Title: ***Strengthening the Energy Savings Opportunity Scheme (ESOS)*** **IA No: BEIS001(F)-22-EEL** **RPC Reference No: BEIS-5088(1)** **Lead department or agency: BEIS** **Other departments or agencies: Department for Transport**	**Impact Assessment (IA)** **Date:** 26/08/22 **Stage:** Final **Source of intervention:** Domestic **Type of measure:** Primary **Contact for enquiries:** businessenergyuse@beis.gov.uk

Summary: Intervention and Options

RPC Opinion: Green

Cost of Preferred (or more likely) Option (in 2020 prices)			
Total Net Present Social Value	**Business Net Present Value**	**Net cost to business per year**	**Business Impact Target Status**
Nil	Nil	Nil	Qualifying provision

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

To address the information failures and behavioural barriers that disincentivise energy efficiency uptake, the Energy Savings Opportunity Scheme (ESOS) was implemented in 2014. The scheme requires large businesses to carry out a 4-yearly audit of the energy use in their buildings, industrial processes and transport; which provides cost-effective recommendations that are tailored to the organisation and are required to be signed off by a board member. However, variable quality of ESOS audits and limited disclosure undermines the uptake of energy efficiency among in-scope parties. Government intervention can address this by coordinating across business to produce common standards and strengthen audit and disclosure requirements.

What are the policy objectives of the action or intervention and the intended effects?

The objectives of the policy are to:

- improve the quality for participating organisations of their ESOS audit and recommendations.
- raise the scope of potential energy and emissions savings from ESOS through public disclosure, due to raising reputational pressure which can drive increased board-level engagement in energy efficiency
- ensure that ESOS is aligned to government's net zero goals

Together, the intended effect of these interventions is to increase the proportion of firms undertaking action on energy efficiency due to ESOS, as well as increase the total number of recommendations being taken up.

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

A wide set of options are considered in the IA, but the shortlisted options are:

- Policy option 0: Do nothing
- Policy option 1: **Preferred option**. Strengthen ESOS through increased standardisation of audits, public disclosure of ESOS data, and inclusion of a Net Zero element to ESOS audits.

Policy option 1 is the preferred option. It addresses issues around clarity which inhibit compliers from fully engaging with their ESOS recommendations. This option would also address myopic behaviour that undermines private action on long-term climate objectives, as well as applying reputational pressure to incentivise greater action on energy efficiency.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** 01/2028

Is this measure likely to impact on international trade and investment?		No		
Are any of these organisations in scope?	**Micro** No	**Small** No	**Medium** No	**Large** Yes
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent) **(2023-2037)**		**Traded:** Nil	**Non-traded:** Nil	

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

Signed by the responsible Minister: Lord Callanan Date: 26/08/2022

Summary: Analysis & Evidence Final Government Position (Proposed)

Description: Implement new standards and strengthen requirements of ESOS audits, mandate public disclosure of ESOS audits and introduce a Net Zero element to ESOS.

FULL ECONOMIC ASSESSMENT

Price Base	PV Base	Time Period	Net Benefit (Present Value (PV)) (£m)		
			Low:	High:	Best Estimate:

COSTS (£m) (2023-2037)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	N/A		N/A	N/A
High	N/A		N/A	N/A
Best Estimate	N/A		N/A	N/A

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

Main affected groups are the large businesses in scope of the ESOS regulations that are required to comply with the proposed mandatory disclosure requirements and Net Zero audits. Capital and installation costs of undertaking measures in response to disclosure are the largest component (69%). Compliance costs, which includes the time taken to complete an ESOS audit as well as familiarisation and compliance with mandated disclosure form the second largest component of the costs (16%). Hassle and operational costs form the remainder of the costs (15 %).

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

Wider non-monetised costs include the potential opportunity cost of capital which firms incur if they invest in energy efficiency after an ESOS audit.

BENEFITS (£m) (2023-2037)	Total Transition (Constant Price)		Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	N/A		N/A	N/A
High	N/A		N/A	N/A
Best Estimate	N/A		N/A	N/A

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

Energy savings are the largest benefit (47%). These energy savings also yield significant benefits from non-traded CO2e emissions reductions (30%), traded CO2e emissions reductions (14%) and air quality improvements (10%).

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

Increased demand for energy efficiency measures can support productivity, growth and jobs within the green construction industry and the wider supply chain. Greater competition within these markets may also spur innovation and lower the end costs of installing measures. Reducing business energy demand is also likely to generate a benefit at the national level from improved energy security.

Key assumptions/sensitivities/risks	Discount rate (%)	3.5

Benefits are dependent on disclosure incentivising energy efficiency. With low levels of response, it is likely that the proposed option would represent a net cost. Policy overlaps have been modelled according to published plans, but the scope of consumption this covers could change which would alter the split of costs and benefits from the policy. Costs of a Net Zero audit are speculative at this point. Energy and carbon prices reflect the IAG projections.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs:	Benefits:	Net:	
Nil	Nil	Nil	Nil

Contents

1. Introduction and policy background

1. In 2021, Department for Business, Energy and Industrial Strategy published policy proposals to **improve and strengthen the Energy Savings Opportunity Scheme (ESOS)**. This consultation tested policy concepts, to inform potential scheme amendments. The Government Response to this consultation which was published on 18 July 2022, outlined the outcome of that process, and operational details of the scheme for the current and future ESOS phases. ESOS operates under existing regulations, taken from a primary power via the European Communities Act 1972 and transposed requirements in the Energy Efficiency Directive. As a result of the UK's exit from the European Union new primary powers are necessary to amend the scheme. The Department seeks a replacement power that would enable the existing scheme to be re-enacted in secondary legislation as a whole, rather than merely to make the proposed changes. It will seek a delegated power to enable changes to be made to ESOS, in particular to provide for a net zero/carbon reduction element to ESOS' existing energy efficiency purpose and to increase the number of participants that take action to achieve energy efficiency savings/carbon reductions in energy use, potentially by requiring action to be taken to achieve savings/reductions.

2. The primary powers we seek will not result in any material impacts in absence of secondary legislation. The enactment of secondary legislation would be expected to result in the costs and benefits that were first quantified in the consultation stage IA[1] and are updated below.

3. Since the consultation IA was published, there have been changes to the evidence base that have been factored into the modelling. These changes impact the overall split of costs and benefits of the policy as well as the potential contributions from a strengthened Energy Savings Opportunity Scheme (ESOS). These changes are discussed In Annex 1.

4. Large businesses make up less than 1% of the total number of businesses in the UK but contribute to around one third of all employment and half of all turnover[2]. These businesses also consume disproportionate levels of energy and emissions relative to their number. In 2019, around half of gas and electricity consumed in non-domestic buildings was in those occupied by large businesses. These businesses also account for over half of all energy

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/999457/energy-savings-opportunity-scheme-impact-assessment.pdf

[2] Business Population Estimates, 2021, Table 5. Estimates can be found here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1019904/BPE__2021_detailed_tables.xlsx.

consumption in industrial buildings, of which energy to support industrial processes is a major component[3].

5. In 2014 to meet requirements under Article 8 of the European Union's Energy Efficiency Directive (2012/27/EU), the UK implemented the Energy Savings Opportunity Scheme (ESOS) which requires large enterprises to undertake an energy audit of the energy use by their buildings, industrial processes, and transport at least once every four years (beginning in 2015). The regulations which introduced ESOS used enabling powers under section 2(2) of the European Communities Act 1972, which has now been repealed following the UK's exit from the European Union. The scheme was estimated to deliver energy savings through two channels: 1) by providing an accurate measurement of business energy use that would lead to consumption changes and therefore reduce energy demand; and 2) through providing a list of high-quality and tailored energy efficiency recommendations which enterprises could adopt to improve their energy efficiency, reduce energy demand, and increase cost savings through lower energy bills. The establishment of ESOS was also designed to overcome other barriers, such as information gaps and salience of energy efficiency, highlighted in the 2012 UK Energy Efficiency Strategy.

6. In 2020 an evaluation of ESOS was published alongside a Post Implementation Review (PIR) of the scheme. Although the evaluation indicated that compliance with the scheme was high, with over 90% of in-scope organisations participating in the scheme over the previous two compliance windows, it also highlighted several unintended consequences. These include[4]:

    - Higher than originally forecast ESOS assessment costs. It is possible that costs were inflated by the large demand for assessors created by participating businesses who delayed their compliance activities until the final year of the four-year compliance window.

    - Greater uptake of ESOS measures among participants who possess a Climate Change Agreement (CCA). This was not foreseen; it was estimated that there would be little uptake of ESOS measures among CCA participants, as CCA participants already have their energy consumption measured and have an incentive to reduce their energy use to meet CCA targets.

    - Evidence of lower quality audits. Several of the interviewed participants reported that their audit was of low quality and provided limited information

[3] Total energy consumed by large and very large businesses can be found here: NEED 2021, Table 12, England and Wales only). Table 18 was used to estimate these businesses share of total factory consumption (England and Wales, Gas and Electricity only).

[4] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/867853/research-on-energy-audits-and-reporting-including-ESOS-phase-1-report.pdf

specific to their business such as the organisation structure and tenancy. Compliance audits also pointed to quality issues. There was also a sense that payback periods of suggested recommendations were not always credible.

- Low levels of attribution assigned to ESOS recommendations: 6% of energy efficiency measures implemented (or planned) by organisations surveyed in the Phase 2 evaluation said that ESOS was the main driver behind implementing these measures. Around 38% of measures were said to be at least partly due to ESOS. There was substantial variation between the types of measures attributed to ESOS, for example lighting measures were much more likely to be adopted because of an ESOS audit, rather than building fabric measures.

2. Rationale for Intervention

7. The evidence gathered from the first Phase of ESOS highlighted issues surrounding the poor quality of audits, as well as ESOS being widely perceived as a compliance-first exercise by participants, limited the scope and size of potential energy savings.

8. The PIR, alongside the evaluation evidence, indicated that although ESOS had largely delivered its original policy objectives, there were several areas where the scheme could be strengthened and improved. The responses from organisations, described above, around the role that ESOS has in driving decisions to implement new measures suggest that there is a small proportion of enterprises in scope whose action under the scheme is sufficient to deliver the total estimated savings.

9. The rationale for Government intervention is that the market failures below are too pronounced and prevalent to be resolved through market dynamics alone. Relevant market failures include:

- The **Negative Externality** of climate impacts associated with greenhouse gas emissions mean energy prices do not fully reflect the impacts of energy use, causing over-use of energy, and underutilisation of low carbon alternatives. This also applies to air quality impacts.

- **Incomplete Information** occurs where private agents lack quality and relevant information on the costs and benefits of energy efficiency, as well as future standards that they will need to achieve to hit Net Zero. Consequently,

firms may not prioritise energy efficiency or behavioural changes that yield significant private and social benefits[5].

- Low salience of energy efficiency can present an additional **behavioural barrier**.[6] This can exacerbate the information failures and externalities, by causing organisations to fail to take potentially privately beneficial action because they perceive gains as too small to prioritise. For example, energy bills constitute only 3% of costs on average across business sectors, and perceived as a small cost, this can limit engagement with lowering these costs.[7]

- **Misaligned or 'split' incentives** can occur in the rented sector when the costs of improving energy or fuel efficiency fall on owners, but the benefits of energy bill reductions go to tenants. Alternatively, costs incurred by current tenants may generate benefits for future tenants and not for themselves. Both issues disincentivise investment.

- **Embryonic markets** exist where industries are typically in the development stage usually dealing with products for which limited demand has been established. This is exacerbated by information failures, for example when customers do not have sufficient information about the potential future benefits that a novel technology might have.

  The existing ESOS scheme may do little to overcome embryonic markets for measures which typically carry higher payback periods. However, the policy could be adapted to raise awareness and demand for measures with higher payback periods, such as heat pumps.

10. The current ESOS scheme, whilst contributing to bridging information failures, could be strengthened to overcome these barriers more effectively.

3. Policy Objectives

11. In accordance with the Green Book, we have detailed the primary objectives of our policy as a SMART objective:

Specific:

[5] ESOS was implemented following Article 8 of the Energy Efficiency Directive. The scheme aimed primarily at overcoming information failures that concern lack of awareness around the opportunities that energy efficiency presents. Energy efficiency has large private and social benefits, such as the value of bill and carbon savings. Lack of quality information around energy efficiency can lead to its undervaluing and de-prioritisation within a firm as an investment and an inefficient allocation of resources.

[6] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/65601/6925-what-are-the-factors-influencing-energy-behaviours.pdf p.7

[7] Business energy statistical summary https://www.gov.uk/government/publications/business-energy-statistical-summary page 17

The policy aims to increase the number of ESOS participants that act and improve their energy or fuel efficiency upon getting an ESOS audit. Specifically, this is estimated to deliver additional energy savings of around 2TWh per year from 2023, from buildings and industrial processes[8]. These energy savings, and other savings such as transport, will be achieved through three prongs: 1) through improved clarity around the content of their ESOS audit; 2) through increased pressure within the firm to act via mandated public disclosure and 3) through providing greater information around the steps firms need to take to ensure their means of consuming energy are consistent with Net Zero.

Measurable:

All firms in scope will be required to meet revised obligations in both Phase 3 and Phase 4, that implement the proposed policy (compliance deadlines of 5 December 2023 and 2027) with the potential for additional action in or beyond Phase 4. We plan to measure the impact of the proposals through evaluating data gathered by the Scheme Administrator, which will shed light on the type and quality of information disclosed by compliant organisations. This will inform evaluations of the proposed policy and indicate whether the forecast impacts are reasonable.

Achievable:

The ESOS evaluation and PIR indicates there is scope for additional action from firms under the policy. Strengthened audit requirements will raise the quality of audits being commissioned, which in turn will ensure more appropriate and tailored recommendations in an ESOS report. Action taken by firms in scope is currently voluntary and compliance is demonstrated through completing an ESOS audit or similar assessment. Evidence suggests that mandated disclosure can drive board level engagement with energy efficiency, leading to greater adoption of measures[9]. In this IA, the main quantified channel through which energy savings are achieved is through disclosure of ESOS reports, including consumption and energy efficiency recommendations. The policies proposed here reflect the gathered evidence so far and sensitivity tests are conducted to model a series of scenarios around voluntary uptake of measures.

Realistic:

Based on the existing evidence, it is realistic to assume that some level of energy savings, and the wider benefits associated with this, could be delivered by the proposals. More importantly, whilst the evidence on the types of measures recommended in ESOS audits is limited, it is more likely that

[8] It was estimated that around 1.7TWh of annual energy savings would come from buildings, and 1.5TWh from industrial processes consumption.

