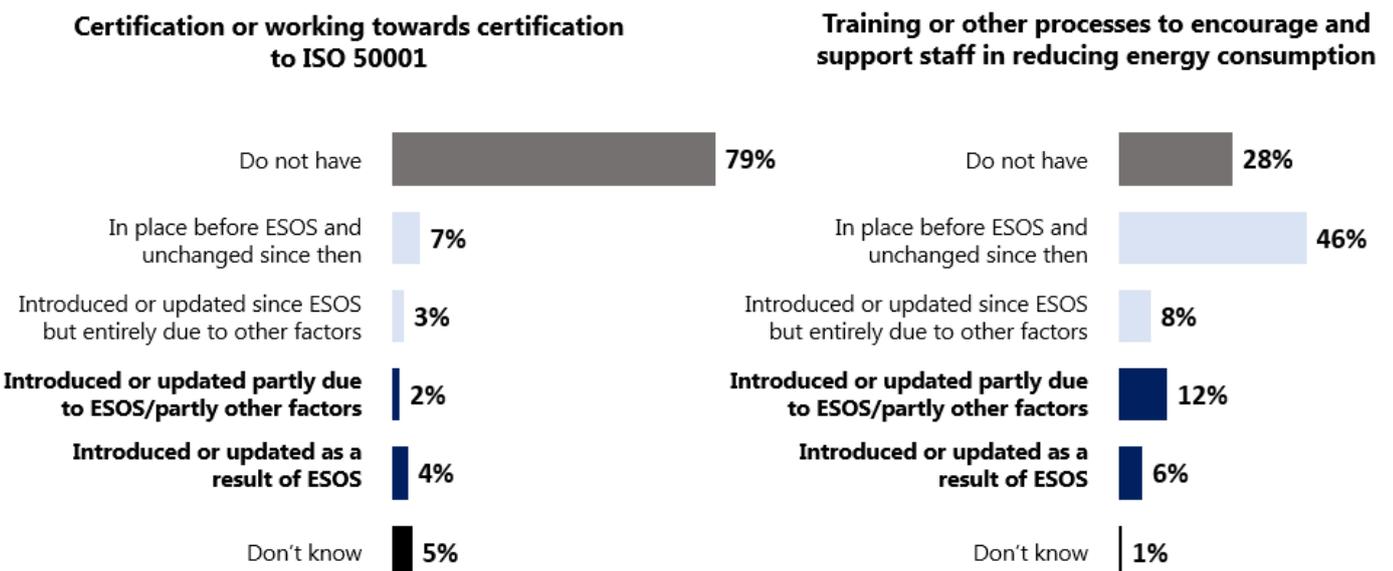
Surveyed respondents were asked whether their organisations had energy efficiency related goals, action plans or policies and whether these had been in place prior to ESOS or whether they had been introduced (or updated) as a result of the ESOS process.

At least two thirds of those surveyed reported their organisations to have an energy efficiency-related goal (66%), action plan (66%) or staff training (71%) in place. As shown in Figure 5, in around one in five cases these policies or processes had been either introduced or updated at least partly due to ESOS. ESOS was most commonly attributed as a factor influencing action plans or strategies for meeting energy reduction or efficiency goals (21%), with one in ten (9%) of these organisations directly attributing their action plan to ESOS. Similar proportions attributed their organisation’s energy reduction goal or staff training process to ESOS (17% and 18% respectively reported ESOS as partially responsible, with 6% in each case directly attributing these policies to ESOS).

Figure 5: Influence of ESOS on energy efficiency goals, action plans and policies



Source: ESOS Complier survey, 2018. Base: 503 organisations



Source: ESOS Complier survey, 2018. Base: 503 organisations

As shown in Figure 5, fewer organisations surveyed either had or were working towards ISO 50001⁵⁵ certification (18%), and this was only attributed to ESOS in 6% of cases. This aligns with [compliance figures](#) which showed only a small minority complied with the regulation through this route. The interim evaluation of ESOS conducted in 2016 explored routes to compliance, and the motivations underlying different approaches, in detail. In many cases, organisations complying through ISO 50001 were found to be those already certified, making it a simple means of meeting the regulatory requirement. However, assessors interviewed during this study were aware of instances in which the ESOS regulation had helped to provide the impetus for organisations to pursue ISO 50001 certification where this was not already in place, or to reach the certification faster than would have happened in the absence of the regulation. The influence of ESOS on promoting ISO 50001 compliance was also highlighted by one of the organisational case-studies:

Case study evidence: impact of ESOS on ISO 50001 certification

Respondents from a property management and development company reported that their organisation was already 14001 compliant and so, when reviewing their ESOS compliance options, reaching ISO 50001 was felt to be a logical next step for them. In their opinion, the organisation became ISO 50001 certified sooner than would have been the case if this had not provided a compliance route for ESOS.

Having ISO 50001 was attributed by these respondents to driving “constant checks on our target, our data, discussions of how we’re doing”. Since complying with ESOS in 2015, these respondents reported their organisation to have a “much better grasp on our energy use, we can pinpoint peaks and troughs, and we try to identify what’s caused it”.⁵⁶

3.1.3 Influence of ESOS on organisational culture and structure around energy management

Board-level priority given to energy efficiency

To support the achievement of its objectives, ESOS sought to secure board-level visibility of energy saving opportunities. As part of the design of the ESOS scheme, ESOS compliance reports had to receive board-level review and sign-off before full compliance could be achieved.

Surveyed respondents were asked to rate (out of 10) the level of priority that they felt their board placed on energy efficiency. A comparison between the baseline and follow-up surveys shows an increase from an average of 5.31 in 2016 to 6.37 in 2018.

⁵⁵ ISO 50001 is a quality management system for energy use management based on a model of continual improvement also used for other standards such as ISO 9001 or ISO 14001.

⁵⁶ Complied through ISO 50001, large corporate group in property management

Table 6: Average level of priority placed on energy efficiency at board level

	2015	2018
Low priority (1-3)	28%	13%
Medium priority (4-7)	48%	50%
High priority (8-10)	21%	35%
Don't know	3%	2%
Mean	5.31	6.37

Source: ESOS Complier survey, 2018, Base: 503 organisations; ESOS Interim Evaluation survey, 2016, Base: 821 complier or intend to comply organisations

For those who participated in both the 2016 and 2018 surveys, the proportion reporting an increase in board-level priority was determined by calculating the proportion who rated the priority that their board level placed on energy efficiency as a higher number out of ten in 2018 than in 2016. Based on this approach, it was found that 55% of participants who took part in both surveys had experienced an increase in board-level priority. All participants who took part in both the 2016 and 2018 surveys⁵⁷ were then asked if they agreed that the level of priority placed on energy efficiency at board level had increased as a result of going through the ESOS process: 30% agreed that it had and 38% disagreed that ESOS had had this influence.

In the absence of a 2016 comparator group, those who did not participate in the baseline survey were asked directly whether they thought the level of priority placed on energy efficiency by their organisation's board had increased or decreased over the last three years: 56% reported that they thought there had been an increase, compared with just 3% that reported a decrease. 38% reported there had been no change in this period. Those who reported an increase were then asked if they agreed that this increase was a result of going through the ESOS process, with 45% agreeing that this was the case, compared with 24% that disagreed. In total, 25% of those who did not participate in the 2016 survey reported that they had experienced a board level increase in the priority given to energy efficiency and agreed that this was because of ESOS.

There is some evidence to suggest that where ESOS is reported to have increased priority on energy efficiency at a board level⁵⁸, organisations may have been more likely to implement a greater number of energy efficiency measures. More of those who agreed ESOS had

⁵⁷ All of those who participated in both surveys were asked this question, regardless of whether the reported priority level placed by the board on energy efficiency had increased between the two surveys. Thus a participant could have agreed that the priority had increased as a result of ESOS even if the reported priority level was unchanged or had decreased between survey waves.

⁵⁸ Note that there were differences in the questionnaire between participants that had taken part in the 2016 baseline survey and those that had not with respect to measuring agreement that ESOS had increased the level of priority. As above, all of those who took part in both surveys were asked this question and could agree with this statement regardless of their reported priority levels, whereas those that did not take part in the baseline survey were only asked if they agreed with this statement if they first reported an increased level of priority placed on energy efficiency.

increased the level of priority placed on energy efficiency at board level in their organisation had implemented two or more energy efficiency measures as a result of ESOS, compared to those whose priority levels were not felt to have been affected. A similar pattern can be seen when observing the proportion of organisations that took forward fuel efficiency measures either partly or directly due to ESOS.

As previously mentioned in section 3.1, feedback from assessors suggests that board-level engagement with ESOS has not always been meaningful: meetings to discuss the audit findings were not always held, and in some cases board-level representatives were not involved in this process except for a simple sign-off for compliance purposes. This may explain why board level priority has not increased in all cases.

Where prioritisation of energy efficiency had not increased, feedback from both organisations and assessors suggested that this may be due to a number of reasons:

- Many organisations reported that they were already doing what they felt able on energy efficiency. For these types of organisation the scope for ESOS to raise the priority they place on energy efficiency was limited.

“Trying to find efficiencies in something that’s already running fairly efficiently is hard.” (Organisation, IT management)

- In particular, organisations that were more energy-intensive reported themselves to already place a high priority on energy efficiency, and were therefore more likely to have limited scope for ESOS to raise the priority placed on energy efficiency. Those that were not already doing what they felt able were more likely to consider implementing simple and low cost measures (described as ‘no brainers’, or ‘low hanging fruit’ by many assessors), but this was a business-focused decision and not accompanied with a change in organisational priority placed on energy efficiency. The survey results supported this: organisations that participated in CCA, CRC or EU ETS (who were assumed to be medium to very energy-intensive) were less likely to report that ESOS had increased the board level of priority placed on energy efficiency (28%, compared with 40% of non-participants)⁵⁹.
- The cyclical approach many organisations are taking to ESOS, to align with the four-yearly compliance deadlines, has meant that ESOS has only raised the level of priority placed on energy efficiency in the short term for some organisations: one assessor observed that the priority placed on energy efficiency among their client organisations rose around the time of the 2015 compliance period, but decreased back to its previous level shortly afterwards.

“We have from the middle of this year increasingly been saying ESOS Phase 2, but people haven’t really been taking notice until the last few months when they’ve asked us to consider how we’d help them.” (Lead assessor)

Levels of discussion around energy efficiency across organisations

Organisations which were part of a wider corporate group were asked whether they had shared their ESOS audit report or any of the recommendations with other organisations in their

⁵⁹ For this comparison, only the three schemes listed were used as they were assumed to be a good proxy for energy intensive organisations. In the data tables and elsewhere in the report, the definition of “other schemes” is broader, including for example Energy Performance Certificates and Display Energy Certificates. As such, these figures are different to the “Any” and “None” columns in the data tables under “Participation in other EE schemes”. The full list of schemes can be found in the technical report.

group. The picture was very mixed, with 45% reporting that their ESOS audit report or recommendations had been shared, while 51% said that they had not.

Respondents who were part of wider corporate groups were also asked which aspects of their reports had been shared. Most commonly, these organisations shared the full report as signed off by the board (shared by 29%), followed by the executive summary (24%) and all of the recommendations included in the report (22%), whereas fewer had shared outputs tailored to particular organisations or sites within the corporate group.

Figure 6: Proportion sharing ESOS audit report or recommendations with other organisations within their corporate group



Source: ESOS Complier survey, 2018, 302 complier organisations part of a wider corporate group

The following types of organisation were among the most likely to have shared their ESOS audit report or recommendations with others across their corporate group:

- 48% of respondents from multi-site organisations, compared to only 31% of respondents from single site organisations.
- Respondents from organisations where the level of action on energy efficiency had increased since ESOS (52%) compared to organisations where the level of action taken had decreased or stayed the same (39%).
- Participants in any other energy efficiency schemes (such as CRC or CCA) (50%) compared to those that did not participate in any of these schemes (30%).

The case study below demonstrates a pro-active approach to disseminating ESOS findings across a corporate group.

Case study evidence: Example of ESOS process across corporate group

One of the case study organisations was a large UK-wide corporate group with a large number of subsidiaries. This Group disaggregated their ESOS compliance into four separate notifications, meeting the regulation through a mix of ISO 50001 certification, Assessor audit activity and Display Energy Certificates.

ESOS was described as providing a good hook to encourage more discussion across the organisation around energy management. The ESOS compliance process had

strengthened lines of communication between Group-level and subsidiaries, and helped to position the energy management team within the Group headquarters as internal consultants to subsidiaries. This team had, for example, presented to each subsidiary on their options to meet compliance and provided advice on the most suitable approach given their business structure, number of sites and existing certifications (a similar process is currently underway to help subsidiaries prepare for Phase 2 compliance).