[9] Evidence Review of the Impact of Central and Public Disclosure Methods for Reporting Energy Use and Energy Efficiency. DECC, 2014. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/323114/ESOS_-_Research_on_Impact_of_Reporting_Energy_Use_FINAL_.pdf. Although the sample size of studies investigating the link between mandated disclosure and corporate board interest in energy efficiency is small, there evidence gathered indicated that participating in a mandatory disclosure scheme can overcome lack of board engagement in energy efficiency. Moreover, several studies indicate that gaining board interest in energy efficiency is key to adopting measures.

measures with shorter payback periods would be adopted following ESOS audits. For example, the ESOS Phase 2 Evaluation showed that lighting measures[10] were the most likely to be implemented following an ESOS audit. Currently, implementation of ESOS recommendations is voluntary, so even if measures with longer payback periods are recommended, they are less likely to be implemented given barriers such as access to finance or business salience. Mandated disclosure does not change this aspect of the policy, and the wider proposals have been designed to reflect this fact.

Time-limited:

By the end of the Phase 3 compliance window (2023), all firms within scope of ESOS should have implemented a number of the revised requirements (disclosure of their energy consumption and assessment of the recommendations on a voluntary basis against a Net Zero standard), before they are required to implement the proposed policy measures fully in Phase 4 The proposed regulatory changes will be reviewed 5 years after implementation, most likely in 2028 following the Phase 4 compliance deadline (2027) to determine whether they are achieving the intended objectives.

4. Short List Options Appraisal

12. The options considered for the short list economic appraisal are:
    - **Policy option 0: Do nothing – *counterfactual***
    - **Policy option 1: Preferred option. Strengthen ESOS through increased standardisation of audits, public disclosure of ESOS data, and inclusion of a Net Zero element to ESOS audits[11].**

13. Option 1 has been quantified in the cost benefit analysis. Other options were considered and quantified at the consultation stage[12].

14. A detailed logic map of how the amendments to the ESOS regulations would work in practice can be seen in Annex 4, theory of change. This also captures the way in which Net Zero audits (proposed in both Option 1 and Option 2) could contribute to transforming business energy use to align with long-term climate objectives.

[10] Research on energy audits and reporting including ESOS: Phase 2 report. Measures implemented are noted on page 23 and 24. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/887138/energy-audits-reporting-research-esos-phase-2-main-report.pdf.

[11] In addition to the current audit requirements, the consultation proposed that the ESOS audit should also include an overall assessment of carbon emissions and other greenhouse gas emissions resulting from energy use in buildings, transport, and industrial processes which the organisation will need to address to be carbon neutral or Net Zero by 2050. In particular, this should include an assessment of current fossil fuel use and direct greenhouse gas emissions from the business, along with the potential for decarbonisation and when relevant investment might occur.

[12] Analysis of the three short-listed options can be found here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/999457/energy-savings-opportunity-scheme-impact-assessment.pdf.

15. Two non-core options proposed in the consultation are explored in Annex 7, looking at the potential impacts of expanding ESOS to medium sized enterprises and of mandating ESOS recommendations.

5. Analytical Approach

5.1 Counterfactual

16. For the counterfactual we assume the energy savings that ESOS has already delivered persists in future years, as without any intervention the current policy framework would continue, and we assume would have stable impacts over time[13]. The Energy and Emissions Projections (EEP)[14] reference case therefore provides suitable estimates for the energy consumption in the counterfactual scenario. The EEP provides time-series estimates of energy use for commercial services, industrial energy, and transport.

17. The buildings baseline has been modelled using the BEIS Non-Domestic Buildings Model, where a 7% energy reduction target was set between 2015 and 2023, which aligns with the EEP forecasts for this period. Since the EEP does not provide consumption at the business-size level, it has been assumed that this represents the wider trajectory of buildings occupied by large businesses. Consumption was then flatlined, which is in contrast to the EEP trajectory, where consumption is estimated to rise following 2025. However, this is because EEP takes a more conservative approach to including savings from policies, and the resulting rise in consumption is due to the expiry of policies[15]. It is possible that the outturn energy consumption is higher than the baseline estimated, in which case the potential savings from the proposed policies are currently underestimated.

18. Also incorporated in the counterfactual scenario are the overlaps that ESOS has with other policies that incentivise reductions in energy use. More detail on the policy overlaps with ESOS is provided in Annex 3. Detail on how the consumption in scope was identified is outlined in section 5.3, below.

[13] Detail on a scenario wherein ESOS is scrapped is provided in the long-list options appraisal and annex 1.

[14] Annex F, Updated Energy and Emissions Projections, 2019. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/931205/Annex-F-final-energy-demand__EEP2019_.ods.

[15] Various publications have provided information on the NDBM, so this is not included specifically within this IA. More detail on this was outlined in the Performance-Based Framework Impact Assessment. For more information on the Non-Domestic Buildings Model, see Annex 2 of the performance-based energy rating IA: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/970368/performance-based-policy-framework-office-impact-assessment.pdf

19. Given the scale of the policy overlaps, it is possible that under the "Do Nothing" option (Option 0) large businesses would still deliver energy savings. This could be achieved through installing energy efficiency in their buildings and through the pressure to act on energy efficiency and decarbonisation that comes from compliance with Streamlined Energy and Carbon Reporting (SECR). The presence of both existing Private Rented Sector (PRS) and planned policies (Point of Purchase [PoP] and Operational Energy Ratings[16]) may provide impetus for building owners and tenants to act on both building fabric measures as well as operational use, that in turn can deliver energy and carbon savings.

5.2 Additionality

5.2.1 Impact of disclosure

20. As noted in section 3, in this IA, the quantified mechanism by which ESOS could deliver energy savings is via disclosure of high level ESOS report information[17]. A review of the literature indicated that disclosure of high level corporate environmental information can yield multiple impacts, which include, but are not limited to:

- Positive effects on firm reputation and brand;
- Usefulness as a tool for investors, providing the data is not misleading;
- Benefits and disbenefits regarding the effect disclosure has on the cost of capital;
- The potential to improve internal reporting systems, resulting in efficiencies and reducing the cost of gathering information by external parties; and
- An increase in public awareness, leading to more public pressure on companies.

21. The above outlined benefits could impact companies in scope of ESOS in divergent ways. For example, companies that are more prominently public facing could be more susceptible to impacts on external reputation. The impacts of disclosure could also depend on what and how information is disclosed. Emissions data may have greater prominence in the eye of public investors than recommendations on energy efficiency[18]. Similarly,

[16] Referred to the Performance Based Framework in the Consultation IA.

[17] A broader literature review into the impact of mandatory reporting on delivering energy savings was published in 2014 and can be found here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/323114/ESOS_-_Research_on_Impact_of_Reporting_Energy_Use_FINAL_.pdf.

[18] Evidence on the Impact of Public Disclosure can be found on p 28 of the following Evidence Review: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/323114/ESOS_-_Research_on_Impact_of_Reporting_Energy_Use_FINAL_.pdf.

recommendations on energy efficiency might gain greater interest from internal management since they can lead to reduced firm overheads through lower expenditure on energy bills. This can also raise management interest, which is likely to be engaged in the process of assessing and reporting on relevant environmental credentials, which in turn can raise interest in the recommendations from ESOS audits.

22. Overall, the Review found that a mandatory, centrally reported, disclosure policy can raise action when embedded within a wider Scheme, such as that which provides quality information on the potential energy savings that could be yielded from energy efficiency measures.

23. The interventions therefore reflect the evidence gathered, since the mandatory disclosure element would be embedded within the wider policy Scheme. ESOS already provides recommendations on energy efficiency and corresponding energy savings, and where poor audit quality is a barrier to uptake, the interventions taken forward and proposed at consultation stage seek to rectify this[19]. This justifies the assessment that strengthening ESOS by requiring mandatory disclosure would yield additional benefits, which have been quantified in this IA. This also supports the view that there are likely to be additional gains despite overlaps with similar schemes, such as SECR, since ESOS goes further to provide specific, quality recommendations on how identified energy savings could be achieved.

24. Further additional benefits could come from raised compliance rates under other policies[20]. A mandatory disclosure scheme could provide robust monitoring data on the compliance under other policies, such as PRS and PoP regulations. ESOS assessments could include information on the EPC score of the building, as well as tenure, and thus provides an opportunity for Government to reliably monitor the effectiveness of policies that require a Minimum Energy Efficiency Standard. Public disclosure of this information could enable regulators to undertake checks and enforce compliance (that raises the compliance rates with these policies). Therefore, mandatory disclosure could yield energy savings via two channels outlined above: through raising corporate pressure and interest in the results of ESOS audits, and also through the potential for higher compliance rates under PRS and PoP policies.

25. However, the “raised compliance” channel has not been quantified in this IA. We currently lack the robust monitoring data on compliance to conduct the analysis of the potential benefits that raised compliance could deliver, and as such assume high compliance rates in the modelling of PRS and PoP policies.

[19] Strengthening the Energy Saving Opportunity Scheme: https://www.gov.uk/government/consultations/strengthening-the-energy-savings-opportunity-scheme-esos.

[20] Evidence for the “raised compliance” route leading to energy savings from disclosure can also be found on p.33 of the 2014 Evidence Review: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/323114/ESOS_-_Research_on_Impact_of_Reporting_Energy_Use_FINAL_.pdf.

Were such compliance rates to be at odds with the evidence, this would arguably further case that an ESOS disclosure policy could yield net benefits overall.

26. Whilst some action on energy efficiency is likely to occur in the counterfactual, the scale of these savings could be expanded by the policy interventions quantified in this IA in section 6. Where ESOS overlaps with buildings that fall in scope of PRS and PoP regulations, it could provide incentive for measures beyond those that would improve the Energy Performance Certificate (EPC) of the building[21]. Moreover, it is possible that the extension of ESOS disclosure to firms within the SECR framework could raise action on energy efficiency, since the recommendations firms receive under ESOS would be given greater prominence in corporate reports, and thus garner greater board level engagement, than in the counterfactual.

27. The largest impact of the interventions is likely to be on industrial process consumption. This is primarily because the policy landscape is less burdensome relative to buildings energy efficiency standards[22], which means there is scope for ESOS to deliver additional energy savings.

5.2.2 Setting Stronger Standards

28. In addition to introducing the mandatory disclosure element to ESOS, the final Government Position is to introduce stronger standards for ESOS. By improving clarity around ESOS recommendations, this intervention aims to reduce barriers to uptake and increase energy efficiency uptake. Similarly, stronger common standards have the potential benefit of ensuring consistency across ESOS audits, which can ensure a minimum market price for ESOS assessments (where the sites audited are similar) and reduce opportunities for gaming the system.

29. At the Consultation[23] it was noted that due to diverse range of sites that are in scope of ESOS, it was not proportionate or desirable to introduce a full standardised reporting template for the ESOS audit. However, some standardised details should be captured in ESOS reports. These include:

- Organisational details including corporate group structure, highest UK parent (and overseas where appropriate), Companies House registration numbers for the group and Standard Industrial Classification (SIC) codes.

[21] Policy overlaps and the interactions with ESOS are discussed in greater detail in Annex 3.

[22] A significant overlap with the interventions and industrial consumption are where a large business also possesses a Climate Change Agreement (CCA). Around

[23] Proposals for intervention can be found on page 19, here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/999452/strengthening-energy-savings-opportunity-scheme-consultation.pdf.

- Reason for qualification in ESOS – based on employee numbers, turnover, balance sheet or inclusion in corporate group.

- Route(s) to ESOS compliance used.

- ESOS lead assessor details and details of all other personnel involved in conducting site visits and/or completing the report.

- Total Energy Consumption, Significant Energy Consumption and de minimis exclusions.

- If ISO 50001 certification is used, an explanation of how certification scope matches (or otherwise) the scope required by the Significant Energy Consumption.

- Use of 12 months energy data estimates and energy profiling for ESOS compliance.

- Number of sites, site sampling method used and rationale for this method.

- Brief summary of the main audit findings (e.g. total savings identified).

- Confirmation that board member signing off is an Executive Director for the highest UK parent, as registered with Companies House.

30. Taken together, the changes to ESOS reporting aim to ensure a consistent level of quality information on energy efficiency opportunities is provided to compliant parties. Through addressing clarity issues, the interventions also aim to nudge participants into raising their uptake of energy efficiency measures and avoid instances where ESOS is seen as a purely “compliance-first” exercise.

31. However, we do not have a robust estimate of the proportion of ESOS audits that are poor quality, nor the degree to which this is a barrier to uptake. As noted in section 1, the ESOS Evaluations highlighted this as an issue, but did not provide a quantified estimate to enable analysis of the impact of strengthening ESOS standards. Therefore, the potential additional benefits of this intervention have not been quantified.

5.3 Identifying energy consumption in scope.

5.3.1. Transport

32. For this impact assessment, the impact on transport energy consumption has not been modelled alongside the relevant consumption of buildings and industrial processes. There may be some overlaps within the current transport

policy landscape mean that would impact on the scope for additional emissions savings beyond the impact of rules on emissions at the manufacturer, which builds vehicles to a certain standard. It is possible that a future ESOS scheme could impact reduction of overall levels of fuel demand and emissions at a firm level, for example through encouraging better driver training and logistical management of fleets; as well as moves to electric vehicles and employee travel. However, we were unable to obtain the necessary robust evidence to model the impact of the ESOS amendments on transport fleets and therefore this aspect of the policy has not been included in the IA.

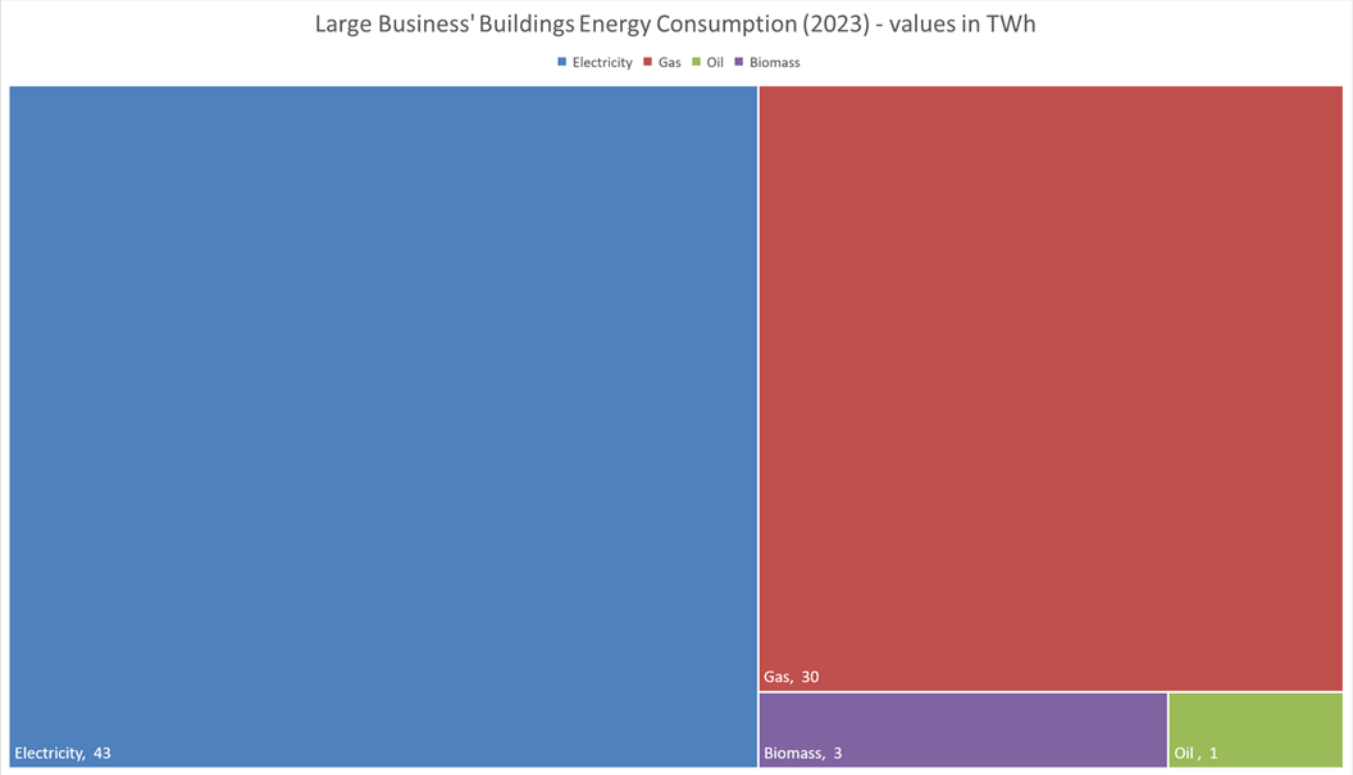
5.3.2 Buildings

33. Figure 1 shows the buildings energy consumption in scope, once a projected 7% energy reduction has been achieved by 2023, which is consistent with the EEP. Post 2023 consumption is assumed to remain constant over the appraisal period[24]. Under this estimate, electricity is the single largest fuel consumed, accounting for around 43 TWh in 2023, or around 56% of total buildings consumption. This is followed by gas consumption, which accounts for around 30TWh, or 39% of the total[25].

[24] Energy consumption is flatlined from 2023 to account for the locking-in of energy savings from current and future policies. This potentially under-estimates the gains of energy efficiency in absolute terms since consumption is forecast as lower than in the EEP reference case.

[25] Data calculated using the Non-Domestic Buildings Model, which uses BEES (2016) data to estimate the buildings consumption in scope of the policy.

Figure 1: in-scope non-domestic buildings energy consumption in 2023.



5.3.3 Industrial processes

34. In 2019 large and very large businesses consumed around 47% of all industrial electricity consumption and around 59% of all industrial gas consumption. Since ND NEED provides gas and electricity consumption only, a weighted average of the gas and electricity consumption of large and very large businesses has been used to estimate the proportion of other fuels which are consumed by these businesses[26].

Table 1: Large and very large businesses factory electricity and gas consumption in 2019

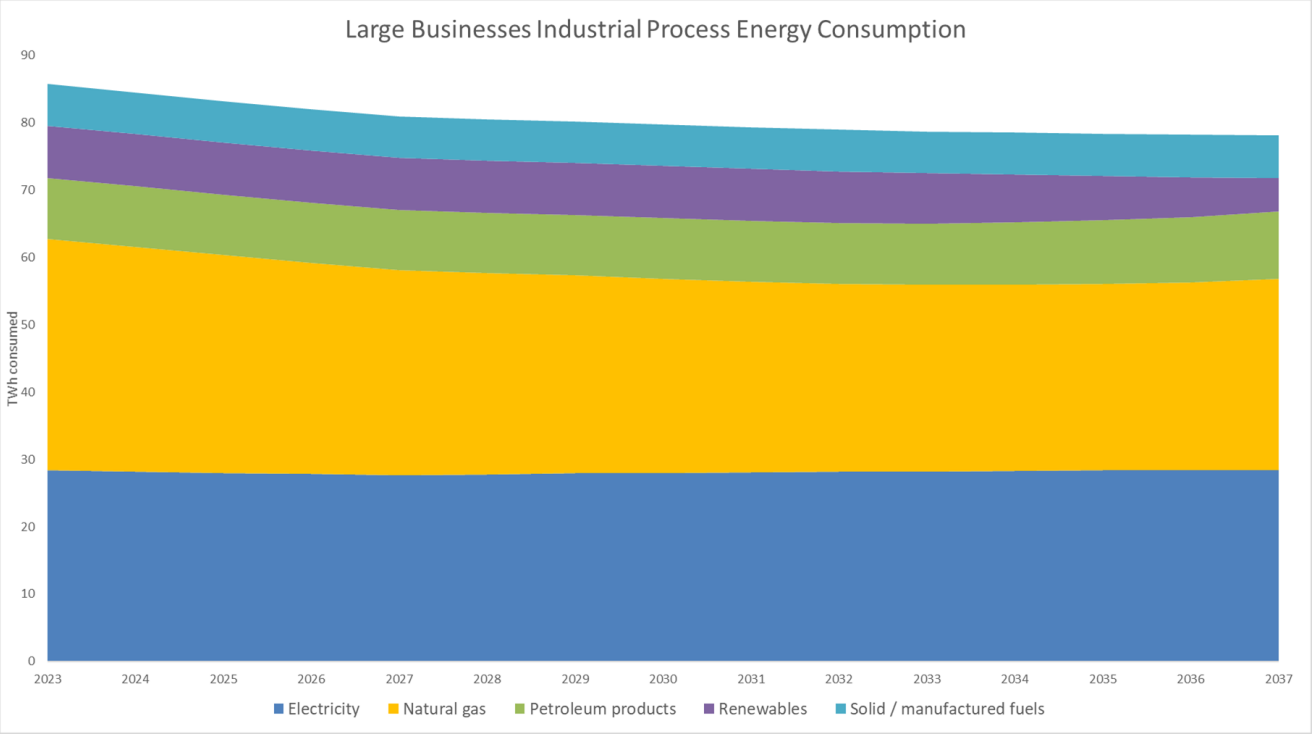
[26] ND-NEED factories category has been used as a proxy for industry. Large businesses defined as any business with between 249-999 employees. Very large businesses defined as any business with 1000 or more employees. These proportions consumed by large and very large businesses have been applied to the whole of the UK to account for Scotland and Northern Ireland in the absence of more robust evidence.

Business size	Electricity (%)	Gas (%)	Other fuels (weighted average)
Large businesses	22%	35%	
Very large businesses	25%	24%	
Total	47%	59%	54%

35. Although splitting out the consumption in this way provides an indicator of the industrial energy in scope, it includes non-process energy, such as buildings consumption. To avoid double counting, the process-share of energy was split out using BEES and comparing this to the ND NEED data on factory energy consumption. This was then applied to the EEP dataset to determine the baseline for process energy consumption[27].

36. Further detail on the energy consumption in scope for buildings and industrial processes can be found in Annex 9.

Figure 2: in scope industrial process energy consumption between 2023-2037:



[27] Data from table 18 in ND NEED 2021. Available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1007426/nd-need-2021-data-tables.xlsx. Missing business size data was excluded from the calculations.

5.4 Appraisal period

37. The policy proposal would potentially require participants to make changes to their ESOS compliance from their Phase 3 audit report onwards. 2023 has therefore been taken as a suitable starting point for the appraisal period.

38. The impacts of the policy have been modelled between 2023 and 2037. This captures the costs of measures from action taken following disclosure as well as the costs of Net Zero audits. Initial compliance with disclosure is expected to have been completed within a year of Phase 3 compliance date (5th December 2023), but the full extent of the Net Zero element will not be made mandatory until Phase 4, requiring compliance in 2027[28].10 years is added to this period, which extends the appraisal period to 2037, reflecting Green Book guidance[29].

5.4.1 Timing of costs and benefits

39. The approach to modelling the costs and benefits has been to assume that costs are incurred up front, such that benefits also start from 2023.

40. This front-loads the costs and benefits of the policy proposals, and a smoother rollout would see the impact of costs and benefits more evenly spread out over the appraisal period. It may be the case that an ESOS audit and subsequent disclosure is completed in 2023, but measures are not implemented until after this. However, considering that disclosure is the primary channel through which the policy is expected to deliver benefits, it is expected that these measures will have some impact on behaviour and uptake of energy efficiency measures from 2023.

41. Front-loading the costs and benefits of the policy proposed takes a relatively conservative approach to the economic appraisal. As up-front costs are not reduced as much by discounting and a larger proportion of the benefits are quantified in the relative near-term when the carbon and energy saving benefits are lower.

[28] This is a change to the modelling approach which was discussed

[29] The 15-year appraisal period The 15-year appraisal period, where 2023 is, for discounting purposes, considered year 0, is consistent with methodologies applied in other similar Impact Assessments, such as the Performance-Based Framework Impact Assessment: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/970368/performance-based-policy-framework-office-impact-assessment.pdf. Wider guidance and background information on appraisal in Government can be found in The Green Book, available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938046/The_Green_Book_2020.pdf.

42. We received no consultation feedback that fundamentally challenged this approach in the consultation IA, and therefore we have held it constant in the final IA.

5.4.2 Categories of costs and benefits analysed.

43. The costs and benefits considered in this Impact Assessment are outlined in Table 3 below.

44. The main monetised additional costs are the capital and installation costs that are incurred by firms who undertake energy efficiency improvements in response to disclosing their energy consumption. Other monetised costs include: the administrative cost of complying with disclosure requirements, the administrative cost of complying with a Net Zero audit, and the cost of getting the Net Zero audit.

45. In this IA we have also estimated the costs to ESOS auditors for undertaking the requisite training to perform a Net Zero audit as well as the cost of familiarising with the new regulations. We have also estimated the cost to the Scheme Administrator of implementing the changes to the regulations.

46. The main benefits considered which are monetised can be split into private and social benefits. The private benefit which has been monetised is the reduced expenditure on energy bills that is a result of businesses installing more efficiency measures or changing behaviour to lower their energy consumption[30]. The main quantified social benefits include the social value of energy savings[31] and the associated carbon savings and air quality improvements. All private and social benefits have been appraised using the 2021 Green Book Supplementary guidance[32].

[30] The value of private bill savings has been calculated by multiplying the consumption savings by the relevant fuel retail energy price.

[31] Calculated using the Long-Run Variable Costs of the relevant fuel in question, multiplied by the consumption saving. The LRVCs are used to reflect the social value of energy savings, as per Green Book Supplementary Guidance.

[32] Green Book Supplementary Guidance can be found here: https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal. Tables 1-19 were used to quantify the value of bill, energy, carbon savings as well as air quality improvements.

Table 2: costs and benefits analysed in the Impact Assessment.

Affected party	Costs	Benefits
Large firms in scope of ESOS	**Monetised** - Compliance - Capital - Installation and hassle **Not Monetised** - Possible opportunity cost of capital	**Monetised** - Energy Bill savings **Not Monetised** - Comfort and Productivity - Improved health of building occupants - Improved clarity around ESOS audit recommendations - Improved information around measures aligned with Net Zero ambitions
ESOS auditors	**Monetised** - Additional costs of gaining relevant skills to conduct a Net Zero audit as well as the additional cost of familiarising with the new standards on ESOS audits	**Not monetised** - Improved productivity because of better guidance provided on what needs to be completed in an ESOS audit
Scheme administrator	**Monetised** - Additional cost of monitoring and ensuring compliance with disclosure requirements.	**Not Monetised** - Improved information around ESOS participants recommendations
Society	**All costs that are faced by the groups described above**	All preceding benefits plus: **Monetised** - Carbon savings - Air quality improvements - Social value of energy savings **Not Monetised** - Increased security of energy supply - Increase in high-skilled jobs in the low-carbon economy

6. Policy Impacts

6.1 Table 3, Results from the cost-benefit analysis

Costs and benefits	Final Government Position (£m, 2020 real prices)
Costs	
Capital and installation costs	710
Hassle costs	140
Operational costs	20
Familiarisation and compliance with disclosure	20
Familiarisation and compliance with Net Zero audits	140
Scheme Administration costs	10
Accreditation cost	10
Total costs (A)	1,050
Benefits	-
Value of energy savings	1,120
Value of air quality improvements	230
Value of greenhouse gas emissions avoided	1,050
Total benefits (B)	2,410
Net Present Value (B - A)	1,360
Benefit Cost Ratio (B/A)	2.3

47. The table above summarises the main quantified aspects of the short-listed options. All costs and benefits are based on 2020 prices and have been monetised and discounted in line with the Green Book and supplementary guidance on valuing energy use and greenhouse gas emissions[33]. A full table of the assumptions used to estimate the costs and benefits of the short-listed options can be found in Annex 5. This informed the sensitivity analysis conducted, which is discussed in section 6.3.

48. The Net Present Value (NPV) of the preferred option is around £1.36bn, with a benefit-cost ratio of 2.3. The benefits delivered under this option are dependent on additional action being taken following disclosure[34].

[33] More detail on the modelling is outlined in Annexes 3 and 5. Major modelling outputs used include data from the Non-Domestic Buildings Model and the Energy and Emissions Projections.

[34] The uncertainty around the size of the response following disclosure is captured in the sensitivity analysis, which is explored in Section 6 and Annex 4. If very little action materialises following disclosure, the policy is likely to represent a net cost.

49. The inclusion of a Net Zero element to ESOS will ensure a more strategic review of business energy use by participants, that takes into account Government's net zero goals, and considers longer term risk to participant's energy consumption and operations resulting from the net zero transition. We have not been able to monetise the benefits of a Net Zero audit as the detail of the policy is expected to be set out as part of external standard development process but ultimately, the audits will be designed in a way that ensures that their benefits exceed their costs.

50. The costs of Net Zero audits are illustrative. In the central cases for all options analysed above, these costs are derived from the assumption that it would take roughly a quarter of the time for an ESOS auditor to conduct a Net Zero audit. This is based on evidence gathered highlighting the potential for an increase in the costs of audits, should a Net Zero element be included[35]. However, the design of the Net Zero element to the ESOS amendments is still under consideration, and it is expected that this will prioritise minimising the additional burden to businesses. The costs of a Net Zero audit are varied in the sensitivity analysis, below.