The Group-level representatives interviewed during this case study described ESOS as having “armed us with more information and knowledge” and to have “given us the opportunity to speak to subsidiaries, it was something to flag to them, it strengthened our dialogue as it was regulation”.

Following ESOS compliance, these Group-level representatives reviewed the ESOS audit reports for those subsidiaries which complied through audit activity and have reviewed with them which actions might be taken forward. At the time of this case study, the 2015 reports were being revisited by both Group-level and subsidiary-level teams to help them decide how best to approach Phase 2 compliance.⁶⁰

3.1.4 Inclusion of energy efficiency in staff roles, impacts on team structures

While encouraging a shift in the approach to assigning responsibility for energy management within an organisation was not set as a policy objective of ESOS, it was hypothesised in the design of this evaluation as a potential co-benefit of the ESOS compliance process. However, there is little evidence to suggest that ESOS has had this influence on organisations, with no clear increase or decrease in the number of staff with energy efficiency and/or energy management among their responsibilities, since the 2016 survey.

3.2 Further outcomes related to ESOS compliance

Indirect benefits of ESOS were reported by a small proportion of organisations – 16% said that it had improved their reputation, 8% said that it had improved staff productivity. Some case study organisations reported that ESOS had improved indoor conditions for staff, customers or clients.

Complier organisations engaged through this study were asked to consider the extent to which the ESOS process was associated with other types of benefit, beyond those previously discussed. In particular, organisations were asked to consider the extent to which the ESOS process impacted on their reputation or staff productivity. These were not stated policy objectives for ESOS but have been included to explore whether ESOS compliance is linked to wider impacts for organisations.

Overall, as shown in Figure 7, 16% agreed that complying with ESOS had enhanced their organisation’s reputation, and 8% their productivity, although most disagreed with both of these statements. These were not, however, key motivators identified by those organisations who had taken energy or fuel efficiency action (4% cited either reputation-driven or customer/client-focused motives).

⁶⁰ Complied through ISO 50001, large corporate group in property management

Figure 7: Perceived impact of ESOS activity on reputation and productivity

To what extent do you agree or disagree with each of the following statements? For each statement please say whether you strongly agree, tend to agree, neither agree nor disagree, tend to disagree or strongly disagree.



Source: ESOS Complier survey, 2018, Base: 503 organisations

3.2.1 Reputational benefits of ESOS compliance

Complying with ESOS had driven reputational benefits in one in six organisations. An enhanced reputation was more likely to be reported by organisations which complied via ISO 50001 certification or had taken increased action around energy efficiency.

One in six (16%) agreed that complying with ESOS had enhanced their organisation’s reputation (similar to the proportion of 17% in 2016). However, this increased to one in four (25%) among those who reported that energy efficiency actions within their organisation had increased since complying with ESOS.

Case study evidence: Internal reputational benefits of ESOS

Reputational benefits were not commonly mentioned by those involved in in-depth organisational cases-studies. That said, representatives of one ESOS compliant organisation described the internal reputational benefits that the compliance activity had driven. The ESOS audit was described as having provided comfort to senior leaders that the organisation was undertaking energy efficiency actions where they could.

Representatives from another case study organisation recognised the potential link between energy efficiency action and external reputation with their customer and shareholder base. However, they were of the opinion that a requirement to publish ESOS audit reports, or action plans, would be needed to capitalise on this driver. They anticipated that publishing the ESOS report, and thereby tying it to external reputational risk, would be a key driver for enhancing the importance placed on energy efficiency action by their senior management.

Those that complied with ESOS via ISO 50001 certification were also significantly more likely to agree that complying with ESOS had reputational benefits (36%).

Case study evidence: ISO 50001 enhancing reputation

Evidence from one of the organisational case studies supported the findings from the survey. Representatives from this ESOS complier believed that ISO 50001 certification had helped their organisation to win public contracts by enabling them to demonstrate the required environmental certifications. While this organisation reported that they were likely to have become ISO 50001 certified outside of ESOS compliance, this process was sped up internally in order to meet the regulatory deadline.

3.2.2 Staff productivity and client comfort

A small proportion of organisations reported increased staff productivity as a result of the ESOS process (8% overall, but up to 13% in organisations reporting an increase in energy efficiency action). In qualitative interviews a few organisations also reported other related co-benefits of energy efficiency measures they had installed, such as improved indoor conditions for staff, customers and clients.

Fewer than one in ten (8%) organisations agreed that staff productivity had increased as a result of implementing energy saving measures recommended in their ESOS audit (similar to the 6% reporting this in 2016). This increased to 13% among organisations that had increased their energy efficiency action since ESOS. While organisations involved in the organisational case-studies did not report staff productivity benefits, a range of other co-benefits related to the comfort of indoor environments were raised:

Case study evidence: Co-benefits of ESOS

A few of the in-depth qualitative case-studies conducted with organisations identified other impacts of ESOS which they reported to have benefited the working or living conditions of staff or customers. Representatives from a few organisations discussed an improved quality of lighting as a co-benefit of implementing more energy efficient lighting recommended in their ESOS report.

For example, a UK charity was in the process of upgrading to LED lighting in their centres where individuals with low or no sight were residents. A primary driver for this upgrade, according to the organisation, was the additional benefits the newer lighting provided to their clients; it provided them with extended control over lighting levels and lighting warmth, allowing the lighting to be customised for different areas of the centres and accommodate for different levels of sight.

Another organisation spontaneously raised the co-benefit of a better working environment for staff on sites after investing in new machinery. While the new machinery was more energy efficient, the case study participants noted that a key benefit was reduced noise levels which made for a better working environment for staff.

Qualitative interviews conducted with supply chain representatives also highlighted evidence of co-benefits experienced among clients who had taken energy efficiency action – although these stakeholders were often not clear on the extent to which these actions had been motivated by ESOS. During follow-up contact with clients (typically arranged to ensure that measures installed had delivered their expected efficiencies) supply chain representatives reported observing evidence of the following benefits being achieved at client organisations:

- LED suppliers mentioned improvements to staff wellbeing due to improved working conditions (staff turnover and sickness fell sharply in one example);
- Another LED supplier also highlighted unintended savings – a client needed to turn down their HVAC system because the previous lighting had been emitting significant amounts of heat;
- Those providing monitoring equipment discussed the benefits of their clients now being automatically alerted to broken or malfunctioning equipment – enabling a pro-active approach to maintenance issues that minimises cost and disruption to business; and,
- An established solar PV installer reported an increase in employee sustainability engagement.

4. Contexts and mechanisms that facilitate implementation of energy and fuel efficiency measures

This section considers what has been learned about the organisational contexts and factors which influence the likelihood of ESOS recommendations for energy and fuel efficiency action being implemented by organisations, including the influences on the recommendations assessors choose to make in ESOS audits. This section therefore draws on findings from the survey and organisational case studies as well as qualitative interviews with ESOS Assessors.

This section contributes evidence to two of the key research questions set for this study:

RQ1: To what extent (in which ways and in which contexts) are energy audits and reporting effective in identifying and delivering energy efficiency savings across organisations?

RQ2: To what extent (in which ways and in which contexts) has ESOS influenced organisational energy efficiency policy and practice? What impact has ESOS had on energy efficiency in organisations?

Key findings

Key contextual factors affecting levels of implementation include; certification to ISO 50001; having energy-related action plans or goals; board-level priority on energy efficiency; wider staff engagement and training on energy efficiency. Notably, and as might be expected, ESOS-driven action was lower where prior certification, goals or priorities were already in place.

The types of recommendations made by assessors in energy audits were also often impacted by a range of organisational factors, such as; contracting arrangements, building-type, age and tenure, organisational policies around payback periods and budgets identified for energy efficiency action.

Assessor experiences pointed to several ways in which engagement in energy and fuel efficiency action could be maximised through the auditing process (although the extent to which this engagement then drives actual implementation is less clear). This included the delivery of presentations to senior management which focused on key recommendations, linked to quantifiable savings able to support a business case.

Even in cases where enabling contexts and auditing approaches have been adopted, this study has found a range of other factors beyond ESOS (and audits) which can impact on levels of implementation, such as whether equipment is at the end of its natural life, or the organisation is refitting new premises. In addition, where implementation of low hanging fruit makes sound business sense, these have often been captured already or are under consideration without the need of a prompt from an audit.

4.1 Organisational contexts leading to implementation of energy efficiency actions

Key contextual factors affecting levels of implementation included: certification to ISO 50001; participation in other energy efficiency schemes; having energy-related action plans or goals; board-level priority on energy efficiency; wider staff engagement and training on energy efficiency.

These organisational contexts have repeatedly emerged in analysis of the complier survey findings as having an influence on whether or not actions recommended through the ESOS process to improve energy and fuel efficiency have been taken forward. These contexts were also found to be related to increased likelihood to have begun ESOS Phase 2 compliance activity.

The extent to which these represent established contexts prior to the ESOS process, or shifting contexts which themselves have been influenced by ESOS, is critical in their relationship with implementation; ESOS-driven action was lower where prior certification, goals or priorities were already in place. However, ESOS-driven action on energy efficiency was higher where ESOS was reported to have led to the introduction or update of such goals or priorities. This suggests ESOS has been most impactful for organisations that had not previously had these policies in place, and where it encourages this that there can be a positive feedback loop to also encourage uptake of specific energy efficiency measures.

Each of these contexts, as well as further organisational factors identified by assessors as having impacted on their choice of recommendations, is discussed further below. Additional information on the methodological approach taken to comparing contexts is included in the technical report.

Certification to ISO 50001

The complier survey found a pre-existing certification to ISO 50001 to be associated with lower uptake of ESOS recommendations, but for implementation to be more common where the certification has been achieved as a result of ESOS; such organisations were more likely to have made two or more energy efficiency changes at least in part as a result of ESOS than those without certification, for instance. This suggests that the certification has prompted improvements to be made, although causality cannot be proven.

Those who were certified prior to ESOS were unlikely to have made improvements as a result of ESOS. These organisations will have had to demonstrate continuous improvement as part of their certification, potentially resulting in less scope for ESOS to identify new opportunities.

“ESOS had no impact because it was looking at things that we as a data centre already do. There were things in place already that were driving that – the CCAs, CRC – these are the things driving energy efficiency beforehand. People having 50001. As a data centre and being such a large intense energy user, it pays for us to be energy efficient. ESOS may be useful to other companies who don’t focus on energy.” (Organisation, IT management)

The same pattern is apparent in action on fuel efficiency among those with a transport fleet; those with ISO 50001 certification prompted by ESOS were more likely to have made fuel efficiency changes at least in part as a result of the scheme than those without certification or whose certification pre-dates ESOS.

Participation in other energy efficiency schemes

Organisations that participate in CCAs were more likely to have reported some impacts of ESOS. For example, more CCA participants had implemented one or more energy efficiency measures at least in part as a result of ESOS than non-participants. Thus, despite CCA participants being likely to already have a high level of energy maturity pre-ESOS compliance, ESOS has still impacted on their uptake of energy efficiency measures, suggesting there may be some synergy between the policies. It is important to note that CCA participants are more likely than average to have had energy efficiency goals and action plans in place before ESOS, and while they place a higher priority on energy efficiency, they are no more likely than average to attribute an increase in priority to ESOS.

Energy efficiency goals and action plans

The introduction or update of an energy efficiency goal or action plan as a result of ESOS was also found to influence the uptake of energy efficiency action within organisations; organisations that introduced or updated an energy efficiency goal were more likely to have made multiple changes because of the scheme than organisations without such a goal or one in place and unchanged since beginning their ESOS activity. The same pattern holds for the introduction of action plans to meet such goals, and in the case of fuel, as well as energy efficiency measures.

These findings suggest that the capacity for ESOS to drive additional implementation depends on the level of unrealised energy efficiency potential. This is likely to have been affected by pre-existing levels of focus on converting opportunities identified through certification reporting, or progress reporting against plans or goals.

The energy maturity of organisations was also recognised by assessors as a factor that affected the way in which ESOS audit recommendations were received; one assessor had found that in more energy-mature organisations, the ESOS audit was used to reiterate the value of implemented or planned energy efficiency actions, rather than encourage new, more advanced actions.

“Depending on maturity of organisation. For example, an energy company I’d been working with from 2000, as we came to 2015, we’d had 15 years at nibbling away at energy assessments. We didn’t find anything new/different.” (ESOS Assessor)

Priority placed on energy efficiency

Trends in (rather than absolute) levels of priority given to energy efficiency appear to be an important context affecting the extent to which ESOS drives action. More of those who agreed ESOS had increased the level of priority placed on energy efficiency at board level in their organisation had implemented two or more energy efficiency measures as a result of ESOS, compared to those whose priority levels were not felt to have been affected. A similar pattern was observed with respect to implementation of fuel efficiency measures. Interviews with assessors suggested that where organisations were already energy mature before ESOS there was less scope for unrealised energy potential for ESOS to capture. There were no observed differences with respect to current levels of board priority, suggesting that where ESOS was able to encourage increased attention at board level this manifested in uptake of measures.

Introduction of training or other processes to encourage staff behaviour change

The engagement of staff and the training given to staff around energy efficiency also influenced actions taken towards energy efficiency. For example, organisations which had put in place training or other processes to encourage and support staff in reducing energy consumption as a result of ESOS were more likely to have made two or more changes because of the scheme than organisations without or who had training in place before ESOS. In keeping with similar contexts, the same pattern was observed with respect to implementation of fuel efficiency measures as a result of ESOS.

Staff engagement

Assessors also identified that the level of engagement among specific staff influenced the type of action on energy efficiency that was likely to be taken within organisations, and as a result, impacted on their choice of recommendations. For example, one assessor recommended energy management policies or processes for organisations with more engaged staff, whereas for organisations with a more operational focus, recommendations focused on energy efficient equipment changes. Another assessor had found they were more able to provide in-depth recommendations to organisations with engaged staff.

Action (though not necessarily driven solely by ESOS) was therefore often seen to be linked to senior-level interest in energy efficiency, or the presence of 'champions' within organisations who had an interest in or responsibility for energy efficiency. This was the case in three organisational case studies: one with a secondary school, one with an industrial manufacturing company and one with a religious organisation. All of these organisations had implemented a number of energy efficiency improvements in recent years though they did not attribute these (solely) to ESOS. The main representative of the school in the case study attributed this to his own championing of energy efficiency which had begun prior to ESOS, and the Energy Health and Safety (EHS) manager from the manufacturing company cited an organisational culture of interest and concern about energy efficiency.

Case study evidence: impact of organisational factors on uptake of energy efficiency measures

Respondents from the administrative headquarters of a religious organisation described how a culture of acceptance of the importance of energy efficiency led to the implementation of measures without a strong financial imperative. They described the length of payback periods being less critical to their decision-making, as the organisation was also interested in taking action that was environmentally beneficial, something which fed into the maintenance of overall organisational principles.⁶¹

Contexts affecting the recommendations made by assessors

Research with assessors has also identified key organisational contexts which affected the type of recommendations made to organisations during the ESOS process; in turn an important determinant of implementation.

The key factors assessors reported they considered when making recommendations centred around how **practicable the recommendations would be**. This included:

⁶¹ Complied through audits, religious organisation

- **Contracting arrangements** which could restrict recommendations made, for example if organisations were tied into vehicle leasing contracts.

“With a lot of the logistics companies that I worked with, I could see that there is huge potential for them to procure better vehicles, but they were with a single supplier. So even though there were real benefits there, the director of the company was not going to change to a different supplier.” (ESOS Assessor⁶²)

- **Building-type, age or site characteristics and tenure** were key factors driving recommendations. For example, where buildings were tenanted, assessors avoided recommending measures that the tenant would not have the authority to action. On the other hand, owner-occupiers or businesses with a long lease period, and so a greater security of tenure were more able to consider measures with longer payback periods or higher levels of capital investment.

“The age of the building, if it was built to spec for this company or if it was taken over from a pre-existing site, and also how the maintenance team on site operated on site also affected what came out of the opportunities.” (ESOS Assessor)

- **Organisational policies around payback periods.** Assessors were sometimes aware of organisational policies around acceptable payback periods in advance of providing their audit recommendations (this could vary anywhere from 1 year up to a maximum of 5 years). The extent to which payback periods could be made more palatable through signposting to available financing to support energy efficiency action, or through payback schemes (where the upfront capital cost is recovered over time) were also considerations made by some assessors.

“The usual payback threshold was four years – anything over that was dismissed.” (ESOS Assessor)

However, some assessors would make recommendations with high paybacks they knew were unlikely to be implemented, such as solar panels. They argued their role was to identify all relevant and practical recommendations, and would leave decisions around appropriate paybacks to their clients. Including recommendations in the report may have increased awareness of the details of the benefits of such measures.

- The **organisational budget set aside for energy efficiency actions** was not consistently viewed as a contextual factor affecting the types of recommendations made. Some would establish the budget in the audit scoping and adapt their recommendations to align with this. However, in a similar vein to payback periods, others felt it was the organisation’s choice to decide whether to fund changes.

“It’s up to them to decide if they have budget, we will always make the most relevant recommendations regardless. We won’t recommend anything unrealistic though.” (ESOS Assessor)

Overall, the evidence suggests that most assessors would not recommend measures that were not applicable, for example based on tenancy. However, the picture is more mixed around whether assessors tended to exclude certain applicable recommendations from their ESOS reports based on either known, or assumed, preferences of client organisations. Some

⁶² It is not known whether in this or similar example circumstances, Lead Assessors were making longer-term recommendations about action to take at the point at which contracting arrangements were subject to change.

reported that they presented recommendations they knew would not be viewed as viable to their clients (for example, due to the payback period or upfront cost) whereas others opted to present a more selective set of recommendations which they believed were most likely to be implemented.

4.2 Mechanisms within audits that drive organisational action on energy efficiency

Feedback from assessors and organisations highlighted several ways to maximise the power of audits to drive energy efficiency action: impactful presentations to senior management, the inclusion of quantifiable savings that could inform business cases, and simple but tailored language in audit reports.

Impactful presentations of audit reports including board-level engagement

Most of the assessors interviewed had held meetings to review key findings from the audits with their clients. These meetings typically included **senior management and board-level directors** who were responsible for signing off the reports. Assessors encouraged these meetings to take place in order to facilitate senior engagement in the recommended measures.

“The presentations of the main findings helped ensure that reports are signed off. There were always senior representatives at those meetings.” (ESOS Assessor)

While there is limited evidence from organisations around the extent to which the requirement for board-level sign-off has driven increased uptake of measures, assessors shared their own learning around how to most impactfully move engagement beyond that related to meeting compliance, and instead to encourage engagement in the recommended measures. In these presentations, assessors found it could be engaging to simply state the amount spent on energy in the previous year as this was often a previously unknown figure to senior management. Some assessors were also of the view that the impact of these presentations could be increased by beginning with the top ten recommendations based on monetary impact and return on investment (ROI), before the fuller details of the recommendations were discussed.

However, a few assessors reported that senior representatives were not always present. Organisation size could be a factor in determining this: some assessors stated that when auditing larger companies they were typically reporting to Energy, Facilities or Maintenance Managers, whereas board-level engagement was more frequent at smaller organisations (who would typically be less likely to have a dedicated Energy Manager leading the process).

In some cases, meetings were not held at all, at the behest of organisations themselves. The main reason given for this was that many companies were not interested, as they viewed the audit as a compliance exercise only. They therefore may not have wanted to pay additional audit costs to include such a meeting, or for it to extend the audit process longer than necessary.

Providing tailored, trusted, quantifiable energy savings to support a business case

Assessors reported their ESOS audits to provide quantifiable savings, generally presented as spend versus savings with associated payback periods, or as ROI. Typically, assessors also

included caveats on the magnitude of likely savings, and risks of achieving them. Feedback from organisations and assessors suggests this information helped lead to investment in energy or fuel efficiency by:

- Providing **independent verification** of the benefits of actions previously considered by Energy Managers, giving them clout within their organisation to take them forward.

“We weren’t looking for an auditor to come in and provide us with energy issues. We pretty much had a full list of them. We said, ‘here’s our list, if you can find any more, then that’s what you’re here for, so go and do that’. They went through the entire building and we never got a single initiative back that wasn’t already in our system. It was a validation of what we were doing.” (Organisation, IT management)

- Highlighting **new areas of potential energy savings**, for example by auditing aspects of energy consumption that have previously not been as visible to organisations.

Under ESOS audits, this was particularly relevant to transport: many organisations (aside from those with large fleets, or from the transport sector) had limited awareness of the opportunity to become more fuel efficient pre-ESOS. There was therefore more scope for ESOS to make a difference, although other factors appear to be more powerful in driving action around fuel efficiency than ESOS audits.

These recommendations, with quantified projected savings, need to be received from a trusted source (particularly if feeding into a business case) and this has been largely achieved through ESOS’s assessor accreditation process⁶³. Evidence collected as part of the interim evaluation suggests that this was successful: seven in ten of those who complied via an external audit were confident in the costs of the recommendations in the report (74%) and in the predicted benefits (71%). However, quality was not universally high – one case study organisation did not recall quantifiable savings being included in the report, saying they would go to contractors for more detailed information if they decided to pursue implementation. Another case study organisation believed the payback periods in the report were unrealistically short reflecting a lack of understanding of their processes by the assessor.

Case study evidence: cost and ROI of implementing recommendations

Respondents from a maintenance organisation felt that some of the recommendations they received as part of the ESOS process were less tailored, and were “rule of thumb” recommendations. For example, the costings provided in the report around replacing a boiler were perceived to be significantly lower than the costs in practice, and suspected that this was because the size of the boiler was not considered. In this instance, the organisation decided to obtain additional quotes for replacing the boiler, and found that the cost was, as suspected, higher than the approximation provided in the ESOS report.

Engaging audit report format and language

Assessors had also found the language of their audit reports to be key to engaging clients in the recommendations. In general, assessors reported adopting **simple language** to help reports engage non-energy savvy companies or members of staff (even if the main contact was likely to be easily able to understand more technical language). Where relevant, **tailoring**

⁶³ The accreditation and approval processes are covered in detail in the interim evaluation report.

language appropriate to the audience was found to be helpful, for example using financial terms where the Finance Director was the key decision maker for energy efficiency improvements.

The **format** of the audit report was also found to help make recommendations be more quickly understood. For example, audit reports typically included an executive summary presenting a **table of key recommendations** and associated costs, savings and payback periods before going into the detail. A case study organisations' report showed an example of this, which they then used as a template for assessing the value to the organisation of implementing each recommendation as red/ amber/ green.

"You can lead a horse to water ... but if it's too complicated, or they have other priorities, then they will shelve it" (Supply Chain Representative)

A few assessors also aimed to produce short and succinct reports to best engage time-poor senior staff. However, reports seen by the evaluation team suggest other assessors prefer to include all relevant information, meaning the full report can be longer, using the summary to help time poor staff.

Understanding organisations' contexts and goals

Assessors generally reported conducting thorough **pre-audit scoping work** with their clients to ensure they understood the organisational context and to build a relationship with the organisation. For example, they reported it was key to understand:

- if organisations wanted to comply with ESOS quickly and cheaply, or if they desired a more in-depth audit that would identify new energy saving opportunities;
- organisations' tenancy arrangements and any planned relocations;
- previously identified areas of focus for energy consumption reductions, including any internal audits;
- the overall maturity to and priority placed on energy efficiency.

This would help assessors to provide an audit that meets organisational requirements and is deemed relevant and appropriate, which was felt to increase likelihood of action.

Organisations with **greater awareness of potential energy savings**, or a **'culture' of greater receptiveness to and focus on energy efficiency**, were seen to be more likely to implement energy and fuel efficiency measures but were not necessarily more likely to identify ESOS as a driver of these. Action in these cases was often seen to be linked to **senior-level interest in energy efficiency**, or the **presence of 'champions' within organisations** who had an interest in or responsibility for energy efficiency. As mentioned above, the findings from the quantitative survey of organisations suggest that although organisations that place higher priority on energy efficiency are more likely to have implemented measures across the majority of categories, these organisations are not significantly more likely to attribute these to ESOS. This could be because the strong culture around energy efficiency in these organisations promotes action in spite of ESOS.

Indeed, this appeared to be the case in three organisational case studies – one with a secondary school, one with an industrial manufacturing company and one with a religious organisation. All of these organisations had implemented a number of energy efficiency improvements in recent years without attributing these (solely) to ESOS. The main

representative of the school in the case study attributed this to his own championing of energy efficiency which had begun prior to ESOS, and the EHS manager from the manufacturing company cited an organisational culture of interest and concern about energy efficiency.

4.3 Other factors beyond ESOS driving action on energy efficiency

While this research provided examples of when and how ESOS audits can lead to implementation of energy or fuel efficiency improvements, it also highlighted that other factors are often more important drivers of such decision-making in organisations.

The contexts and mechanisms above have set out how audits can help lead to energy efficiency savings. However, research with organisations, assessors and representatives of the supply chain have highlighted that energy audit recommendations are but one possible driver of energy efficiency action. This research suggests there are several other factors that are more important drivers of organisational decisions and action than audits.