51. The impact of disclosed energy consumption and energy efficiency recommendations yields gross benefits of £2.4bn over the period 2023-2037. Under these options, the total value of greenhouse gas emissions avoided, and air quality improvements are £1bn and £230m, respectively, over the appraisal period[36].

6.2 Emissions and Energy Savings Summary

52. The below table shows the emissions savings that could be delivered over Carbon Budget 5 and Carbon Budget 6. It also includes the potential energy savings that could be delivered over the appraisal, by 2037. The analysis presented below covers the preferred option.

53. To capture the uncertainty around the impact of public disclosure on energy consumption and the overlaps with other policies, the emissions and energy savings impacts have been presented as a range. The figures in the table below reflect the range of outcomes that could occur under a High or Low NPV

[35] Net Zero audits: state of the market and potential for action, BEIS, 2021. The costs associated with conducting a Net Zero audit are highly illustrative. In the central cases for all options analysed above, these costs are derived from the assumption that it would take roughly double the time for an ESOS auditor to conduct a Net Zero audit. This is based on evidence gathered highlighting the potential for a substantial increase in the costs of audits, were a Net Zero element included.

[36] The benefits in option 1 and option 3 are derived from the impact of disclosure on energy consumption. A central estimate of a 4% energy reduction due to disclosure was used, which was then adjusted to account for buildings and industrial energy policy overlaps. The size of the energy savings are a source of uncertainty and sensitivity analysis has been conducted to test the scenarios under which the policy would represent a net cost.

scenario. More detail on the sensitivity tests undertaken to account for uncertainty is expanded upon below[37].

54. Energy savings of between 12.0 and 52.0 TWh could be achieved across building and industrial processes between 2023 and 2037. There may also be additional transport savings. This could also save between 0.5 and 1.9 MtCO2e of non-traded emissions over Carbon Budget 5. Likewise, between 0.5 and 1.9 MtCO2e of non-traded emissions could be saved over Carbon Budget 6.

Table 4: Table of Energy and Emissions Savings

Summary of Energy and Emissions Savings	Range of potential savings - Low to High NPV scenario, central in brackets
Carbon budget 5 (2028-2032)	
Traded emissions (MtCO2e)	0.2 - 1.0 (0.5)
Non-traded emissions (MtCO2e)	0.5 - 2.0 (1.1)
Total emissions saved (MtCO2e)	0.7 - 3.0 (1.6)
Carbon budget 6 (2033-2037)	
Traded emissions (MtCO2e)	0.0 - 0.2 (0.1)
Non-traded emissions (MtCO2e)	0.5 - 2.0 (1.1)
Total emissions saved (MtCO2e)	0.5 - 2.2 (1.2)
Energy saved (2023-2037) - TWh	12 – 52 (28)

6.3 Sensitivity Analysis

55. To capture the uncertainty around the impact of disclosure on delivering energy savings, sensitivity analysis has been undertaken. By adjusting the potential savings that could occur from the intervention, the sensitivity analysis undertaken provides a suitable means of accounting for optimism bias around the impact of disclosure or the additional impact that the interventions could have despite the overlaps with other policies. The preferred option in the Impact Assessment was tested against a range of optimistic, central, and pessimistic assumptions.

The core variables tested include but are not limited to:

- The potential annual energy savings that a disclosure policy could deliver.
- The extent of policy overlaps with other schemes targeting large businesses energy consumption, such as the potential Performance-Based Framework

[37] More information on the overlaps and the analytical approach followed is outlined in Annex 3 and Annex 5.

(now called the Operational Energy Ratings System), the Private Rented Sector regulations and potential Point of Purchase regulations.

- The percentage increase on existing costs of complying with a Net Zero audit and the costs passed on from auditors in completing a Net Zero audit.

- The value of future carbon and fossil fuel prices.

- Capital costs[38] have not been adjusted in the sensitivity analysis. This is traditionally incorporated into sensitivity analysis to capture the uncertainty around the costs of installing energy efficiency measures. However, since undertaking any efficiency upgrades following an ESOS audit is entirely voluntary, the emphasis in this Impact Assessment has been placed on the likelihood of policy leading to a response. This is best captured by the range of assumptions applied to the size of disclosure savings as well as the scale of policy overlaps. The results from the sensitivity analysis are outlined in table 5. This shows the range of outcomes which could occur which affect the overall impact of the proposed package of measures.

Table 5: breakdown of costs and benefits under the sensitivity tests outlined in Annex 2[39].

NPV scenario

Costs and benefits - present value, £m, 2020	**High**	**Central**	**Low**
Description			
Costs (A)			
Capital and installation costs	1,140	710	340
Hassle costs	220	140	70
Operational costs	40	20	10
Familiarisation and compliance with disclosure	20	20	20
Familiarisation and compliance with Net Zero audits	50	140	270
Scheme Administration Costs	10	10	10
Accreditation costs	5	5	5
Total costs (A)	1,500	1,050	720
Benefits (B)	-	-	-

[38] Capital and installation costs have been calculated by applying a £m/TWh estimate to the energy savings. This is described in further detail in Annex 5.

[39] NPV figures in Table 5 are rounded to the nearest £10m, therefore NPV totals may not sum up from individual components.

Value of energy savings	2,700	1,120	290
Value of air quality improvements	390	230	110
Value of greenhouse gas emissions avoided	2,840	1,050	230
Total benefits (B)	5,930	2,410	630
Net Present Value (B - A)	4,430	1,360	-90
Benefit Cost Ratio (B/A)	4.0	2.3	0.9

56. Under the high NPV scenario, which reflects a 'best case'; policy overlaps are lowest and disclosure savings are estimated to be 6% per year, before any adjustments are made. This scenario also applies optimistic assumptions around the additional cost of completing a Net Zero audit, implying that this aspect of the policy changes would not be overly complex to either the firms complying with the scheme, or the auditors carrying out the audits.

57. The combined effect of limiting the policy overlaps and applying optimistic assumptions around the impact of disclosure and the cost of Net Zero audits, is to deliver a Net Present Value of £4.4bn. Under both the high scenario and the central scenario, where policy overlaps are more pessimistic, the preferred option delivers a net social benefit, reflected by the positive NPV in these scenarios. In the central NPV scenario, the proposed option delivers an NPV of approximately £1.36bn over the appraisal. The largest driver of benefits in these sensitivities comes from the value of energy savings, which use the high and central Long-Run Variable Cost price series, in the respective cases.

58. The scale and value of emissions savings in the high scenario, which contributes around 48% to the gross benefits that could be achieved are driven by both the larger energy savings obtainable in this scenario, as well as applying the high carbon price series.

59. In the low NPV scenario, the core assumptions have been adjusted to highlight a 'worst case' scenario. This reflects large policy overlaps, which eat into the potential consumption where ESOS can deliver energy savings. An example of this is the potential performance-based energy rating scheme which in this scenario covers all large private offices (those greater than 1000sqm) from 2023, and all large buildings from 2025[40]. This could result in around 70% of the in-scope consumption of non-domestic buildings falling into scope of the performance-based energy rating framework, where it is expected little impact

[40] The current plans outlined for the Operational Energy Ratings System involve the scheme being extended to all private large offices (>1000sqm) from 2023. However, to provide a sense of an illustrative 'worst case' scenario for the policy options, this scheme was extended to 2025. This results in around 20% of the in-scope consumption being covered by the performance-based energy rating framework between 2023-2024, rising to 70% from 2025. This mutes the potential for future savings in buildings where the performance-based energy rating and ESOS overlap.

from ESOS could occur. Under this scenario, the scale of the compliance costs, combined with the muted impact of disclosure on delivering additional benefits, leads to a negative NPV of around £90m[41].

6.4 Qualitative Impacts not accounted for in the Cost-Benefit Analysis

60. As outlined in Table 2, there exist a range of unquantified impacts which could be delivered due to the proposed options. Major impacts include, but are not limited to[42]:

- **Impacts on transport fleets:** the original ESOS impact assessment estimated that the current ESOS policy could deliver between a 1% and 2% reduction in fuel use. The policy landscape has evolved since the original regulations were implemented with tougher regulations coming into force from 2020, including average emissions standards that vehicle manufacturers must produce to. Given the presence of more onerous regulations, the additionality from a future ESOS scheme in this area is estimated to be small and is unquantified. It is possible that ESOS recommendations could lead to improved driver training and moves to ultra-low emission vehicles, which would reduce fuel use and for businesses to look at other ways to reduce the emissions from their workforce (and subsequent emissions savings). However, the evidence on this is unclear, and so has not been quantified.

- **The rebound effect:** bill savings due to energy efficiency improvements may be spent on other energy-using goods and services. This reduces the estimated overall energy savings resulting from energy efficiency policies.

- **Comfort improvements**: for occupants of buildings owned or rented by large businesses. If the policy proposals deliver improvements to energy efficiency, such as the installation of double glazing, this can yield improvements to occupants in the form of comfort. Moreover, low temperatures pose health

[41] More detail on the performance-based energy rating and how it is incorporated into the Cost Benefit analysis is discussed in the Annexes.

[42] Discussion of the qualitative benefits of energy efficiency and public disclosure is also outlined in the Domestic Private Rented Sector Regulations Impact Assessment as well as the Streamlined Energy and Carbon Reporting Framework Impact Assessment. Both can be found here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760313/IA_-_Energy_Efficiency__Private_Rented_Property___England.pdf and https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/725912/SECR_and_CRC_Final_IA__1_.pdf

risks. Improvements to energy efficiency can therefore reduce the risk of illnesses posed by working in low temperature environments.

- **Improved productivity:** increased demand for energy efficiency measures is likely to support productivity growth and jobs within the green construction industry and the wider supply chain. Greater competition within these markets may also spur innovation, lower the end costs of installing measures, and help sustain jobs. There could be benefits in the wider macro-economy associated with some of the bill savings experienced by businesses being spent on other goods and services. Energy efficiency also reduces business costs, meaning they can deliver more for less.

- **Security of supply:** reducing energy demand through energy efficiency also improves security of supply. It reduces the UK's exposure to volatile international energy markets and means less energy infrastructure is required, lowering the overall costs of the energy system.

- **Benefits from disclosure - publishing ESOS reports online:** improving publicly available information on energy efficiency opportunities, by publishing audit data could: (i) attract entrepreneurs and innovators to enter the market for energy efficiency, helping to overcome the 'embryonic markets' barrier; (ii) improve the evidence base available for policy development.

    - This could also result in **raised compliance with wider energy efficiency policies**. For example, for policies such as PRS and planned PoP regulations, Government could collect information on the tenure and EPC rating of the audited building, which could allow Local Authorities to improve targeting of their monitoring and enforcement activities. This could in turn raise compliance rates of landlords and owner-occupiers and increase the potential benefits of these EPC-based policies.

    - Publishing ESOS reports online could also provide detailed insight into the energy efficiency recommendations that companies in scope receive as part of their audits. This can serve as a first step to gauging the impact on businesses and society of potential longer-term ESOS options, such as mandating recommendations.

- **Opportunity cost of capital:** businesses could potentially incur an opportunity cost on capital allocated towards adoption of energy efficiency measures. The opportunity cost would be equivalent to the return businesses could have earned by allocating capital to alternative uses (e.g., investing elsewhere). This cost is an indirect impact of the policy package, however, since businesses are still ultimately responsible for deciding whether and which measures to adopt.

6.5 Distributional impacts

61. The size of the costs of complying with the regulation as well as the benefits of lower energy costs is likely to vary across the organisations in scope. The costs of undertaking a Net Zero audit for example, will depend on an individual organisation's size and complexity of operations. Firms with more complex or more diverse sites would likely face higher assessment costs due to the greater time required by ESOS assessors to undertake audits. The costs of complying with disclosing could be greater for firms that do not already have requisite IT and operational systems in place to deliver this.

62. Similarly, the benefits from energy savings depends on the number of ESOS recommendations implemented. Some enterprises may undertake an assessment, disclose their consumption and recommendations, but not undertake any energy efficiency improvements. The benefits of reduced energy consumption and corresponding bill savings will be lower for those firms that undertake very little action following disclosure relative to those that implement recommendations fully.

63. Whilst we have factored in the increased costs of auditing more complex sites, such as factories where industrial processes are located, we currently lack the requisite granularity of data to undertake distributional analysis across the firms in scope of ESOS.

7. Business Impacts

7.1 Equivalent Annual Net Direct Cost to Business

64. The regulatory changes to ESOS will incur additional costs to participating businesses. The extent of these costs ranges from a scenario in which there is a low uptake of measures (implying a low impact from disclosing energy consumption and recommendations) to one in which uptake is high. However, at a minimum, large businesses in scope of ESOS would face the additional administrative costs associated with familiarising with regulatory changes, publicly disclosing information in ESOS audits, and undertaking a Net Zero ESOS assessment. The scale of these additional costs incurred from undertaking a Net Zero audit ranges from a total of approximately £50m to £240m in Present Value terms. This is likely to be the greatest driver of additional compliance costs, owed to the added complexity of undertaking a Net Zero audit.

65. The private benefits of the policy proposals are the bill savings that result from consuming less energy. Through giving greater clarity on ESOS recommendations, improved audit quality could also lead to reduced energy consumption and therefore overall social benefits. However, this is a second-order benefit since there is no mandated requirement for ESOS participants to undertake energy efficiency measures. Therefore, we have not included the benefits from energy and bill savings in the EANDCB calculations.

66. The direct costs in scope are the costs of complying with disclosure and undertaking a Net Zero audit. These are direct costs levied onto firms in scope of ESOS and this is mandatory. Capital, hassle, and operational costs that result from undertaking energy efficiency improvements are second round costs (indirect) and are therefore not included in the EANDCB estimates.

67. The main assumptions and evidence sources used for each cost are set out in Annex 3. Using Departmental Guidance on calculating the Equivalent Annual Net Direct Costs to Business (EANDCB) and on calculating Business NPV of the short-listed policy options, the impact to businesses is outlined in the table below. Also included is an estimate of the additional annual compliance costs incurred by businesses. The EANDCB and Business NPVs have been calculated using the central NPV scenario assumptions, applied to all short-listed options.

Table 6: EANDCB and Business Net Present value[43]

Business impact table **All values in £2020 prices, discounted from 2022**	
	Regulatory changes
EANDCB (£m)	12
Business NPV (£m)	830
Score against BIT target (£m)	60
Estimated annual admin cost per business (£)[44]	880

68. The EANDCB is positive, reflecting a net direct cost to business of approximately £12m. However, this is because the bill savings, which are captured by businesses, have not been included in the calculation. Overall, the regulatory changes have a positive private NPV, since the costs incurred by

[43] Business NPV calculated as the sum of all private benefits (bill savings) from the policy option minus the private costs incurred. All values have been calculated using BEIS Impact Assessment guidance and HMT Green Book appraisal guidance. EANDCB and score against the BIT target has been calculated using the BEIS BIT calculator, available here: https://www.gov.uk/government/publications/impact-assessment-calculator--3.Figures in the table are rounded to the nearest 10.