The following factors have been identified:

Financial drivers

Some energy efficiency changes are ‘no brainers’ that make sound business sense, irrespective of any energy efficiency plans or targets. This is exemplified by the finding that 37% of those who have increased action on energy efficiency say this was to reduce costs/ make savings. This is not unexpected as energy managers in particularly intensive industries will have a remit to find savings wherever possible. On the other hand, lack of availability of capital can be a major barrier to uptake of energy efficiency measures, even if they make business sense. For example, the funding available to SMEs, in particular, was widely cited as crucial for getting many projects over the line. However, one supply chain interviewee suggested limiting the period that capital is available as companies will often delay implementation if they feel that the offer is indefinite.

Natural equipment lifespan

For some equipment, e.g. boilers or chillers, the significant capital costs mean that organisations would not tend to replace equipment that is relatively new and functioning well, even if it is not the most energy efficient. End of life will necessitate new equipment – at this point, organisations will tend to purchase something efficient. i.e. in many cases organisations will know they could save with an upgrade, but even if the audit provides additional information about the potential savings of new equipment it may not drive an upgrade decision on its own. Similarly, organisations may already be in the process of a gradual scheduled upgrade, for example to more efficient lighting, meaning improvements were already planned at the time of the audit.

Relocation/ consolidation

In a similar vein to natural equipment lifespan, if organisations are moving to new premises with new equipment this provides a natural opportunity to purchase more energy efficient models. Therefore, an organisation that knows it is due to relocate is likely to wait before making significant investment in energy efficiency.

Furthermore, the case studies revealed some organisations will aim for an excellent BREEAM⁶⁴ rating when relocating. This can drive a greater emphasis on energy efficiency as part of relocation. One case study organisation highlighted that the BREEAM rating was a condition of planning permission; therefore, this was a regulatory driver of energy efficiency action.

Non-energy/ financial impacts

Some energy efficiency actions were reported to have been actioned for other co-benefits, such as improving the quality and comfort of the indoor environment for clients or staff, rather than energy savings. For example, one organisation reported upgrading their lighting to improve the visibility and working conditions for staff, and another had upgraded processes to be much quieter, as the previous environment was very loud for staff. In these cases, the other benefits were more important drivers than energy efficiency savings. New equipment in general is likely to be higher quality, safer, and quieter, meaning what appears to be 'energy efficiency' action can be driven by other priorities entirely.

Competing priorities

While this research found that many organisations place a high priority on energy efficiency, businesses' ultimate focus is often on productivity and profit. Therefore, there may be other capital investments organisations could make that can yield greater productivity gains than energy efficiency investments highlighted by ESOS, and as such, would represent a better business opportunity. This was viewed to be particularly the case for process changes.

“The easy ones are more likely to be taken forward, like ways of collecting data or fitting meters. Whereas some, like a new pump at a chemical plant or power station require significant capital investment and technical project evaluation for feasibility and cost, and the organisation would need to set up dedicated project teams.” (Lead assessor)

Market forces

Interviews with the supply chain suggested that market forces can impact organisations' investment decisions, including on energy efficiency. For example, one supply chain representative reported that clients have put LED-upgrades on hold due to Brexit uncertainty. More broadly, the rapid rate of technological development is putting companies in a “wait or buy” dilemma according to another supply chain representative.

Expectations around other policies/subsidies

For some energy efficiency improvements, expectations around future subsidies are an important determinant of the expected benefits and payback periods. For example, uncertainty regarding subsidies such as the Feed-In Tariff and Renewable Heat Incentive were discussed by those involved with Solar PV and Heat Pumps respectively. If organisations have doubts about the financial implications of implementation due to this uncertainty, it is likely there is less scope for audits to lead to implementation.

⁶⁴ BREEAM is a sustainability assessment method which provides independent third-party certification of the assessment of the sustainability performance of individual buildings, communities and infrastructure projects.

Broader Corporate Social Responsibility (CSR) agenda

Finally, there is evidence that some particularly 'green' organisations take action on energy efficiency as it fits into their broader commitment to energy saving and sustainability. Specific CSR drivers can include:

- Firm requirements from overseas parent to reduce energy consumption and/ or emissions;
- Desire to score highly on Dow Jones Sustainability Index or similar;
- Environmental consciousness of key decision makers within the organisation.

Case study evidence: Limited impact of ESOS in the context of extensive, on-going energy reductions

This organisation had a team dedicated to reducing energy waste across their UK sites. The organisation had high energy costs because it housed computer systems for clients, and therefore had a heavy infrastructure and power supply focus. Reducing energy consumption was at the core of the business as it was vital for increasing profit margins.

Due to the ongoing target to reduce energy waste, action to meet this target was driven by a number of factors outside of energy auditing. The primary driver of energy efficiency was financial, in order to increase profit for a company in which the primary cost was energy. A second driver was to become valued for energy accreditations, which was seen as driving business. This organisation had a number of energy accreditations, including ISO 50001 and a Climate Change Agreement, which helped the organisation to be attractive to new clients. Another driver of energy efficiency was the organisation's CSR policies, which always included energy reduction. A final driver for this organisation was the lifecycle of equipment. The organisation felt happy to invest in reducing energy waste, but often tied this into the lifecycle of equipment and aimed to replace larger items such as chillers when they reached the end of their life.

Because of these multiple drivers, this organisation regularly identified and made energy efficiency changes, and therefore, this limited the impact of their ESOS audit and report. The organisation found that all of the recommendations provided within the report were at least being planned or considered, and in some instances, had already been implemented.

5. Influence and impact of ESOS on the wider market for energy efficiency services and products

This section explores the extent to which the ESOS process has impacted on the assessor market and the supply chain for energy efficiency services and products.

This section contributes evidence to a broader understanding of the impact of ESOS on the supply chain and how it can support organisational implementation of energy efficiency measures, and as such is an extension of RQ2.

RQ2: ESOS influence and impact: To what extent (in which ways and in which contexts) has ESOS influenced organisational energy efficiency policy and practice? What impact has ESOS had on energy efficiency in organisations?

Key findings

ESOS generated substantial volumes of business for the assessor market (including opportunities with new clients and increasing work with existing clients). It is also attributed with extending the experience of auditors to consider transport-related measures. Overall, however, evidence to date does not suggest that the ESOS process has had a significant long-term effect on the assessor market: most of those certified were already working within the field, and ESOS led to a short term spike in energy audits, rather than sustained demand between compliance phases.

Many parts of the energy efficiency supply chain were experiencing steady growth and this was attributed by the supply chain representatives to drivers such as building regulations, availability of business loans and benefits from communicating action on climate change to customers and staff. ESOS was not recognised as a key driver (as may be expected, with ESOS anticipated to form part of a mix of market factors) though the scheme has been used as a hook by some supply chain organisations to attract custom.

5.1 Influence and Impacts of ESOS on the Assessor Market

ESOS Assessors were typically engaged in energy or auditing services prior to becoming a certified assessor and some secured ESOS work through their contacts with organisations from their work in other areas. Demand for auditing peaked in the run up to, and shortly following, the Phase 1 compliance deadline.

This section considers the impact that ESOS has had to date on the assessor market. It considers the extent to which ESOS attracted new entrants to the assessor market; whether ESOS helped to upskill assessors; whether business has been maintained (i.e. the extent to

which follow-on work has been commissioned), and; any indicators around the extent to which a high quality, stable market has been created⁶⁵.

5.1.1 Short term impacts on the Assessor Market

Attracting new entrants to market

While ESOS drove an increase in accreditations to the assessor registers in the lead-up to the Phase 1 compliance deadline, its biggest impact is likely to have been generating substantial volumes of business for the existing market (including opportunities with new clients or increasing work with existing clients) rather than attracting large volumes of entirely new entrants to the market. This is explored further below.

During ESOS Phase 1, over 900 ESOS Assessors were accredited to 15 approved ESOS assessor registers, hosted by a mix of industry bodies and training and certification providers. During the in-depth interviews, assessors were asked about their previous work histories in order to establish the types of individuals who were attracted to deliver ESOS services, and to identify potential motivations for becoming accredited under ESOS.

Assessors were found to have varied professional backgrounds which typically fell into three broad categories:

- **Those working in energy auditing**, including ISO auditing, energy training, internal energy auditing, permitting work, or low carbon assessing. Becoming accredited under ESOS was often viewed by this group as a logical step in line with ongoing energy auditing work.
- **Those working in non-energy auditing**; for some of these assessors, becoming accredited under ESOS was a strategic step taken to support the clients they were already auditing in other areas.
- **Those working in the energy sector more generally**; some assessors had an energy-related background but had not previously worked as an auditor. For example, one assessor included in the research was a retired chemical engineer, and re-trained as an ESOS assessor when the opportunity arose.

“ESOS wasn’t really new to me – my usual day-to-day life is doing Energy certification services for buildings - EPCs, also Display Energy Certificates plus ad-hoc business consultancy with reference to energy reduction, it was very straight forward to move into ESOS.” (ESOS Assessor)

Some assessors also believed there to be a group of new entrants to the market, although the size of this group has not been estimated by this study.

Business generated through ESOS

Assessors reported the demand for auditing services increased rapidly during 2015 due to high volumes of ESOS-related work, with demand peaking in late 2015 around the Phase 1 compliance deadline. The high demand was reported to have been driven by both demand for

⁶⁵ This section draws on 20 in-depth interviews with ESOS accredited Lead Assessors, and considers applicable data from the ESOS complier survey which compliments impacts identified by Lead Assessors in the interviews.

ESOS services from existing clients (from previous energy-related or auditing work) and by new clients.

In the run up to and in the months following the Phase 1 deadline, assessors recalled that the **vast majority of their time was spent on ESOS compared to other types of work**. The demand for ESOS work in late 2015 and early 2016 impacted assessors in a number of ways:

- **ESOS audit work was being declined:** The demand on services at this time was so great that some assessors recalled that when the compliance deadline was nearing, they received calls from potential clients but were forced to decline the work as they were already experiencing too much demand for services from their existing clients.

“We received phone calls in October and November from potential clients but we were turning work down at that time due to the level of client demand.” (ESOS Assessor)

- **A sense of urgency and pressure:** Assessors recalled that often organisations were late to commission auditing services in the run-up to the ESOS compliance deadline, so there was a sense of urgency around completing the audits before the deadline across a high number of clients.

“To be honest, when it got busy, it was 120%; I was even working on my honeymoon.” (ESOS Assessor)

- **Higher costs of an ESOS audit:** A consequence of the peak in demand was a higher price per audit during the run up to, and in the months following, the Phase 1 deadline. Analysis conducted during the interim evaluation of ESOS based on audit prices self-reported by surveyed organisations, found the average price paid to have peaked in January 2016 at £12,587; at double the price paid prior to October 2015 (£6,200). The interim report provides further detail around prices paid per audit around the Phase 1 deadline⁶⁶.
- **A potential concern around lower quality reports:** Assessors feared that, in some cases, the high demand of ESOS work and the nearing compliance deadline meant that the quality of some audits was reduced.

“Some people trying to do the bare minimum – some low-quality reports have come through as a result of lack of clarity about minimum standards for reports.” (ESOS Assessor)

One assessor feared that the quality of reports was also affected where assessors were not clear about their experience (for example, sector-specific experience) and where organisations had not been forthcoming about their requirements (for example, complexities in their organisational structure). This influenced a view for this interviewee that some organisations did not have an appropriate assessor for their requirements. In spite of this perception, preliminary quality assurance checks conducted by the Environment Agency found that **ESOS energy audits undertaken by obligated organisations met the scheme’s requirements**, although some did require remedial action. In addition, most audited organisations surveyed

⁶⁶ Evaluation of ESOS Interim Report, October 2017. Section 4.0 covers the assessor accreditation process, views of the Lead Assessor training and feedback on the quality of auditors from Register holders and audited organisations in detail.

<https://www.gov.uk/government/publications/energy-savings-opportunity-scheme-esos-evaluation-of-the-scheme>

during the 2016 interim evaluation of ESOS expressed satisfaction with the quality of audit report they received, though there were some examples of dissatisfaction.

“I wouldn’t feel comfortable auditing [an] office-based organisation with heavy transport bias. It requires honesty from assessors about their background and companies being honest about requirements.” (ESOS Assessor)

Assessors reported that requests they had received to date for ESOS Phase 2 audits were mostly from clients they had worked with during Phase 1. Assessors were of the view that the number of requests they were receiving at the time of interviews (December 2018 – January 2019) were still limited due to continued low engagement with ESOS across organisations, outside of the compliance driver.

“As Phase 2 approaches I’ve started to contact my clients again but haven’t got much from it in general, although through ESOS I started a good long-term relationship with a hotel chain who I will audit again. This type of relationship was a big motivating factor in getting involved with ESOS to begin with.” (ESOS Assessor)

Further discussion of organisations’ intentions around Phase 2 compliance are discussed further below.

Upskilling existing energy auditors

While many ESOS assessors were already skilled in energy auditing, a few gained new skills through becoming ESOS accredited. This was particularly the case where assessors **expanded their professional experience into transport auditing** (driven by the inclusion of transport within ESOS audits where this had previously been excluded from prior reporting schemes).

“I was comfortable with processes, and had some experience with buildings, but I wasn’t knowledgeable about transport ” (ESOS Assessor)

In some instances, ESOS complier organisations felt that assessors **lacked understanding around corporate structures**. Organisations, and assessors themselves, suggested that further training was needed around this prior to conducting audits. Although support was provided on this through the Environment Agency’s scheme guidance and helpline, many assessors commented on the complexity of unpicking complex corporate structures. At times they found it challenging to ensure they were supporting organisations to notify compliance at the right level of company structure, and to ascertain what areas of energy usage were in-scope of the audit activity. This was reported to have been a highly time-consuming element of the compliance process.

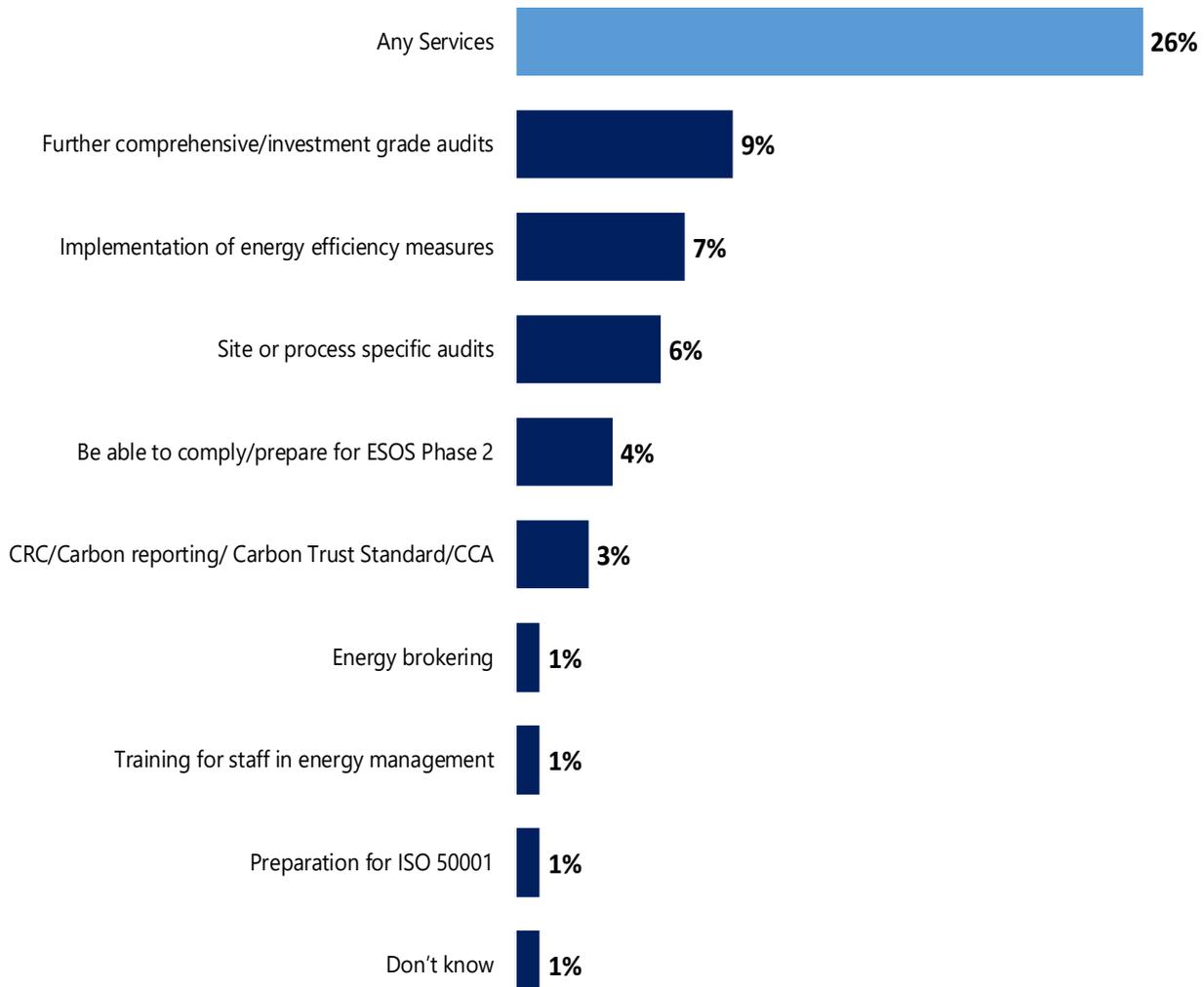
5.1.2 Medium term impacts on the Assessor Market

There is some evidence of medium-term impacts on the assessor market, with around a quarter of organisations reporting they had commissioned follow-on work from their assessor and nearly two-thirds stating they had begun their Phase 2 compliance activities (by the time of survey at the end of 2018). Longer-term impacts on the assessor market are less clear.

Extent to which follow-on services have been commissioned

One in four complier organisations (26%) had commissioned further follow-on work from their Phase 1 assessor, providing evidence that ESOS has had some impact on the assessor market in the medium term.

Figure 8: Commissioning of further services from assessors post-Phase 1 compliance



Source: ESOS Complier survey, 2018, Base: 420: all who complied with ESOS via an audit carried out by an external ESOS assessor

As shown in Figure 8 above, a range of follow-on work was commissioned from ESOS assessors since the ESOS Phase 1 deadline. The most frequently procured service was further **comprehensive or investment grade audits** (9%), followed by **implementation of energy efficiency measures** (7%). Organisations that formed part of a wider corporate group, or which owned their sites, were significantly more likely to have commissioned the implementation of energy efficiency measures (9% and 12% respectively). A small number (6%) had commissioned follow-on **site or process specific audits** or reported commissioning services related to **CRC or carbon reporting** (3%).

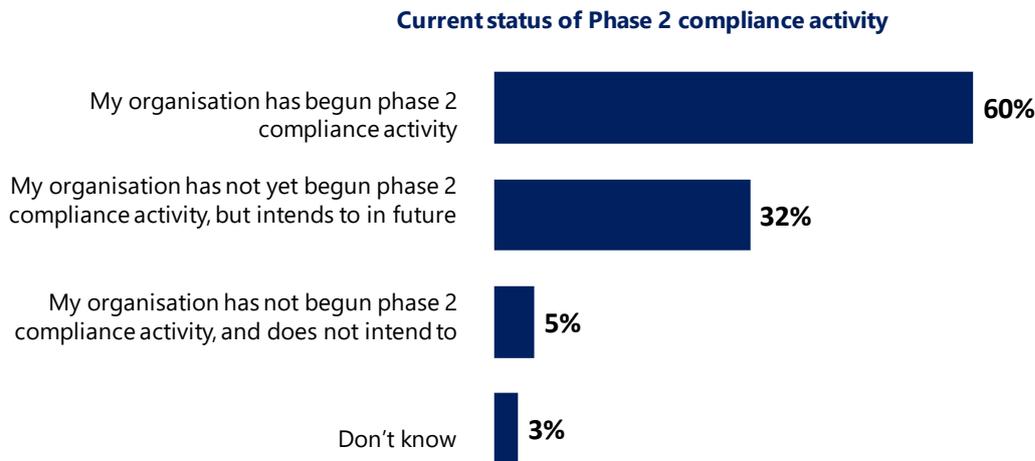
A link between engagement levels in energy efficiency and pursuing follow-on work was reflected in the survey: organisations which had taken action towards energy efficiency or participated in additional energy-related schemes were more likely to have commissioned follow-on work from their assessor.

Securing follow-on work appears to also be influenced by the **initial engagement approach made by the assessor**; where assessors had ongoing relationships with clients, and became ESOS certified in order to support their clients, assessors reported that they tended to have further work from this client base. Some assessors **did not, however, appear to be using any tactics to secure further work** and a few reasons emerged for this; a lack of capacity (either in terms of time or skills) to deliver services beyond the ESOS audits; a motivation to become accredited driven by the opportunity for a short-term revenue boost rather than driving longer-term client relationships and service delivery; or, an active decision not to pursue implementation work in order to maintain an independent status around the ESOS recommendations.

“I’m not a salesperson. I should have done more but didn’t: after phase 1 everyone was so exhausted.” (ESOS Assessor)

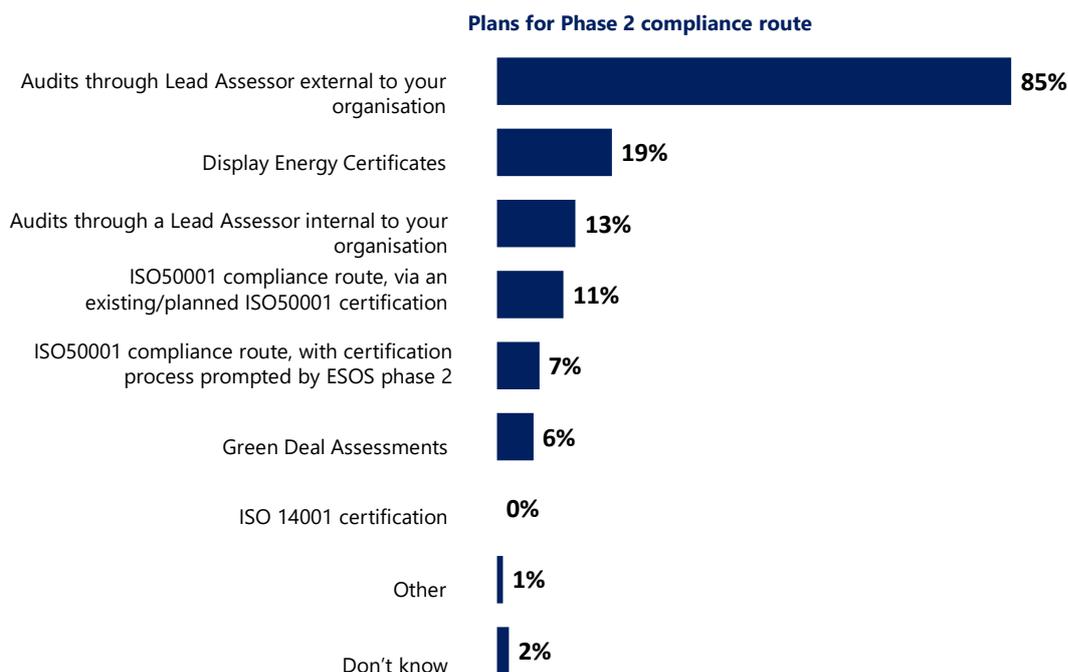
Demand for further auditing services is likely to have been driven by the December 2019 Phase 2 compliance deadline: of organisations responding to the survey, the majority had begun their Phase 2 compliance activities (60%), and a third (32%) hadn’t yet begun compliance activities (at the end of 2018), but did intend to comply. The majority of organisations also reported that they had started or planned to comply via an ESOS Assessor (85%), which suggests that there may be similar scale of demand for assessor services in Phase 2. (Figures 9a and 9b).

Figure 9a: Status of Phase 2 compliance



Source: ESOS complier survey, 2018, Base: 503

Figure 9b: Plans for Phase 2 compliance route



Source: ESOS Complier survey, 2018, Base: 469 organisations that have begun or intend to begin ESOS Phase 2 compliance activity

5.1.3 Longer-term impacts on the Assessor Market

Overall, the evidence to date does not suggest that ESOS has created significant, or sustained, shifts in the assessor market. This is primarily because many of the assessors delivering ESOS services were already working within audits or energy auditing specifically beforehand. Assessors interviewed explained that once the work for ESOS Phase 1 died down, they tended to continue with the same work they were doing pre-ESOS.

Assessors also did not consider a more stable market for audit activity to have been driven by ESOS, both due to cyclical demand associated with compliance deadlines from organisations and some assessors being accredited for ESOS Phase 1, and then renewing their license for Phase 2, rather than continuing ESOS work in between the phases. Some assessors shared a view that the overall assessor market has not grown as many of the new entrants who joined the market in 2014 or 2015 have since moved onto other things after completing Phase 1 compliance.

5.2 Influence and Impacts of ESOS on the energy efficiency supply chain

While many parts of the energy efficiency supply chain were considered to be experiencing steady growth according to the supply chain organisations interviewed, they did not attribute this to ESOS. As may be expected, they considered growth to be driven by a range of factors such as building regulations, availability of business loans, and benefits to communicating action on climate change to customers and staff. However, some supply chain organisations were also using ESOS as a hook to attract custom.