[44] Estimated annual admin cost per business was calculated as the sum of all administrative and compliance costs relevant to the policy option. Option 1 involved has the largest admin burden as this requires both Net Zero audits and public disclosure. Admin burdens were discounted and divided by the number of firms in scope of the policy (11,900). This was then divided by the years the policy has been appraised over (15) to produce annual admin costs per business.

complying with the policy and undertaking measures in response to disclosure are offset by the bill savings delivered. The positive business NPV could rise further once the evidence base on the potential energy and carbon savings from the Net Zero aspect of the ESOS audit develops.

7.2 Small and Micro Business Assessment (SAMBA)

7.2.1 Small and Micro Businesses in scope of ESOS

69. ESOS applies to large businesses and their corporate groups, meaning Small and Micro Businesses (SMBs) are only in scope if they are part of a corporate group within a large undertaking or if they are part of a group which includes a large undertaking[45]. Previous efforts at identifying the number of SMBs in scope of ESOS, or the extent to which they undertake compliance activities have not yielded many robust results. The ESOS evaluation exercise produced limited information on how ESOS has affected SMBs included within the scheme, due to difficulties identifying the relevant subsidiaries from group-level reports.

70. Since the consultation IA was published, we have tried to explore the question on the number of SMBs within the scope of ESOS in detail. A series of different datasets were examined, such as the Interdepartmental Business Register (IDBR) as well as Fame[46], an online tool provided by Moody's Analytics.

71. The IDBR allows one to capture the number of enterprises that number of enterprises in an enterprise group, the enterprise at the apex of the group and details such as the turnover and employment in each enterprise in the enterprise group. However, an issue presented is that the IDBR enterprise groups is that they are based on ONS criteria for grouping enterprises together, which does not align to the definition of companies in scope of ESOS.

72. Fame enables the user to combine different company definition metrics and returns information on the companies in scope. Using Companies Act definitions on Small and Micro businesses, we have estimated that there were around 50,000 businesses that had met the criteria on employment (less than 50 employees) [47] and turnover (less than £10.2m in annual turnover in the

[45] For guidance on eligibility – see section 1 here: https://www.gov.uk/government/publications/comply-with-the-energy-savings-opportunity-scheme-esos/complying-with-the-energy-savings-opportunity-scheme-esos#what-esos-is-and-who-it-applies-to.

[46] The Fame database can be found here: https://www.bvdinfo.com/en-gb/our-products/data/national/fame. BEIS has a license to access this information.

[47] Specific criteria searched for in Fame include all active companies that were part of a corporate group with an ultimate owner that had less than 50 employees and reported less than £10.2m in annual turnover in the most recent reporting year.

most recent reporting year). However, the Fame database only includes VAT registered businesses, which means the total number of small and micro businesses reported is around half of those reported in the BEIS Business Population Estimates (~2.8m in Fame vs ~5.5m)[48].

73. Compliance data published by the Environment Agency (EA) supports the view that there are a number of SMBs that fall within scope of ESOS due to the requirement to report under the corporate group[49]. However, whilst the evidence from the EA indicates that the true number of compliant organisations could be larger than the 11,900 large firms estimated in scope of ESOS, this information does not disaggregate by the metrics needed to identify SMBs from the overall number of reporting organisations.

7.2.2 Extent of costs incurred by SMBs

74. As outlined above, whilst there may be some SMBs in scope of the regulations, the evidence in the PIR and Evaluation did not shed light on the extent to which SMBs actually incur any compliance costs as a result of this. The section below describes how an SMB could be in scope of ESOS. To try and answer the question on how many SMBs this affects in practice, we engaged the Environment Agency (EA), the Scheme Administrator.

75. When an SMB falls in scope of ESOS because it is part of a corporate group containing a large undertaking, it will be required to take part in an ESOS assessment[50]. The 'responsible undertaking' which by default is the highest UK parent, completes the ESOS assessment and notifies compliance to the scheme administrator for itself and subsidiary undertakings[51]. The highest parent could be an SMB (which might happen, for example, where the parent organisation is a head office for a corporate group). However, EA guidance notes that 'another undertaking within the highest parent group can be chosen to act as the responsible undertaking provided all undertakings in the highest parent group have agreed in writing'. Therefore, another undertaking within the group, other than an SMB as the highest UK parent, could manage compliance on behalf of the wider group.

[48] Business Population Estimates, Table 1. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1019904/BPE__2021_detailed_tables.xlsx.

[49] ESOS compliance data can be found here - https://data.gov.uk/dataset/15eb8228-32e4-40e1-b722-b2efe571edd3/energy-savings-opportunity-scheme.

[50] The IA has outlined what is involved in the ESOS compliance process, but more information can be found here: https://www.gov.uk/government/publications/comply-with-the-energy-savings-opportunity-scheme-esos/complying-with-the-energy-savings-opportunity-scheme-esos.

[51] Guidance can be found at point 1.7 here: https://www.gov.uk/government/publications/comply-with-the-energy-savings-opportunity-scheme-esos/complying-with-the-energy-savings-opportunity-scheme-esos.

76. The EA has confirmed the finding from its compliance checks that of the organisations providing ESOS compliance notifications in the most recent Phase of ESOS (Dec 2015 – Dec 2019), none have so far been SMBs[52]. This offers evidence to indicate that SMBs are not typically the parties that actually undertake compliance activities, nor are they likely to be the party that discloses the results of the ESOS audit in the future. Nonetheless, no evidence is available to confirm how the costs of assessments (including paying for lead assessors) are approached in practice. These are funded at the discretion of the group and could be borne by the responsible undertaking or split by agreement across the group.

77. Whilst we cannot definitively rule out SMBs undertaking compliance in the future, the de-minimis threshold potentially protects SMBs from being required to comply with the regulations. The de-minimis threshold for ESOS currently excludes up to 10% of total energy consumption from the ESOS audit (which will be reduced to 5% as part of the changes to ESOS), which can be applied at the group basis – for example by excluding one or more undertakings. Engagement with the EA indicates that on this basis SMBs are often excluded from group-level ESOS compliance, since they consume relatively little energy compared to the wider group. The savings offered by the measures recommended in an ESOS audit will likely be largest if implemented at the level of the large organisation. Due to the fact that large businesses often consume much more energy than SMBs, the potential payback periods of measures are on average likely to be shorter, and therefore the net bill savings higher, than if implemented at the SMB level[53]. If the group is fully covered by ISO 50001 this may also mean the SMB does not require an additional assessment.

78. The PIR published in 2020[54] and ESOS evaluation exercise produced limited information on how ESOS has affected SMBs included within the scheme, due to difficulties identifying the relevant subsidiaries from group-level reports. However, we received no consultation feedback indicating evidence of burdens on SMBs as a result of ESOS reporting organisations. Given this, whilst we cannot definitively rule out the possibility of SMBs incurring compliance costs in the future, the evidence outlined above has not led us to change the view that ESOS compliance is generally not currently administered by SMBs within a corporate group.

[52] As of 7 April 2022.

[53] Data from table 12 in ND NEED 2021. Available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1007426/nd-need-2021-data-tables.xlsx. Large and Very Large businesses consumed 72TWh of gas and electricity in 2019, compared to 53TWh for small and micro businesses. England and Wales only.

[54] ESOS Post-Implementation Review - https://www.legislation.gov.uk/uksi/2014/1643/pdfs/uksiod_20141643_en.pdf.

8. Risks, uncertainties, and unintended consequences

79. The impacts of the proposed changes to the ESOS regulations are uncertain due to a range of factors. The quantitative assessment of these impacts is outlined in section 6, which covers the sensitivity tests that have been undertaken within this Impact Assessment. This section also includes discussion of the ways in which we plan to mitigate against risks and unintended consequences.

8.1 Impact of disclosure

80. As outlined in the sensitivity analysis (section 6.3), the impact of disclosure on delivering energy savings has been modelled under different scenarios. This incorporates a range of possibilities governing the percentage reduction in energy use that disclosure can deliver. The evidence on this has been compiled using estimates from other current policy measures that depend on behavioural change from disclosure to deliver energy savings. However, there could be a substantive number of large businesses for whom energy costs represent a small proportion of their overall overheads and so opt not to undertake any further action following disclosure. At an aggregated level, this would diminish the quantified benefits of the policy options and reduce the related NPV.

8.2 Net Zero audit costs

81. Assumptions around the cost of Net Zero audits are an additional uncertainty. At this point it has not been finalised how this element of the proposed changes will be delivered. The Net Zero audit could be an entirely additional ESOS audit, in which case the assumptions around the additional costs would be in the pessimistic range (representing 25-50% of an existing ESOS audit). However, if this materialised as a lighter-touch assessment, the more optimistic assumptions around compliance costs would be more accurate (where a Net Zero element costs 10% of an existing ESOS audit). Ultimately, the costs of the Net Zero audit element will be determined by the policy's requirements. We intend to continue using stakeholder feedback to inform the final policy design and to consider ways in which the costs to businesses can be minimised for mandatory introduction in Phase 4.

8.3 Compliance risks

82. One risk that has not been integrated into the modelling, concerns the rate of compliance. Current and historic estimates suggest compliance with the

current ESOS policy is high[55] with over 95% of ultimate parent groups notifying the Scheme administrator of their compliance in 2019. However, compliance with the current ESOS scheme involves conducting an ESOS audit or having an equivalent energy assessment undertaken. There is no requirement to undertake a more comprehensive Net Zero-type assessment, nor an obligation to disclose the information gathered as part of the ESOS audit. There is, therefore, a risk that placing substantial additional costs on large businesses could deter their compliance with the scheme. Concurrently, this would reduce the potential benefits of the policy proposals.

83. To mitigate the risks of lower compliance, policy development that has not yet been finalised, such as net zero assessments, will use a consultative process of external standards development to an appropriate design of the Net Zero element to ESOS. This would incorporate stakeholder feedback to ensure that benefits of this policy outweigh the costs of compliance.

8.4 Delivery risks

84. The benefits from the proposed policy improvements are dependent on the impact of disclosure. Therefore, a major risk concerns how public disclosure is designed and implemented. To mitigate this, the policy delivery model would need be designed in a way that maximised the reputational impact on firms, so that disclosure incentivises greater action on ESOS recommendations[56] and realise potential/expected energy savings.

9. Monitoring and Evaluation

85. An evaluation of the first phase of ESOS was conducted between 2015 and 2017, with later research on energy audits and reporting (including ESOS) published in 2020[57]. Given the wealth of evaluation evidence available from the previous scheme and from other similar policy interventions, it would not be proportionate to conduct a counterfactual impact or economic evaluation as the benefits and costs are not expected to have changed significantly to warrant repeating previous work. The intention instead is to utilise scheme management data as far as possible to monitor both the existing aims and new aspects of ESOS and then where required collect further data from relevant stakeholders.

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[55] Review of the Energy Savings Opportunity Scheme Regulations 2014. Post Implementation Review BEIS, 2020. Available here: https://www.legislation.gov.uk/uksi/2014/1643/pdfs/uksiod_20141643_en.pdf

[56] More evidence on the relationship between energy efficiency and disclosure schemes can be found here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/323114/ESOS_-_Research_on_Impact_of_Reporting_Energy_Use_FINAL_.pdf. This study investigates some of the ways in which disclosure can be an effective tool in raising corporate board interest in energy efficiency, which is identified as a key barrier to businesses energy efficiency improvements. One of the major findings was that a small amount of high-quality information, which can be accessed easily and presented in a comparable format is more likely to have an impact on raising energy efficiency action than dissemination of large quantities of raw data.

[57] Energy Savings Opportunity Scheme (ESOS): evaluation of the scheme: https://www.gov.uk/government/publications/energy-savings-opportunity-scheme-esos-evaluation-of-the-scheme#history

86. Monitoring of the scheme is already in place with the scheme administrator[58]. All firms in scope will undertake the proposed policy recommendations by the Phase 3 compliance deadline (5 December 2023) and begin undertaking additional action from this point. Therefore, management data will be monitored from the point of this deadline to understand the rate of compliance with the new requirements. The monitoring data available from the previous scheme, which can therefore be expected as standard for this scheme, provides a range of key details on obligated organisations, including:

- Business details, including sector, addresses, and parent company details;
- Notification details, including status, number of UK organisations and date of compliance;
- Assessor details;
- Percentage of total energy consumption (that is in scope of ESOS);
- Information around the data used for ESOS energy audits/evidence pack;
- Confirmation that ESOS recommendations were reviewed by the board director (or individual with management control) and whether discussed by board of directors / senior management;
- Energy efficiency targets and/or benchmarks data where available;
- Public disclosure compliance flag;
- Companies House Registration Number (potential for data matching).

It is expected that the available monitoring measures will be expanded to include further key measures through both the planned standardisation of the reports and negotiation with the Environment Agency as the scheme administrator.