This section explores whether ESOS has led to any impacts to date on the energy efficiency supply chain. It considers the extent to which supply chain representatives were aware of ESOS, their perceptions of energy efficiency audits, and the extent to which they observed any impacts on the market for energy efficiency products or services from ESOS-driven activity (as opposed to other market drivers)⁶⁷.

5.2.1 Key market drivers for supply chain organisations

Supply chain representatives described steady growth in turnover during recent years. The main factors driving these increased sales were thought to be:

- **Building regulations:** Solar PV and heat pump installers both cited building regulations, such as SAP requirements for new builds and minimum EPC ratings for rentals, as a factor driving up-take in these technologies;
- **Availability of business loans** (through both national and local schemes): Where low-cost finance for energy efficiency measures is available this was reported to have driven demand, particularly among SMEs. This finance was helping some clients of the interviewees to overcome internal competition for capital, which otherwise resulted in energy efficiency investments being considered as beyond core business activity and therefore delayed or overlooked;
- **Public awareness of climate change:** A few supply chain representatives discussed awareness around climate change issues as a growing influence in clients' decision-making. Where they had previously encountered a few "enlightened CEOs", they suggested increasing expectations from both customers and employees was having an impact on how businesses operate.

"Climate change has filtered through to the public domain, big companies can't recruit young staff unless they're shown to be a sustainably-thinking business ... millennials are hugely concerned" (Supply Chain Representative)

5.2.2 Awareness and perception of ESOS within supply chain

Awareness of ESOS amongst supply chain representatives interviewed was mixed:

- Those most familiar with the scheme had a larger turnover and offered audits as part of their services or had to comply with the regulation themselves due to the size of their parent group;
- Some discussed using ESOS as part of their sales and marketing process. This included framing conversations with prospective clients around the scheme to encourage uptake of their products, or creating website blog content around ESOS in order to attract internet traffic;
- Half of the interviewees had not heard of ESOS, however, and did not recall it being mentioned by clients.

⁶⁷ Thirteen in-depth interviews were conducted across organisations representing a range of relevant technologies including LED lighting, compressors, HVAC systems, solar PV, battery storage and heat pumps. Respondents were all director level and their firms were typically involved in consulting, designing and/or implementing solutions. These organisations also represented a mix of maturity (5 to over 30 years in business) and size (annual revenues ranging from £300k to £5m).

Overall supply chain representatives shared a view that ESOS has not yet stimulated a significant increase in demand for their company's products and services. The majority of interviewees could not attribute a perceptible influence on demand from the scheme, although there were isolated exceptions; one supplier had seen a significant impact on their business as a result of a substantial lighting contract with a large company, believed to have been influenced by their experience of the ESOS process. It was also acknowledged that where clients did not explicitly mention ESOS, or energy audits more widely, when procuring products or services, this could not rule out the possibility that it may have been an influencing factor.

Sentiments towards the intentions of ESOS were positive among supply chain representatives. However, there were some recurring themes about how it could, in their opinion, be improved (and these align with feedback provided by many across the assessor market as well as recommendations made by some obligated organisations keen to see a wider impact from the scheme). Suggestions included: introducing an element of mandatory reporting on actions taken; incentivising implementation of measures (for example, through cost rebates or tax breaks); further assurance processes to improve the consistency and quality of ESOS audit reports; and, considering how best to rollout a similar requirement to smaller organisations (which are less likely to have dedicated energy or facilities teams and may have greater potential for improving their energy management).

6. Appetite for audits and reporting across non-domestic sector

This section explores the extent to which audits and reporting are being used, and are driving energy and fuel efficiency action, across the non-domestic sector outside of activity driven by ESOS; for example, in SMEs or through non-ESOS related activity undertaken by ESOS-obligated organisations.

This section contributes evidence to one of the key research questions set for this study:

RQ1: To what extent, (in which ways and in which contexts) are energy audits and reporting effective in identifying and delivering energy efficiency savings across organisations?

Key findings

Audits are not widely used by organisations, unless there is a legal requirement to do so (such as under ESOS, which had commonly encouraged large organisations to undertake audits for the first time).

Where audits had been undertaken (outside of the scheme) these have tended to be more narrowly focused than ESOS audits, for example, assessing the feasibility of a specific process change, equipment upgrade or diagnosing the cause of unexpected energy bill spikes.

Audit activity by SMEs tended to be driven by the availability of free auditing services, aside from where business owners show strong environmental leadership. Where audits had been commissioned by a public sector organisation, this was also often driven by senior-level leadership and tended to be used to understand where best to focus constrained budgets in achieving energy (and cost) savings.

Reporting on energy efficiency also tends to be most widespread when mandatory, although examples of voluntary reporting included reporting against private carbon reduction schemes or charitable commitments.

The findings suggest that while ESOS does not include a mandatory reporting element, linking the scheme to reporting could help to drive energy efficiency improvements.

6.1 Uptake of audits outside ESOS

Evidence gathered and reviewed by this study suggests that, in general, audits are not widely used by organisations, unless there is a legal requirement to do so (such as under ESOS). Phase 1 of this study explored the reasons for this, and the circumstances in which audits are

voluntarily commissioned, in detail.⁶⁸ A summary of these findings is presented below, alongside further evidence gathered through the latest primary research conducted with ESOS-obligated organisations, assessors, supply chain organisations and SMEs.

ESOS-obligated organisations

Uptake of energy audits prior to, or outside of ESOS-related activity, was rare among the ESOS-obligated population. Where audits have been undertaken these have tended to be more narrowly focused than ESOS audits.

ESOS often encouraged large organisations to undertake audits for the first time, although there were examples of pre-existing audit regimes. Energy audits were more likely to have been carried out voluntarily by large and more energy intensive organisations which had a strong financial driver to be energy efficient (such as those in the industrial sector, and also those with Climate Change Agreements).

Such audits had frequently been carried out through internally appointed assessors (although there were examples of external auditors being commissioned) and were typically conducted with a view to assessing the case for specific energy efficiency changes (for example, the feasibility for Combined Heat and Power, or upgrading a single system such as heating). Furthermore, some organisations have carried out specific internal audits such as around fleets, or to include non-energy metrics such as water and waste. These highly targeted audits contrast with ESOS audits which aimed to identify a broader scope of energy and fuel savings opportunities across the range of energy uses within an organisation.

“We had an energy audit done about two years before ESOS. It was prompted by one of the governors who commissioned someone external to do it. That audit mainly just reinforced what we were doing, but might have prompted us to do the sports hall lights more quickly – we’d already been getting feedback that they were too dim for exams.” (ESOS compliant school)

Where external auditors had been appointed, assessors reported this was generally to conduct audits with large organisations as a part of the certification process for ISO standards. Once this certification was in place, regular audits were then being commissioned (for example, by the two case study organisations that had achieved ISO 50001 certification) to demonstrate ongoing commitment to the standard. However, these organisations advised that such audits are very different to ESOS audits. For the most part, they see the role of ISO 50001 audits as **assessing** whether they meet the standards to maintain certification, which are focused on **energy management**. The report may **identify** how to rectify non-conformities and improve energy management. However, these audits would not comprehensively identify ways of improving **energy efficiency**. ISO 50001 auditors may mention such opportunities to organisations as relevant, but organisations did not see this as a formal part of the process.

Organisations and assessors shared a view that voluntary audits were only likely to take place in less energy intensive industries if the business owner or others within senior leadership positions acted as ‘energy champions’.

While many grant-funded audits are targeted at SMEs, there was evidence of some large organisations receiving free audits (including one example of an organisation involved in the

⁶⁸ The findings from Phase 1 of this study are published here: <https://www.gov.uk/government/publications/energy-audits-and-reporting-research-including-the-energy-savings-opportunity-scheme>

case study research which had received a free transport audit). Organisations receiving these audits reported energy and fuel efficiency changes they made as a result (and this was often then associated with reporting a lower level of impact from the ESOS process).

SMEs

Audit activity by SMEs tended to be driven by the availability of free auditing services, aside from where business owners show strong environmental leadership.

Feedback from assessors and SME organisations found SMEs tend to only carry out audit activity if provided free-of-charge (for example, via the Carbon Trust Green Business Fund). This reflects limited availability of capital to commission audits as well as, in some circumstances, a lack of belief that audits can identify appropriate and meaningful energy (and cost) saving opportunities which do not need a significant capital outlay to implement.

Outside of grant-funded activity, the highest levels of motivation to undertake audits come from cash rich companies with **owners which have a commitment to the environment**, or where employees take on the role of '**energy champions**'.

"They are only interested if it's free!" (ESOS Assessor)

Nevertheless, a small number of assessors had delivered audits that SMEs financed themselves. Similar to the drivers of audit activity among larger organisations, these were most commonly commissioned to focus on a specific site or process, or to diagnose the cause of higher-than-expected energy bills. Assessor and supply chain representatives found that such audit activity was often still driven by the leadership of a key individual within a business. The case study below explores the impact that such leadership can generate; in this case through a Managing Director with a strong commitment to environmental issues.

Case study evidence: Impact of strong leadership on energy efficiency within an SME

This SME has ten employees, an energy expenditure of less than £10,000 per year (excluding fuel costs) and a turnover of £1m. Its main energy costs are fuel, heating and lighting, with a small manufacturing function.

Despite its low size and energy expenditure, this organisation is accredited to ISO 9001, 14001 and 50001, and is in the process of becoming accredited to ISO 45001. It sets targets for reducing its energy use and carbon emissions as part of the continuous improvement needed for their ISO accreditations, and has been externally recognised for its long-term approach to carbon management.

This action reflects the commitment of the Managing Director: he believes environmental and wider corporate social responsibility are the right thing to do. He also wants to demonstrate this ethos to staff, and believes such accreditations are a valuable means of ensuring ongoing commitment to this vision.

This organisation does not however, currently advertise its accreditations to customers – they feel demand is already sufficient without using this as a tool for driving sales. Thus, while part of this business' motivation to be committed to strong energy management is to save money on energy and other process efficiencies, it is the sustainability commitment of the MD, rather than financial motivations, that are largely responsible.

Given the ISO 50001 certification, and ongoing engagement with an energy assessor as part of this process, the SME is not investing in further auditing activity (beyond a grant-funded audit previously received).

Public sector organisations

Public sector organisations engaged in this study perceived audits to be useful, however financial and technical constraints reduced the chances of audits being prioritised and ultimately implemented.

Where audits had been commissioned by a public sector organisation⁶⁹, this tended to be in cases where the organisation had made a commitment to save energy, and required an audit to understand where best to focus its efforts (and constrained capital). As with private sector organisations, this was often driven by organisational priorities at the highest levels of the organisation, such as a new police commissioner cascading interest in energy efficiency across all the bodies that respond to them. Only larger public sector organisations tended to have dedicated energy managers, although others were providing some training to staff members to acquire some of the required technical skills.

One assessor working with this sector highlighted the role played by the Public Sector Energy Efficiency Loan Scheme in driving uptake of audits and supporting public sector organisations to meet government targets for carbon reductions.

6.2 Reporting

As with audits, reporting on energy efficiency tends to be most widespread when mandatory, although examples of voluntary reporting included reporting against private carbon reduction schemes or charitable commitments.

Phase 1 of this study explored the extent to which organisations in the UK reported internally or externally on their energy use, and the perceived impact and value of reporting on driving energy efficiency action.⁷⁰ A summary of these findings is presented below, alongside further evidence gathered through a survey of ESOS complier organisations.

Many large organisations only report externally on their energy use when required to by schemes such as the CRC or Mandatory Greenhouse Gas Reporting. Nevertheless, some organisations also report voluntarily, for example as part of private carbon reduction schemes or charitable commitments. These organisations identified some benefits to reporting including that reporting progress against carbon management plans can raise the importance of energy management within their organisation. Reporting may be more common among public sector organisations, who have to report against targets set by a higher level public body, such as the Greater London Assembly.

The survey of ESOS complier organisations conducted during the final phase of the study provided quantitative data on the extent of reporting on energy use. It confirmed that many

⁶⁹ Engagement with public sector organisations in this study was limited to one workshop. The findings in this section are therefore indicative.

⁷⁰ We have published the [findings from Phase 1 of this study](#).

ESOS complier organisations are part of energy efficiency schemes which involve mandatory reporting to government on their energy use:

- 30% participate in the CRC
- 18% in both CCA and Mandatory Greenhouse Gas Reporting
- 10% in the EU ETS⁷¹

Such organisations were more likely to have implemented energy changes as a result of ESOS, as discussed in chapter 4.

The survey also found some evidence among the ESOS complier population of voluntary reporting to government, the public or shareholders or investors. This appeared most common for organisations with ISO 50001 certification, with a high priority on energy efficiency, those that were members of corporate groups, and the largest organisations (both by number of employees and turnover).

A case study with an organisation that met all of these criteria demonstrated how a combination of corporate structures and a culture around energy efficiency can lead to comprehensive reporting of energy use, both internally and externally.

Case study evidence: Drivers of Reporting within corporate group

This large manufacturing organisation has its global headquarters outside the UK. Each country has targets for energy use and carbon emissions, and must report internally on progress against these to the corporate group each quarter. This requirement, as well as being ISO 50001 certified, was reported to help drive energy efficiency action led by the UK energy team. The Energy Manager has leveraged these requirements to drive an energy and fuel efficiency agenda, including for example a plan to replace all their LGVs and HGVs with electric vehicles. This action was reported to be further supported by a conducive board-level culture, including a Chief Operating Officer that is “really a champion” of environmental issues.

This corporate group is keen to demonstrate its action on sustainability more widely, and is part of the Dow Jones Sustainability Index. The organisation believed this helps their reputation and they actively promoted it.

While ESOS does not include a mandatory reporting element, this research suggests linking the scheme to reporting could help to drive energy efficiency improvements. Representatives from each of the supply chain, assessor market and organisations themselves felt that public reporting on the recommendations identified in the ESOS report could lead to reputational risk of inaction, and therefore increase the likelihood of ESOS raising the profile of energy efficiency and leading to implementation of improvements.

“Having a public facing pledge and to do something about it [...] will sharpen everybody’s minds.” (Organisation, Property Management, Group level).

⁷¹ The survey also found that 40% have Energy Performance Certificates, 39% are subject to the Climate Change Levy, and 25% have Display Energy Certificates

7. Lessons Learned: supporting better organisational energy management

This chapter summarises lessons learned from this research study in three key areas: lessons learned from implementing ESOS; learning around how best to maximise the engagement of large organisations in, and the value they gain from, audits and reporting; and, learning about additional support and levers that may be needed, beyond audits and reporting, to support better energy management. This chapter draws on evidence from both the interim and final evaluation of ESOS, as well the first phase of this study which looked to the experience of other EU Member States and further countries around the world.

This section contributes evidence to two of the key research questions set for this study:

RQ3: What are the lessons learned from implementing ESOS that could feed into future policies?

RQ4: What is the wider learning from this research for BEIS policy making?

Key findings

Communicating examples of best practice for the format of audit reports, and the framing of audit recommendations (even if not through a mandated template) may help to ensure organisations receive outputs which are meaningful, motivating and targeted at the right internal audience.

Promoting, or incentivising, certification to energy management systems (such as ISO 50001) is likely to help drive an ongoing commitment to better energy management. Organisations may also need more support to act on energy efficiency recommendations through provision of **technical assistance** (such as training for energy managers), the **sharing of best practice** from peer organisations and, where feasible, **financial support** for implementation and complementary policies, such as **phasing out of inefficient technologies**.

A **consistent and clear communications plan** in the lead up to regulatory deadlines may help to avoid a key challenge experienced during the implementation of ESOS related to **organisations delaying their compliance activity until close to the notification deadline** (with associated implications for the cost and quality of audits). This should provide guidance on the expected length of time required, regularly re-enforce government commitment to the regulation, highlight examples of prior enforcement action and communicate case-studies of organisations benefiting from complying.

7.1 Lessons learned from implementing ESOS: smoothing demand for audit activity

The evaluation of ESOS conducted through this study (and preceded by the [interim process and early impact evaluation](#) conducted in 2016) found the scheme to have broadly met its objectives: there were high levels of compliance; many organisations were encouraged to conduct audits of their energy and fuel use for the first time (accessing tailored information about how they could make cost-effective savings); and a sufficient supply of accredited assessors was generated to support organisations to reach compliance, mostly on time and at a cost in line with the estimates in the 2014 Impact Assessment.

That said, not all organisations felt they gained value from their ESOS compliance activity or were stimulated to take up cost-effective energy efficiency measures. While in some cases this reflected organisational context (including levels of unrealised energy efficiency potential), lessons can be learned about how best to encourage engagement in, and action on, audit recommendations (whether this supports further organisations gaining benefit from ESOS, or from audits more generally). This is discussed in section 7.2.

This section first focuses on the challenge of the ESOS Phase 1 compliance activity being highly concentrated in a short time period leading up to the 2015 notification deadline. Although associated with the implementation of ESOS, this had implications for engagement in audits, but also for the ability to minimise the cost to obligated businesses. This issue was highlighted by large numbers of organisations as well as assessors, but also evidenced in ESOS compliance data analysed for the interim evaluation. The concentration of activity was found to have implications for the prices paid for audits, and the quality of assessor services and recommendations received.

Limiting the extent to which a similar spike occurs in the run-up to the Phase 2 compliance deadline in December 2019 (or around any future similar types of regulatory requirement) would:

- Benefit **organisations** by ensuring they can meet the compliance deadline and receive a good quality audit at a reasonable cost; and,
- Benefit **assessors** by smoothing demand for their services, making their business easier to manage, and reducing the chances of them turning work away close to the compliance deadline.

The UK was not alone in experiencing this challenge; representatives of other EU Member States also fed back that their assessor market experienced high levels of demand for audit activity in a very concentrated time period. The review of implementation of Article 8 (4-6) in other EU member states carried out at an earlier phase in this study⁷² highlighted the importance of early and clear engagement on policy aims, and most importantly on scheme guidance, including the nature of the requirements, the timelines for action and the eligibility criteria.

Based on the learning across the interim and final evaluation of ESOS, steps that could be taken to mitigate organisations' delaying of ESOS-related audit activity could include:

⁷² [Fully reported here.](#)

Issue clear guidance on the amount of time typically required to reach compliance: Using information and case-studies from ESOS Phase 1 to communicate to organisations the key steps typically involved in meeting compliance. This would include:

- The identification and then commissioning of a Lead Assessor;
- The type of activities that organisations themselves may need to support in order to help establish company structures and reach decisions about the level at which to notify and the areas of energy use to include in notifications;
- How much time these steps typically require.

A key aim would be to encourage organisations not to underestimate the time required to reach compliance and avoid commissioning services too late. This would be of particular relevance to those that had not previously been obligated to comply.

Highlight the potential cost to the business of delaying compliance by presenting data on the rise in prices charged for audit activity in the final weeks ahead of the Phase 1 deadline.

Consistently reinforce commitment to the regulation and the risk of enforcement action through frequent and consistent messaging from BEIS and the Environment Agency throughout the year leading up to the next deadline so that organisations do not delay their compliance activity in case the regulation changes. Re-highlighting the number and type of enforcement actions issued during Phase 1 may also help encourage organisations to take timely action to avoid penalties.

Communicating case-studies of organisational benefit achieved through audit activity may help to encourage organisations to commission auditor services not only to reach a time-bound compliance deadline but also to gain value from doing so.

Consider incentives to encourage compliance through ISO 50001 (which could include communicating early, a longer grace period for this compliance route) as (looking ahead for future compliance periods) this could drive an ongoing approach to energy management and reduce sudden demand for auditor services.

7.2 Lessons learned for maximising organisational engagement in, and value from, audits

This research has found that ESOS audits can lead to action to improve energy or fuel efficiency in organisations, but this is often action targeted at the easiest measures (such as lighting, rather than more fundamental process-related changes) and even in these cases, there are still large numbers of organisations not taking any action.

Evidence reviewed over the course of this study highlights that audit and reporting tends to be most effective at delivering energy or fuel efficiency savings where it involves:

- **A high quality audit**, including valid, time and organisational-relevant data;
- **A skilled auditor** with relevant expertise (in the right sector, organisation type);

- **Strong senior management engagement** with the auditing process (an essential precursor in many instances, although something that can be encouraged by the first two conditions – quality of audit and auditor).

Lower quality audits (which the evidence suggests are less likely to drive the uptake of beneficial energy efficiency improvements), are characterised by the limited scope of information they contain, a lack of technical depth and/or understanding, or insufficient cost/benefit analysis.

Maximising engagement with the recommendations of audits also depends on how the information is presented within the audit report and the extent to which the assessor manages to leverage contextual knowledge about the organisation and exposure to senior managers. Lessons from this study (drawing on the experience of UK organisations and assessors around ESOS, those of organisations and assessors in other EU Member States as well as literature around effective auditing in other sectors⁷³) include:

- Ensuring recommendations are easy to understand, with quantifiable savings and using language that is appropriate to relevant decision makers. The full detail of audit reports is valuable but the **recommendations and associated savings should be easily digestible**. Reflecting this, a Swedish SME audit policy plans to introduce a mandatory one pager of recommendations that will be collated online.
- **Presenting recommendations to key organisational stakeholders**, including those at board level, to improve buy-in and awareness of the value of implementing proposed measures by those who can make relevant financial decisions. Assessors could be more likely to secure board-level attendance at such meetings if the importance and relevance of ESOS has been visible to senior stakeholders from the outset of the process.
- **Assessors undertaking detailed pre-audit scoping work** to ensure the organisation's context and aims are understood, meaning the report and recommendations can be appropriately tailored to maximise the likelihood of implementation. During ESOS Phase 2 this could include reviewing what was recommended under Phase 1 (if relevant), understanding any barriers preventing uptake and providing advice on which measures remain relevant, or may need to be updated or re-scoped.
- **Use of benchmarks and setting of targets**, particularly to engage organisations which have already taken some action, which have multiple sites, or are part of corporate groups or will commit to regular reporting against progress. This may include reporting site-to-site comparisons or company-to-company comparisons although understanding what is likely to motivate engagement among senior managers and is appropriate for the sectoral context, is important to get right.
- **Communicating non-energy-related benefits to taking action**. Engagement with some organisations during this study (particularly apparent, but not limited to, SMEs) found that decisions to act on energy efficiency can also come from non-energy-related

⁷³ The use of audit and feedback to encourage organisational behaviour change is a well-recognised intervention in the field of implementation science, including beyond the energy sector for example in relation to healthcare. Phase 1 of this study drew on a review of success factors for audits which were identified by a group of international experts at a two-day meeting, building on a Cochrane review of 140 randomised audit and feedback trials conducted in a variety of countries and clinical settings.

concerns, such as improving conditions for the workforce or customer base or improving product quality.

Evidence gathered, and reviewed by this study, suggests similar drivers and barriers to audit and reporting exist internationally as well as in the UK. Phase 1 of this research studied the implementation of Article 8 (4-6) of the EED in other EU Member States as well as similar audit-based programmes in non-EU states. This review found several policy design features were important for using audits to encourage action on energy efficiency:

- **Targeting obligations at those with greatest potential to realise benefits.** EED Article 8 (4-6) mandates audits in all large organisations. However, taking into account energy use/intensity and sector can improve the reception to audit requirements.
- **Standardisation and accreditation of key scheme actors.** The robust accreditation processes in ESOS ensured obligated organisations were consistently provided with access to high quality information and advice with which to make energy efficiency improvements.
- **Encouraging a commitment to action.** Even if specific action is not mandated, the requirement to report back on a self-imposed target or action plan can help organisations to go beyond a ‘tick box’ approach to compliance and take up recommendations in the audit report. This is more effective if reporting is public such that organisations can be ‘named and shamed’ for not meeting targets. ISO 50001 certification requires a continuous development plan, and reporting against it which can encourage a commitment to action. Some member states have gone further, for example in the Netherlands participants in Long-Term Agreement 3 (LTA3) and Long-Term Agreement for the Energy Efficiency of ETS Enterprises (MEE) must construct energy efficiency plans every four years, and implement those measures deemed cost-effective, reporting annually on their progress.
- **Taking advantage of the data created by the policy.** Some EU Member States have taken advantage of the wealth of data created by the mandatory audits implemented under Article 8 to create publicly accessible databases gathering recommendations, payback periods, estimated savings, and other useful benchmarking tools.

Steps BEIS and the Environment Agency could take to further support the delivery of high quality, meaningful audit recommendations and engagement in these by recipient organisations (in part informed by approaches taken in other Member States):

Publicise good practice examples of audit reports or recommendations: The ESOS policy did not mandate any specific template for the audit report and feedback from organisations, or a methodology for carrying out audits. Assessors and the scheme manager’s spot checks suggests the quality of feedback presented in the reports varied. The evidence also suggests that the format of outputs tended to be led by the assessors rather than organisations. The sharing of recommended templates for audit reports (as is done in the Netherlands), or publishing anonymised examples of best practice audit reports would be welcomed by organisations and assessors. This could include guidance on the most engaging language to use, how to prioritise recommendations lists, and what types of financial metrics to include to facilitate business case development.