87. The high-level research questions of interest for the M&E of this scheme are outlined in the table below.

High-level research question		**Relevant monitoring data**	**Further data collection and analysis that will be carried out**
1. What are the observable outcomes of the scheme?	Energy efficiency	- Percentage of total energy consumption (that is in scope of ESOS) - Obligated organisations' energy efficiency targets and/or benchmarks data when available	- Matching scheme data to NDNEED data to monitor energy use over time - Further data collection with a

[58] Energy Savings Opportunity Scheme data can be found here: https://data.gov.uk/dataset/15eb8228-32e4-40e1-b722-b2efe571edd3/energy-savings-opportunity-scheme

		- Energy consumption data (TBC)	sample of obligated organisations to gain insight around whether they are implementing energy efficiency measures, and the role of ESOS in the decision-making process
	Board level engagement	- Confirmation that ESOS recommendations were reviewed by the board director (or individual with management control) and whether discussed by board of directors / senior management	- Further data collection with a sample of obligated organisations to explore board level discussions around the ESOS audits/recommendations and to understand if any action has been taken
2. How are organisations engaging with the new mandatory public disclosure element and how has it influenced on the outcomes of the scheme?		- Public disclosure compliance flag (measure of whether obligated organisations are complying with the mandatory public disclosure element) - Confirmation that ESOS recommendations were reviewed by the board director (or individual with management control) and whether discussed by board of directors / senior management - Obligated organisations' energy efficiency targets and/or benchmarks data where available	- Comparative evidence from previous ESOS evaluation (i.e. previous compliance evidence) - Further data collection with a sample of obligated organisations to understand how they are engaging with mandatory public disclosure, and how it has influenced decisions and behaviours around energy efficiency
3. How has the newly implemented standardisation of ESOS		- Information around the data used for ESOS	- Review of scheme/audit materials

reports affected the quality of audits and recommendations?	energy audits/evidence pack - Obligated organisations' energy efficiency targets and/or benchmarks data where available - ESOS audit recommendations (TBC)	- Further data collection with a sample of ESOS assessors to understand their perceptions and experiences around standardisation and how it has affected the quality of audits and recommendations - Further data collection with a sample of obligated organisations to collect insights around the quality of insights and recommendations and how this affected their engagement
4. How has the newly added Net Zero focus influenced the recommendations provided by the scheme?	- Information around the data used for ESOS energy audits/evidence pack - Obligated organisations' energy efficiency targets and/or benchmarks data where available - ESOS audit recommendations (TBC)	- Review of scheme/audit materials - Further data collection with a sample of ESOS assessors to understand the role of the Net Zero focus in shaping recommendations - Further data collection with sample of obligated organisations to understand how Net Zero element has shaped their recommendations and whether it

		influenced their decisions and behaviours

88. As above, the approach to M&E will consist of analysing the monitoring data and conducting further data collection and analysis to understand the role of the new aspects of ESOS in influencing obligated organisations' behaviour and energy efficiency actions, as well as their insights and perceptions. Through collecting data from organisations and assessors, we will also gain an understanding around the role of some of those new aspects in shaping the quality of ESOS audits and recommendations, and subsequently, whether these influence obligated organisations' engagement and decisions.

89. A theory of change can be found in Annex 6 which outlines the policy's outputs, outcomes and impacts as well as the underlying assumptions

10. Public Sector Equality Duty

90. The changes proposed to the scheme are unlikely to have differential impacts on individuals or groups with protected characteristics, as the proposals appear to solely affect participating businesses and should not extend to individuals.

91. The policy relates to the production of energy audits that provide high-quality energy efficiency recommendations for participating businesses. We have no reason to believe that the proposed improvements would be applied unequally across any protected characteristic[59]. ESOS audits are carried out by a specific section of the UK business population and are unlikely to have an impact on individuals with protected characteristics.

92. The proposed creation of a digital solution to allow participating businesses to disclose their audit recommendations should provide improved facilities for those with protected characteristics, such as people with disabilities, as the development process ensures that the digital solution will meet Government Digital Service guidelines for accessibility.

[59] More detail on protected characteristics can be found here: https://www.gov.uk/discrimination-your-rights.

Annex 1: Analytical changes made since the Consultation IA was published

List of modelling changes

93. **Updated IAG Supplementary Guidance**: includes new electricity and non-electric fuel emissions factors, as well as new retail and Long-Run Variable Costs price series for electric and non-electric fuels and new Air Quality Damage Costs. The collective impact of these changes is small, reducing the NPV by around £100m. The main driver of the reduced NPV comes from lower electricity LRVCs, due to higher renewables deployment.

94. **Revised Carbon Values**: following conclusion of the review into Carbon Values, Government has published a new set of appraisal values. The new values are significantly larger than previous prices, which reflects the higher climate ambitions since the Paris Agreement. The new values are consistent with the UK's domestic (Net Zero) and international (Paris 1.5C) commitments. Incorporating the new price series significantly raises the monetised benefits of carbon abatement, which is expressed in the roughly £1bn rise in the overall NPV package of policy measures considered compared to the NPV estimated in the consultation IA.

95. **Revisions to Net Zero audit costs**: since the conclusion of the consultation, BEIS has examined the Net Zero element of the proposed changes to the Scheme in more detail. We anticipate that much of the Net Zero assessment requirements can be integrated into the main energy audit requirements, which will limit any additional costs. This has been factored into the modelling, reducing the costs of compliance with the policy. The previous modelling was largely indicative, based on the assumption that the Net Zero audit element would carry costs at a similar order of magnitude to an existing ESOS audit.

96. **Timing of Net Zero audits**: the consultation IA modelled the Net Zero audit as achieving full compliance from 2023, as this was then consistent with the proposals. We have therefore updated the profile of the costs to reflect uncertainty on the final Net Zero approach , which, due to the greater discounting of future values, reduces their magnitude in the NPV of the policy.

97. **Revisions to policy overlaps**: since the publication of the ESOS consultation IA, a separate consultation into extending Minimum Energy Efficiency Standards to all owner-occupied private buildings has been launched. The preferred option in the proposals' IA would require building owners to undertake energy efficiency and heating improvements to achieve a minimum EPC B at the point of purchase (PoP), with the regulations taking effect from 2025. The consultation also includes a 'backstop' where all commercial and

industrial properties will require to make those building improvements by a specified date, with the proposed preference of 2035. The addition of this policy reduces the amount of untapped energy efficiency potential for ESOS to target. Correspondingly, this reduces the net impact of disclosure on buildings energy consumption and so reduces both the benefits of the policy, as well the overall NPV.

98. **Revisions to disclosure costs:** At the consultation stage it was assumed that disclosure costs would be incurred annually, the policy is now clear that it will be on a 4-year cycle, and the costs in the modelling have been updated accordingly, which improves the NPV.

99. **Revisions to buildings consumption estimates**: in the consultation IA the Non-Domestic Buildings Model (NDBM) was used to estimate the costs of attaining the projected energy savings delivered by the ESOS policy amendments. The NDBM undergoes regular updates to ensure that it reflects the latest evidence. Correspondingly, this affects the model outputs and the costs and benefit estimates of achieving a certain buildings decarbonisation target. The approach to defining the level of energy consumption in scope has been refined. This has resulted in a more accurate, but reduced, level of consumption being in scope, reducing the NPV.

100. **Updated large business industrial energy consumption**. In the consultation IA we used ND NEED data from 2018 to estimate the proportion of industrial electricity and gas consumption that was consumed by large and very large businesses. This has been updated as part of ND NEED 2021 , reflecting the latest estimates, which are for 2019 . The latest figures from ND NEED show that electricity consumption fell around 2 percentage points between 2018 and 2019, whilst gas consumption was largely flat overall. Incorporating this update to the modelling reduces the industrial consumption in scope of the policy, which reduces the total energy and carbon savings possible. This reduces the estimated NPV by around £10m (from £1.4bn to £1.3bn).

Annex 2: Policy Options and Alternatives to Regulation

The below list presents narrative on the options considered for the Impact Assessment. The preferred option is option I within which several sub-options have been analysed.

A. Do nothing – retain the existing approach.
B. Scrap ESOS – remove the current scheme and do not replace.
C. Amend ESOS – standardise and strengthen audit requirements.
D. Amend ESOS regulations so that audits focus on business readiness for Net Zero.
E. Mandated public disclosure of energy consumption and energy efficiency recommendations.
F. Fiscal alternatives to amending ESOS.
G. Mandate measures within a certain payback period.
H. Extend ESOS to medium enterprises.
I. Amend ESOS – strengthen current Scheme through the measures outlined in Annex 2. ***Preferred*** option.

All options were considered in the consultation stage IA Annexes, and from the long-list, only options G, H and I have been considered in detail in this Impact Assessment[60].

Long List Options Appraisal

Multi-criteria analysis (MCA) of long list options.

101. Before refining the options considered in the short-list, and therefore appraised, the long list of options was analysed through MCA. The scoring criteria used in the MCA were a combination of Green Book critical success factors and project specific objectives, such as improving clarity from ESOS audits to compliant parties[61]. Critical success factors included: the likelihood of supply side capability of achieving the option, as well as the value for money of the proposals.

102. Options were given a 0-2 rating against the stated objective, in ascending order of how well the option was estimated to achieve that objective. The analysis comprised 8 distinct objectives, with a total attainable score of 16. Options were then ranked by total scores achieved, and the top three options

[60] For quantified analysis of the short-listed options, this can be found in the consultation stage IA: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/999457/energy-savings-opportunity-scheme-impact-assessment.pdf.

[61] Business Case Guidance for Projects, HM Treasury and Government Finance Function, 2020. https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent

were short-listed. Table 1, below, outlines the approach to the discounting or short-listing of the long-listed options.

103. More information on the long-listed options as well as a qualitative assessment of the potential costs, benefits, risks and how well they achieve the aims of the overall intervention can be found in Annex 5 and 6. Annex 5 looks at the potential impacts of the two non-core options which were proposed in the consultation: extending ESOS to Medium Enterprises and Mandating ESOS recommendations.

104. Option I is the preferred option, and is discussed in further detail, below.

Table 7: Long-list options appraisal table

Options	Option A	Option B	Option C	Option D	Option E	Option F	Option G	Option H	Option I
Option description	**Do nothing**	**Scrap ESOS**	**Amend - standardise and strengthen audit requirements**	**Amend - changes audit focus to ensure business readiness for Net Zero**	**Mandate public disclosure**	**Fiscal alternatives to amending ESOS**	**Mandate measures within a certain payback period**	**Extend ESOS to medium enterprises**	**Amend - strengthen Scheme through the measures outlined in Annex 2**
Key policy intervention aims:									
Improved clarity around the content of an ESOS audit	0	0	2	1	0	0	0	0	2
Increase pressure on firms to adopt ESOS audit recommendations	0	0	0	1	2	0	2	0	2
Provide greater information around the steps firms need to take to ensure their means of consuming energy are consistent with Net Zero.	0	0	0	2	0	0	0	0	2
Green Book Critical Success Factors									
Strategic fit	0	1	1	2	1	2	0	1	2
Potential Value for Money	0	1	1	1	2	1	0	1	2
Potential achievability	2	2	2	1	2	1	1	1	1
Supplier capacity and capability	2	2	1	1	2	1	1	1	1
Potential affordability	2	2	2	1	2	1	1	1	1
Total score	6	8	9	10	11	6	5	5	13
Rank	6	5	4	3	2	6	8	8	1
Discounted/shortlisted	Discounted	Discounted	Discounted	Shortlisted	Shortlisted	Discounted	Discounted	Discounted	Shortlisted

Option I: Strengthen ESOS through increased standardisation of audits, public disclosure of ESOS data, and inclusion of a Net Zero element to ESOS audits – *Preferred*.

105. The available evidence on the impact of mandatory disclosure suggests that this could have a significant impact on overcoming information failures and would help alleviate externalities which result in the undervaluing of energy efficiency[62]. The evidence indicates that reporting schemes requiring board-level approval and public disclosure, can help to address misaligned incentives by generating reputational scrutiny and encouraging behavioural change.

106. Increasing demand for energy efficiency measures also attracts profit-seeking entrepreneurs and innovators to enter the market for energy efficiency, which can help to overcome the 'embryonic markets' barrier[63]. The proposed package of policies assessed in the Impact Assessment therefore aims to address the barriers outlined above:

- **Standardisation and strengthening audit requirements** can overcome information failures and improve corporate transparency around energy use and the potential for reductions.

- **Mandatory public disclosure of ESOS audits** could create reputational drivers for participating businesses to act on audit recommendations and improve their performance against their peers and wider social decarbonisation objectives, such as the Net Zero, which could lead to increased value being placed on energy efficiency at firm level.

- **Introducing a Net Zero element to audits** could assist participating businesses to overcome information failures that impede uptake of low carbon measures and assist them to shift their focus towards longer term decarbonisation and investment in low carbon options. This could also alter the current perception of ESOS from a compliance first exercise, to one that seeks to contribute to delivering to the strategic objective of Net Zero.

[62] Evidence Review of the Impact of Central and Public Disclosure Methods for Reporting Energy Use and Energy Efficiency. DECC, 2014. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/323114/ESOS_-_Research_on_Impact_of_Reporting_Energy_Use_FINAL_.pdf.

[63] Whilst not specific to energy efficiency nor low carbon heating options, there is a plentiful body of evidence that has reviewed the relationship between increased demand and technological cost reductions. Relevant examples include the case of solar photovoltaics (PV), the unit cost of which fell by around 99% between 1975 and 2020. More information on this can be found here: https://www.iea.org/data-and-statistics/charts/evolution-of-solar-pv-module-cost-by-data-source-1970-2020 and https://ourworldindata.org/cheap-renewables-growth.

Annex 3: Approach to policy overlaps

107. There are several major policies that incentivise improved energy efficiency in businesses. This annex outlines the existing policy landscape and provides clarity on how this was incorporated into the cost benefit analysis. Discussion of the scale of the policy overlaps is considered in section 6. This is also noted in the long-list options appraisal in Annex 2, where a qualitative assessment of different policy options is made against the 'do nothing' counterfactual.

108. Table 8 notes some of the major policies which have been factored into the quantitative analysis[64]. A further description of how these policies have been implemented into the modelling is below.

[64] This list is not exhaustive: there may be levers which are not considered in this IA that overlap with ESOS. The evidence on this is under development and the major drivers of energy savings in the buildings and industrial sectors have been outlined here. Work is ongoing to improve the understanding of the impact of the proposed changes on the transport sector, but this has not been incorporated into the analysis. The impacts on transport are discussed in the qualitative impacts section (section 6.4). A more comprehensive list of the policies which overlap with ESOS can be found in the original IA, here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/323116/ESOS_Impact_Assessment_FINAL.pdf.

Table 8: outline of major policies targeting energy use reductions that overlap with ESOS.

Policies incentivising energy use reductions	Aspect of ESOS-related consumption targeted	Description
Streamlined Energy and Carbon Reporting (SECR)	Whole business energy consumption for large or quoted UK companies and gas and electricity consumption as well as grey fleet for unquoted companies.	Requires public disclosure of measured energy consumption as well as planned or implemented energy efficiency measures.
Private Rented Sector - Minimum Energy Efficiency Standards (PRS MEES)	Buildings	Requires improvements to building fabric or heating measures to achieve a specific Energy Performance Certificate (EPC) standard.
Operational Energy Ratings for large commercial and industrial buildings	Buildings	Would requires monitoring of actual energy consumption at a building level and energy efficiency improvements to be undertaken for star rating to be raised.
Climate Change Agreements (CCAs)	Industrial Processes	Climate change agreements are voluntary agreements made between UK industry and the Environment Agency to reduce energy use and / or carbon dioxide (CO2) emissions. An operator that has a CCA must measure and report its energy use and carbon emissions against agreed targets over 2-year target periods up to the end of 2022. In return, operators receive a discount on the Climate Change Levy (CCL).

Overlaps with Streamlined Energy and Carbon Reporting (SECR)

109. Using estimates from the Environment Agency, the SECR Impact Assessment determined that roughly 95% of large businesses in scope of SECR also conduct an ESOS audit. Since it requires several of the same disclosure elements that are proposed in this Impact Assessment, it is one of the key

policies to incorporate in the analysis[65]. The 95% overlap occurs despite SECR using a slightly different definition of what constitutes a large business compared to ESOS. The risks of assuming that there is little difference in the definitions used are outlined in the qualitative impacts in section 6.4.

110. The original rationale for introducing ESOS was that businesses did not have the information available to allow them to understand what cost-effective energy efficiency opportunities were available to them and that an ESOS energy assessment would resolve this. Some of these information failures are now also addressed through the new reporting requirements brought in by SECR, which requires companies to report annually on their energy use and carbon emissions, thereby increasing awareness of energy and fuel consumption and cost[66]. ESOS however still has a unique role to play in providing large businesses with cost effective recommendations for energy efficiency improvements and for the majority of businesses in scope of both schemes, ESOS covers wider energy use.

Inclusion in the Cost Benefit Analysis

111. Given the overlaps with the number of businesses which would be required to report under both schemes, we have incorporated the SECR requirements within the cost benefit analysis. The SECR Impact Assessment provided a central estimate of approximately 4% in annual energy savings that could be achieved through requiring large businesses to report on their gas and electricity consumption as well as energy efficiency actions taken[67]. The disclosure requirements under SECR broadly overlap with those in the proposed option. Core differences include reporting on non-electric and non-gas use, such as solid fuels[68] and reporting of recommendations for reducing energy consumption that are provided within an ESOS audit including disclosure of targets for energy reduction and progress against these.

Inclusion in the benefits calculations

112. The centrally estimated energy savings rate of 4% is the starting point for estimating the benefits of the proposed option in this IA. Given the similarities

[65] Streamlined Energy and Carbon Reporting Framework (SECR), Final Impact Assessment, 2018. Total large businesses in scope of ESOS was estimated to be 11,900 in 2018 (based on data provided by the Environment Agency). Of these, around 11,300 were estimated to fall in scope of the SECR framework. Although there are slight differences in the definition of the firms that need to comply with each regulation, for practical purposes it was assumed that the type of firms in scope was the same. This led to an estimated 95% of firms in scope of both policies.

[66] SECR requires UK registered unquoted large companies to report their energy use and emissions relating to gas, electricity and transport and an intensity metric, through their company reports as well as reporting on their energy efficiency actions taken. Given ESOS covers all energy consumption, opportunities for reducing consumption of non-gas or non-electricity fuels, benefits around reducing energy consumption of other fuels could be missed as the reporting requirements do not cover this.

[67] The range of starting point estimates for disclosure energy savings incorporated into the analysis can be observed in table 8 below. More detail on this is provided in Annex 3 and 9 on evidence and data sources used.

[68] Solid fuels such as coal represented around 7% of all business industrial energy consumption in 2019. 2019 Updated Energy and Emissions Projections, BEIS. Annex F. https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019.

in the reporting requirements under the two schemes[69], this savings rate is adjusted for the actions that would occur anyway (for 95% of the firms in scope) and those that are currently out of scope of the SECR requirements. As ESOS is more comprehensive in nature, the analysis in this IA assumes there are additional savings to disclosing the information that is compiled in an ESOS audit, where disclosure has already been undertaken due to overlaps with SECR[70].

113. This yields a revised centrally estimated energy savings rate of approximately 2.1%. The high and low NPV scenarios for the proposed option take a starting point of 6% and 2% in annual energy savings, respectively. This is revised down to 3.2% and 1.1% in the high and low NPV scenarios, respectively[71].

The savings rates can be seen in the table below, pre-, and post-adjustment for SECR overlaps.

Table 9: Annual disclosure savings rate pre and post adjustment for SECR overlaps

	Scenario		
	High NPV	Central NPV	Low NPV
Starting point annual energy savings	6%	4%	2%
Revised annual energy savings (accounting for overlaps)	3.2%	2.1%	1.1%

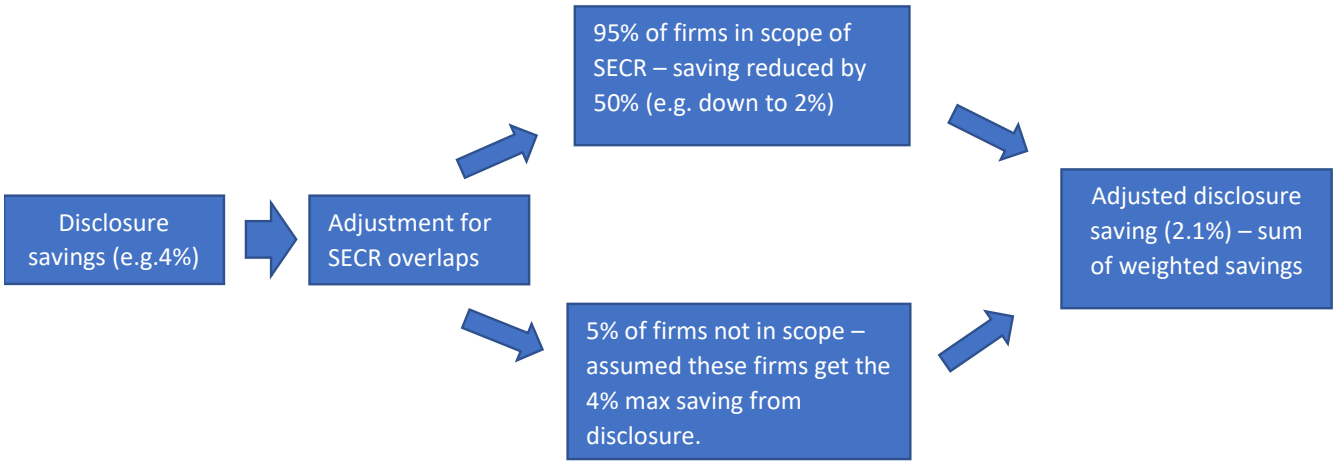
The flow chart in figure 3 provides insight into how the disclosure savings rates were adjusted to account for the SECR policy overlaps. This assumes a 4% energy saving reduction to reflect the adjustments made to the central estimate.

[69] The reporting requirements under SECR and ESOS overlap closely, but since ESOS is more comprehensive in gathering both energy use data and energy efficiency recommendations, there is scope for potential additional savings on top of the savings that occur in the counterfactual.

[70] See footnote above. If the savings rate from ESOS disclosure was 4% in absence of any policy overlaps, the savings are reduced by 50% (down to 2%) for the firms in scope of SECR, which account for 95% of the population. The remaining 5% of firms achieve the full 4% annual energy saving.

[71] The revised savings rates are calculated as the sum of the additional energy savings that parties already in scope of SECR as well as those not already in SECR could achieve. This gives a weighted average energy saving which accounts for the policy overlaps between a future disclosure scheme and SECR.

Figure 3: flow chart demonstrating the adjustments made to the headline disclosure savings rate.



Inclusion in the disclosure costs calculations

114. One of the key components of the additional cost of the proposed option concerns the admin burden of complying with the disclosure requirements. Using the approach outlined in the SECR final Impact Assessment, which used data from the CRC costs of compliance survey[72], it is possible to estimate the potential additional costs of complying with a new disclosure scheme, as proposed in this IA. The additional cost of compliance is revised down to account for the firms already in scope of SECR. This reflects the fact that many of the costs which would need to be incurred to comply with disclosure, have already been incurred by most of the businesses in scope of the regulations. This follows the same approach taken for adjusting disclosure benefits as outlined above.

115. The table below provides a breakdown of the costs of complying with an ESOS disclosure scheme, pre- and post-adjustment for SECR overlaps. The total costs of complying with the disclosure scheme fall from approximately £23m in up-front and recurrent costs, to around £8m.

[72] Assessment of Costs to UK participants of compliance with Phase 2 of the CRC energy efficiency scheme, BEIS, 2017. Available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/651109/Research_-_Assessment_of_costs_to_UK_participants_of_compliance_with_Phase_2_of_the_CRC_Scheme.pdf.

Table 10: costs of complying with disclosure requirements pre- and post-SECR adjustment[73]

Costs all in £m, 2020 values, undiscounted	Costs of complying with ESOS disclosure	Adjusted costs - accounting for firms in SECR
One-off costs	8.0	3.0
Recurrent costs	15.0	5.0

Overlaps with Operational Energy Ratings for large commercial and industrial buildings

116. The Government has consulted on a proposal to introduce a performance-based energy rating for commercial and industrial buildings over 1,000m^2. This scheme seeks to improve awareness of energy use at a building level by requiring the public disclosure of a rating based on metered energy use and carbon performance. This is different to the Energy Performance Certificates (EPC)-based system which looks at the fabric and services of a building and cannot model the behaviour of those who use it[74].

117. The Operational Energy rating would be benchmarked against similar buildings to enable comparison and greater public scrutiny. The scheme has been designed to complement ESOS – the framework would require businesses to get a rating which provides information on how a building is performing, while the organisational level ESOS report can provide recommendations for reducing energy use, which if carried out would have the effect of improving the rating. [75].

118. Since an Operational Energy scheme would involve regular monitoring of energy consumption as well as submitting information publicly, it could act as a potentially powerful incentive to drive reductions in energy consumption[76]. Given the incentive of the performance-based energy rating is improving performance, it is plausible that energy savings from the proposed ESOS option are minimal where the two policies overlap. The annual cycle of receiving and disclosing performance-based

[73] The figures in this table are rounded to the nearest £m.

[74] There are several issues with the use of EPCs for non-domestic buildings that result from the heterogeneity of the building stock. Whilst EPCs may be a reliable indicator of building energy use and energy efficiency potential in the domestic sector, the relationship in the non-domestic space is less clear. For more information on EPCs see the performance-based energy rating Impact Assessment: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/970368/performance-based-policy-framework-office-impact-assessment.pdf.

[75] More information on the design of the scheme can be found here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/970519/performance-based-policy-framework-ci-buildings--strategy-paper.pdf.

[76] A range of evidence was compiled to accurately estimate the impact of energy ratings and disclosure schemes on improving building operational performance. A key source of information is evidence from the NABERS scheme in Australia. For more information on this, see the Impact Assessment linked above.

energy rating arguably provides the sufficient incentive to act to improve building energy efficiency, compared to the disclosure of an ESOS report and its recommendations. Energy savings that are currently achieved through adoption of measures on ESOS reports will already be factored into the counterfactual and are therefore not additional benefits.

119. This also impacts the counterfactual as well as the 'scrap ESOS' option in the long-list appraisal. It is likely that some future ESOS-driven savings are picked up by Operational Energy Ratings, which mitigates the energy savings lost if ESOS were scrapped.

120. The performance-based energy rating scheme, if taken forward, would initially be expected to apply only to private offices over 1000m^2 , this represents around 23% of the energy consumption of buildings occupied by large businesses in the UK[77]. In the theoretical absence of ESOS, it is possible that some of the potential energy savings would be retained for this proportion of the buildings stock via such a scheme.

121. Section 6 on the cost benefit analysis outlined a range of scenarios in which the performance-based policy framework is applied to all large offices from 2023 and extended to all large buildings from 2025. Under this scenario, around 70% of large businesses' buildings energy consumption would be covered under the performance-based policy[78] and therefore it is likely that a large proportion of the ESOS-delivered energy savings would continue to be delivered if ESOS were removed. Overlaps with the performance-based policy constitute a key source of uncertainty in the economic appraisal and is described in further detail in section 6.

Overlaps with Private Rented Sector (PRS) Minimum Energy Efficiency Standards

122. A further policy overlap is where large businesses that comply under ESOS occupy buildings that fall in scope of the Private Rented Sector regulations. The private rented sector represents around 33% of all energy consumption of buildings occupied by large businesses in the UK[79]. These regulations use the EPC as regulatory framework to improve the worst performing buildings. Since 2018, these regulations have required landlords of all non-domestic properties to achieve at least an EPC E before they are permitted to grant a new tenancy

[77] Figures weighted for Scotland and Northern Ireland using Building Energy Efficiency Survey (BEES) data and scaling factors calculated using the Non-Domestic Buildings Model, an internal BEIS model. As of May 2021, there have been no announcements on plans to implement Performance-Based regulations for buildings in Scotland and Northern Ireland and therefore the proportion of consumption covered by the performance-based energy rating policy falls when weighting to account for these Devolved Administrations.

[78] Figure calculated using BEES data and scaling factors from the NDBM, as above. It has been assumed that no like-for-like regulations exist in Scotland and Northern Ireland.

[79] Figure calculated using BEES data and scaling factors from the NDBM, as above. It has been assumed that no like-for-like regulations exist in Scotland and Northern Ireland.

or to extend or renew an existing tenancy if their property had an EPC rating of an F or G (the EPC scale ranges from A-G)[80].

123. The Government has consulted on tightening these regulations. Under current plans, all landlords will be required to demonstrate that by 1 April 2030 their property has a minimum EPC rating of B, or demonstrate as much progress as possible within a 7-year payback test. There would also be an interim EPC C milestone in 2027[81]. Given the existence of mandatory regulations, it is likely that a policy option involving removing ESOS entirely would not fully lose energy savings that had been achieved so far, since large businesses which rent out buildings to other large businesses would continue to face regulatory requirements to undertake improvements that affect their EPC score. Moreover, where 'shell and core' buildings are concerned, the landlord largely leaves the core of the unit untouched, with the tenant organising the fit-out of the core of the building to suit their needs[82].

Overlaps with Point of Purchase (PoP) Regulations

124. The Government plans to consult on introducing a Minimum Energy Efficiency Standard that would capture the currently largely unregulated owner-occupied non-domestic building stock. These regulations would functionally similar to the PRS regulations. Under current plans, all commercial and industrial buildings would need to achieve an EPC B at the Point of Purchase from 2025 onwards, with a backstop date of 2035 by which all buildings must achieve EPC B, or demonstrate as much progress as possible within a 7-year payback test. The impact of these planned regulations is functionally similar to the PRS policy, and so reduces the potential energy and emissions savings that could be achieved by ESOS. The inclusion of this into the modelling was discussed in Annex 1 on analytical changes made since the consultation closed.

125. Since PRS (and PoP) primarily drives the installation of measures that affect the EPC score, they do not include measures such as behavioural change and awareness, which could deliver energy savings. Therefore, whilst removing ESOS would not necessarily result in a return to pre-ESOS levels of energy consumption, it is possible the total potential energy savings would not be retained. Further, ESOS recommendation reports could add value in helping businesses / non-domestic properties achieve their minimum energy efficiency standards via more bespoke recommendations.

[80] Consultation Stage Impact Assessment for amending the Private Rented Sector Regulations, 2019, BEIS. Available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/839565/non-domestic-prs-consultation-ia.pdf.