Encourage compliance through Energy Management Systems (ISO 50001) compliance as this includes explicit target setting and continuous improvements in energy management, encouraging awareness and engagement with energy to become

embedded in a company and aligned with business goals. Some European countries (such as Germany) have complemented their EED Article 8 (4-6) implementation with incentives for the roll-out of ISO 50001. Key steps taken to encourage energy management system certifications have been: providing tools and guidance to lead companies step-by-step through the process; financial support and advice for the first time a company seeks certification, including funding for IT systems; and sector-specific guidance beyond the general guidance provided by ISO.

7.3 Additional support and levers that can help drive better energy management in non-domestic organisations

Policies to support better organisational energy management need to be designed to overcome barriers in three key main areas identified during this study:

- **Awareness of, and commitment to the energy efficiency opportunity** (where awareness is driven by audit activity, complementary drivers may be needed to encourage commitment);
- **Technical solutions and expertise** for understanding and implementing energy efficiency;
- **Financial resources** to invest in energy efficiency projects.

As such, **complementary policies** to encourage better uptake of opportunities could include:

- **External reporting of energy use⁷⁴, and against energy use targets or action plans:** Evidence suggests however, that mandatory reporting on its own may not drive energy efficiency action. It needs to be linked to more significant measures, such as 'name and shame' publications.
- **Knowledge sharing of best practice linked to published benchmarks on levels of energy efficiency that may be achievable:** Better benchmarking databases and tools were of particular interest and perceived as lacking at the moment, particularly by SMEs and the public sector.
- Direct **incentives or penalties for implementation** of energy savings.
- **Technical assistance** (such as training for energy managers or other staff) to support recipients of audits to engage with, and act on, the information provided. This is particularly the case for SMEs, which rarely have dedicated energy managers with experience in this field, and who may lack confidence in the savings (or technology) proposed to them.
- Subsidised or mandatory **roll-out of enabling technologies such as sub-metering and energy management systems** as assessors engaged in this study frequently highlighted the challenge in accessing non-domestic energy data at a level of granularity that could support the identification of specific and tailored recommendations.
- **Financial support** for implementation – such as concessional loans.

⁷⁴ Such as, the [Streamlined Energy and Carbon Reporting \(SECR\)](#) being introduced in the UK.

These measures go beyond the *identification* of opportunities (such as achieved under ESOS), and target the *implementation* of energy efficiency.

Other complementary policies can also help audits to lead to energy efficiency changes:

- **Maximising policy synergies, making it simple for organisations to engage in, and derive value from, policies and regulations:** The implementation of SECR in particular will have an important role to play in maximising the benefits of ESOS without duplication. A suggestion was made by an assessor, for example, to allow an ESOS-compliant report to be part of the SECR compliance process.
- **Mandatory phase out of inefficient technologies.** As described in Chapter 3, this research highlighted that organisations frequently wait until the end of a product's natural lifespan to replace it. Mandating such replacement would expedite energy efficiency improvements. Lessons should be learned, however, from experiences of other phase-out schemes. This has been successfully achieved in the EU, for example the phasing out of incandescent lightbulbs.

Annex A: Summary of evidence against Research Questions

RQ1: Energy audits and reporting: *To what extent, (in which ways and in which contexts) are energy audits and reporting effective in identifying and delivering energy efficiency savings across organisations?*

Evidence gathered and reviewed by this study suggests that, in general, auditing was not common practice in large organisations before ESOS and there was little evidence of other energy-use related quality systems being in place. Energy audits were more likely to have been carried out voluntarily by large and more energy intensive organisations which had a strong financial driver to be energy efficient.

Outside of this, findings from this study suggest that audits can be effective when organisations use them to investigate specific issues or to support time-bound decisions. Organisations can have greater motivation to hear the evidence and recommendations when, for example:

- information is needed to support them to understand, and act on, a bill spike;
- choosing between two pieces of new equipment or potential new sites; or,
- making decisions about how to refurbish and operate a new site.

This research found that there may be a positive feedback loop between changes to policies and priorities as a result of an audit, and the implementation of specific energy or fuel efficiency measures: organisations that reported introducing goals, action plans, training or ISO 50001 certification as a result of ESOS, or who agreed that ESOS had increased the level of priority placed on energy efficiency, were more likely to have implemented energy efficiency measures as a result of ESOS.

On the other hand, organisations with pre-existing energy efficiency policies or which already placed high priority on managing energy use, were less likely to have taken action as a result of ESOS which may reflect that low-hanging fruit had already been captured. This highlights that the scope of audits to influence organisations is limited by their existing energy maturity i.e. if priority is high already, it is more challenging for a scheme such as ESOS to increase it.

Professional audits are often deemed too expensive relative to energy spend for smaller organisations, with most only undertaking audits if provided free, or at subsidised rates. Audits were also more common in SMEs where driven by the leadership of a key individual within a business. When they do take place, findings from audits in SMEs can more easily reach decision makers than in large organisations. Public sector organisations undertake audits when driven by senior-level leadership and/ or a need to ensure effective use of constrained budgets.

This research also highlighted the mechanisms within audits and reporting that can be effective in delivering energy efficiency savings. It found that:

- **Simple and non-technical language** can engage organisations in the recommendations, particularly where the organisation overall is not energy mature and/ or key audit stakeholders lack energy experience.

- A **table of key recommendations** helps make the energy savings and associated costs and payback periods easily digestible.
- **Pre-audit scoping work** helps assessors deliver audits that meet their clients' contexts and objectives.
- A **high-quality audit** carried out by a **skilled auditor** maximises the chances of the audit encouraging action that results in energy efficiency savings.
- **Strong senior management engagement** with the auditing process can be an essential precursor and can be improved with presentations.

Furthermore, while audits have been demonstrated to have a role in influencing action on energy efficiency, other factors are also often at play, including:

- Organisations, particularly those in energy intensive industries, have often undertaken energy efficiency action already as part of a general drive to **cut costs**, limiting the scope of audits to have additional impact.
- Organisations frequently upgrade equipment and building fabric at the end of its **natural lifespan** or when **relocating or consolidating premises**. When doing so they are likely to procure more energy efficient replacements, but the timings are unlikely to be influenced by audits, although the choice of equipment may be.

RQ2: ESOS influence and impact: *To what extent, (in which ways and in which contexts) has ESOS influenced organisational energy efficiency policy and practice? What impact has ESOS had on energy efficiency in organisations?*

The impact of ESOS to date has varied considerably across obligated organisations. For some organisations it has driven changes to organisational approaches to energy management or encouraged the uptake of energy efficiency measures (though often those most simple and low cost to implement). For other organisations ESOS has had limited impact and has not being a key factor in organisational decision-making. This evaluation suggests that where ESOS has had a more significant impact on organisational energy efficiency policy and practice this has been among organisations that started from a lower level of energy maturity.

This research found that of all energy efficiency measures implemented or planned by complier organisations since the start of ESOS, 38% were attributed by organisations at least in part to going through the ESOS process. This varied considerably by category of energy efficiency measure: 13% of ventilation measures were attributed at least in part to ESOS, compared with 48% of process measures and 46% of lighting measure. The evaluation also found that a minimum of 38% of organisations had implemented or planned at least one energy efficiency measure as a result of ESOS, and 29% had implemented or planned two or more.

One of the key features of ESOS was that it required organisations to audit their transport use with a view to identifying fuel efficiency measures, as well as those related to energy efficiency. The evaluation found evidence that ESOS has prompted action on fuel efficiency: 32% of all fuel efficiency actions that organisations had implemented or planned since starting the ESOS process were attributed to the scheme, and that 31% of all organisations with a fleet had implemented or planned at least one such action as a result of ESOS.

This evaluation also sought to understand the impact of ESOS on broader organisational policies and attitudes with respect to energy efficiency, beyond the implementation of individual measures. It found that:

- In some cases, organisations had limited awareness of their energy and fuel consumption and lacked processes to monitor such data. In some organisations, the ESOS process was observed to have necessitated improvements to energy and fuel data collation and management in such organisations (although the extent to which these are sustained in the longer term is yet to be seen).
- Organisations have introduced energy efficiency related goals (17%), action plans (20%) and training (17%) as a result of going through the ESOS process, and it also prompted certification with ISO 50001 in some cases (7%)
- 25% of organisations⁷⁵ reported that the level of priority placed on energy efficiency at board level in their organisation had increased since ESOS, and attributed such an increase to ESOS.

In addition, ESOS has yielded co-benefits for some organisations, not related to energy efficiency:

- 25% of those that reported that energy efficiency action within their organisation had increased since ESOS agreed that compliance had enhanced their organisation's reputation.
- 13% of organisations that reported an increase in energy efficiency action as a result of ESOS agreed that staff productivity had also increased because of compliance. For example, some organisations highlighted that compliance could lead to the purchase of more efficient lighting that also generated a brighter and more productive work environment.

In spite of the influence and areas of impact being associated with ESOS by organisations as described above, a large proportion of organisations involved in this study did struggle to articulate an impact from the policy on their organisation. In some cases, this may have been due to ESOS being just one out of a broader mix of factors affecting decision-making around energy in their business, but for others it reflected the ESOS process adding limited additional value. This may have been because:

- they were an organisation already investigating energy saving opportunities through other routes;
- they felt they had little room to improve due to low energy use;
- they faced organisational restrictions on making changes; or,
- saw the ESOS process as a compliance-only exercise.

RQ3: ESOS lessons for future policy: *What are the lessons learned from implementing ESOS that could feed into future policies?*

One of the key challenges identified in both the interim evaluation of ESOS (conducted in 2016) and this study was that many obligated organisations left the initiation of their compliance activity until close to the regulatory deadline. This resulted in a significant spike in compliance activity around the deadline which was found to have implications for the prices

⁷⁵ This statistic is based on organisations who participated in the 2018 survey only (and not the earlier 2016 survey) – see Section 3.1.3 for further details.

paid for audits, and the quality of assessor services and recommendations received. Steps to limit such a spike in future policies could include:

- Issuing clear guidance on the time taken to reach compliance so organisations do not underestimate this.
- Highlighting the risks of late compliance, both in terms of possible increased costs or lower quality of the audit itself, and the risk of enforcement action if compliance is not reached by the deadline.

This research also identified several ways in which ESOS or similar future policies could be optimised to yield energy efficiency savings:

- **Targeting obligations at those with greatest potential to realise benefits**, for example taking into account energy use/intensity and sector.
- **Publicising good practice examples of audit reports or recommendations**, so assessors learn the best approaches to presenting the findings.
- **Encouraging compliance through ISO 50001** as the requirement this creates for continuous improvement can drive action.
- **Encouraging commitment to action**, such as (ideally public) mandatory reporting on targets or action plans as this can encourage greater ongoing commitment to reviewing energy use and drive organisations to take up recommendations.
- **Taking advantage of data created by policies to spread awareness of potential for, and benefits from, taking action**, for example through creating publicly accessible databases of recommendations, payback periods and estimated savings.

RQ4: Wider learning: *What is the wider learning from this research for BEIS policy making?*

Policies to support better organisational energy management need to be designed to overcome barriers in three key areas identified during this study:

- **Awareness of, and commitment to the energy efficiency opportunity** (where awareness is driven by audit activity, complementary drivers may be needed to encourage commitment);
- **Technical solutions and expertise** for understanding and implementing energy efficiency;
- **Financial resources** to invest in energy efficiency projects.

As such, **complementary policies** to encourage better uptake of opportunities could include:

- **External reporting of energy use, and against energy use targets or action plans:** Evidence suggests however, that mandatory reporting may need to be linked to more significant measures, such as ‘name and shame’ publications to deliver energy efficiency action;
- **Knowledge sharing of best practice linked to published benchmarks on levels of energy efficiency that may be achievable;**

- Direct **incentives or penalties for implementation** of energy savings;
- **Technical assistance** (such as training for energy managers or other staff) to support recipients of audits to engage with, and act on, the information provided;
- Subsidised or mandatory **roll-out of enabling technologies such as sub-metering and energy management systems** as assessors engaged in this study frequently highlighted the challenge in accessing non-domestic energy data at a level of granularity that could support the identification of specific and tailored recommendations;
- **Financial support** for implementation – such as concessional loans.

These measures go beyond the *identification* of opportunities (such as achieved under ESOS), and target the *implementation* of energy efficiency.

Other complementary policies can also help audits to lead to energy efficiency changes:

- **Maximising policy synergies, making it simple for organisations to engage in, and derive value from, policies and regulations:** The design and implementation of SECR in particular will have an important role to play in maximising the benefits of ESOS without duplication.
- **Mandatory phase out of inefficient technologies.** Organisations frequently wait until the end of a product's natural lifespan to replace it. Mandating such replacement would expedite energy efficiency improvements.

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