[81] The Non-Domestic Private Rented Sector Minimum Energy Efficiency Standards: Implementation of the EPC B future target, 2021, BEIS. Available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/970192/non-domestic-prs-mees-epc-b-future-trajectory-implementation.pdf.

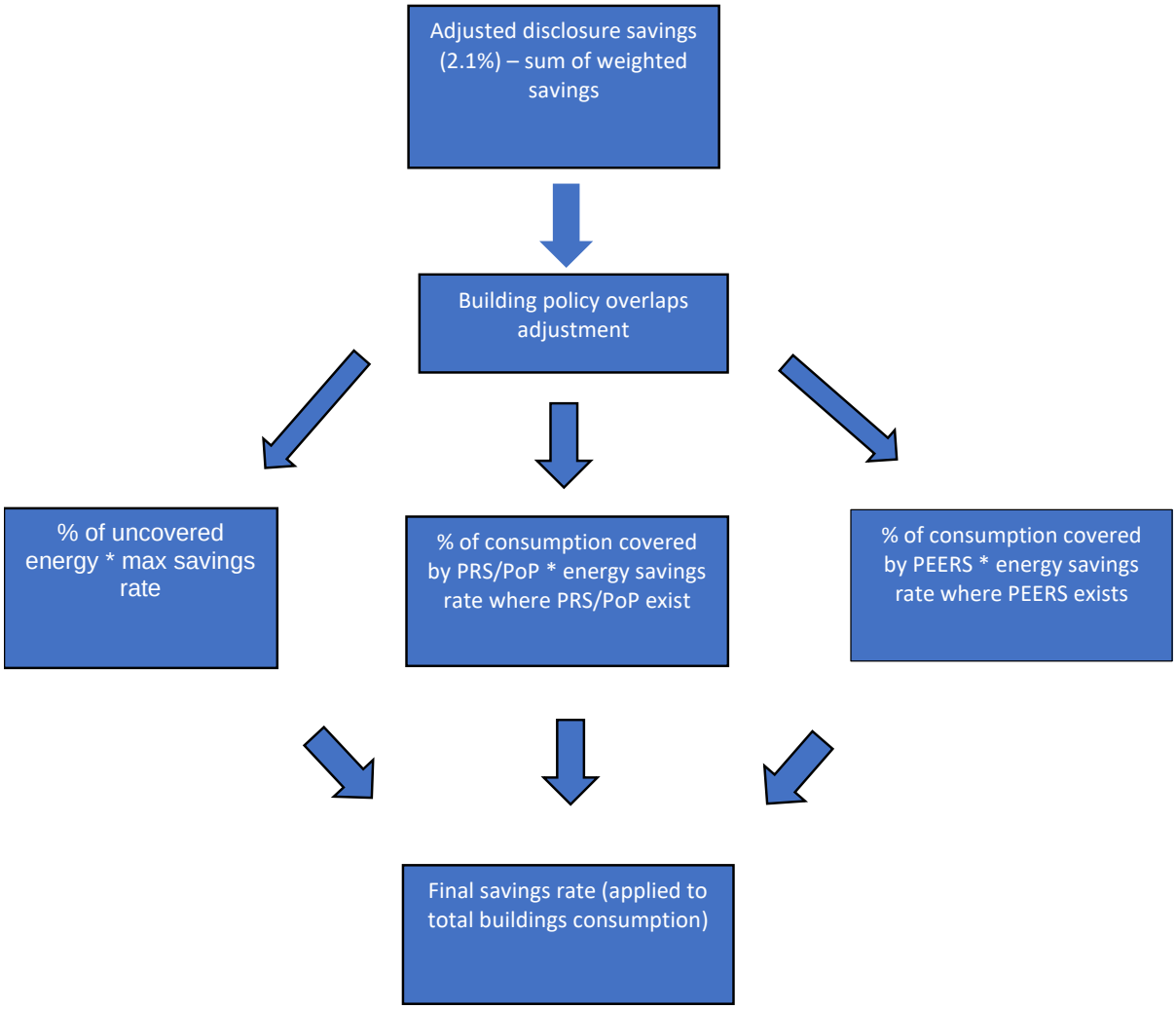
[82] Up to 380,000 and 270,000 retail and office premises, respectively. BEIS, 2021, BEES data (2015). The number of large businesses which occupy 'shell and core' units has not been estimated.

126. The flow chart in Figure 4 captures the process of factoring in the buildings-related policy overlaps into the analysis. The starting point in the flow chart below is the 2.1% energy savings rate which was calculated in Figure 3, to account for the action that is undertaken anyway due to firms in scope of SECR. The savings rate is then adjusted according to the segments of the building stock which are in scope: where large businesses occupy buildings that are in scope of the performance-based energy rating, the potential savings rate is reduced to zero, reflecting minimal additional action that could occur from ESOS in this space[83]. The final savings rate is derived from all the savings rates that could occur where there are policy overlaps, multiplied by the relevant consumption shares[84].

Figure 4: flow chart capturing the adjustments made to the potential energy savings once policy overlaps are accounted for[85].

[83] The range of assumptions around the proportion of the stock covered by PRS and performance-based energy rating as well as the savings that could occur are outlined in Annex 4 on sensitivity analysis.

[85] PEERS = Property Energy Efficiency Scheme (now called the Operational Energy Rating Scheme).



Mapping the buildings overlaps

127. As outlined above, a crucial input for deriving the energy savings that could occur from buildings is the scale and size of the overlaps across the stock. The analysis for this IA used BEES data to split out the relevant segments of buildings consumption and mapped this against the definitions of the main policies outlined in table 8[86]. Splitting the stock in this way presented a picture of the proportions of the relevant consumption which were covered by PRS and the performance-based energy rating scheme as well as that which could be considered uncovered[87]. The starting point for the analysis was to look at

[86] BEES (2016) data allows one to split the stock into the necessary categories for this analysis - https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees This includes tenancy information (Figure 3.17)(not obtainable from the larger ND NEED dataset), building size (Figure 3.14) and building sector (Figure 3.1).

[87] The extent to which other buildings policies overlap is unclear and further evidence gathering is ongoing to clarify this. In this analysis, the consumption that is not clearly covered by PRS and performance-based policy regulations is considered uncovered, and so this is where the largest proportion of savings can occur.

only those buildings relevant to large private businesses by tenure[88]. This provided an initial estimate of the consumption share covered by PRS (around 55% of known tenure total consumption[89]). To estimate the share of consumption covered by the performance-based energy rating, the BEES data was split out by tenure into large offices (>1000sqm). This was analysed for both rented and owned offices, with the rented share net off from the total consumption covered by PRS[90].

128. The resulting consumption shares can be visualised in the below figure, which is the result of cutting the BEES data and mapping this against the policies which incentivise energy efficiency upgrades or behaviour changes that result in lower energy use.

[88] All unknown tenure information was removed, as this could have distorted results. Scaling the unknown consumption proportionately across the 'known' tenure information would not have changed the final adjusted savings rate as this relies on the proportion which is rented or owned. With improved evidence on tenure information, these consumption shares could vary, which will impact the overall results from the Cost Benefit Analysis.

[89] Internal BEIS analysis of BEES (2016) data.

[90] The rented share was net off from the PRS covered consumption to adjust the PRS share down, reflecting the view that buildings will likely be required to comply with the performance-based energy rating regime rather than PRS.

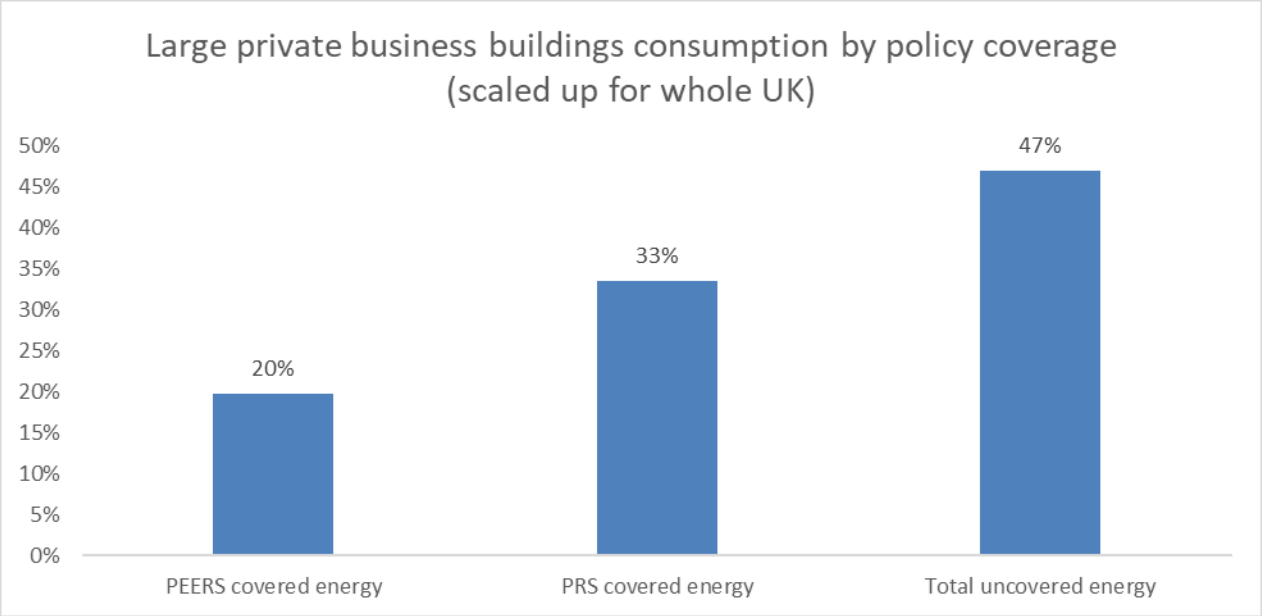


Figure 5: chart showing proportions of the non-domestic stock covered by different policies (calculated on a consumption basis)[91].

Overlaps with Climate Change Agreements

129. Since ESOS covers energy consumed from industrial processes, to provide a robust estimate of the potential savings the proposed options could deliver, the relevant policy overlaps have been incorporated. As outlined in Table , one of the major policy overlaps concerning large business industrial energy consumption is where the firms in scope possess Climate Change Agreements (CCAs). These are voluntary agreements made between industrial firms and the Environment Agency to reduce energy use and / or carbon dioxide (CO2) emissions. An operator that has a CCA must measure and report its energy use and carbon emissions against agreed targets over 2-year target periods up to the end of 2022. In return, operators receive a discount on the Climate Change Levy (CCL)[92.]

130. The ESOS PIR determined that one of the unintended outcomes from the current policy was greater savings from CCA participants in scope of ESOS than non-CCA participants. This could imply that where firms are already

[91] The consumption shares have been calculated using BEES data and scaled up from the sample size to reflect the total consumption across the UK. These shares vary according to the sensitivity analysis undertaken, which is outlined in Annex 4. This is the consumption under policies post-2023, but pre-2025. After 2025 the uncovered consumption is expected to fall once Point of Purchase regulations extend to all privately owned buildings, and Operational Energy Ratings extends to all large private buildings.

[92] The Climate Change Levy (CCL) is a tax levied on business energy users. It is designed to encourage energy users to be more efficient as well as helping to reduce their overall consumption. For more information on the CCL and CCAs: https://www.gov.uk/green-taxes-and-reliefs/climate-change-levy and https://www.gov.uk/guidance/climate-change-agreements--2.

incentivised to reduce their energy consumption under a CCA, an ESOS audit can improve the possibility of achieving relevant targets by providing detailed information on energy efficiency recommendations. A possible conclusion from this evidence is that the benefits in the original IA were underestimated. The original IA assumed that firms in scope of CCA already had robust knowledge of their energy consumption as well as opportunities for energy efficiency, and therefore estimated that there would be zero additional savings from ESOS where CCAs are possessed[93].

131. However, the impact of the existing ESOS framework has already been embedded within the baseline industrial energy consumption, so any additional savings to CCA-covered consumption would be captured in the counterfactual, outlined in section 5. There may be scope for the Net Zero element in the proposed option to provide greater information on the potential opportunities for achieving CCA targets, which could raise the potential savings delivered where CCAs and ESOS overlap. However, since this is currently under development, it has not been factored into the policy overlaps, nor the Cost Benefit Analysis.

132. The approach to this analysis has been to apply the same assumptions from the original IA made about the additional savings where CCAs and ESOS overlap, because the monetised benefits in this IA focus on the potential savings from disclosure. It is assumed there will be no additional energy saving where consumption is covered by a CCA. Arguably, the savings that could be delivered from a strengthened ESOS policy on top of the CCA covered consumption would be delivered through the 'improved information' channel, rather than via the means of reputational pressure on the firm in scope[94]. But as noted above, once a Net Zero element is more clearly defined, this could deliver additional savings from ESOS, even factoring in CCA overlaps. Therefore, the approach in this IA could be considered conservative.

Inclusion in the Cost Benefit Analysis

133. Using evidence from Energy Consumption in the UK tables, it was estimated that approximately 28% of electricity and approximately 18% of non-electric

[93] Energy Saving Opportunity Scheme, DECC, 2014 and Review of the Energy Saving Opportunity Scheme, Post-Implementation Review, BEIS, 2020.

[94] Further evidence is needed to clarify this, but it is expected that the combination of the presence of a CCA combined with the requirement to comply with the existing ESOS policy leaves little scope for additional savings. The higher than projected savings determined in the PIR originated from improved information around energy efficiency opportunities, compared to the information gathered as part of the drive to achieve specific emissions and energy consumption targets under the CCA. Given this channel, there could be potential for a Net Zero audit element to deliver emissions savings despite the overlaps with CCAs, but this has not been quantified.

fuels were covered by a CCA[95]. These proportions are point estimates for 2018 and have not been calculated to account for variations in CCA participation across different business sizes. These estimates therefore reflect a substantive source of uncertainty, but in the absence of robust business-size information, they have been used to adjust down the industrial energy consumption where benefits could occur.

134. The remaining consumption is then adjusted to account for the large business share of total industrial energy consumption[96] to provide the total in-scope energy consumption. The final step applied is to split out the proportion of consumption, which is related to industrial processes, since the buildings share of consumption is captured in the buildings baseline[97]. The benefits that are derived from disclosing industrial process consumption are calculated by multiplying the adjusted disclosure savings rate by the consumption in scope[98].

[95] 2018 ECUK – Consumption data tables (BEIS, 2020). Available here: https://www.gov.uk/government/statistics/energy-consumption-in-the-uk.

[96] See section 5 for more detail on this.

[97] See above source for more information on how this was calculated.

[98] More detail on the adjusted savings rates is described in Table 8.

Annex 4: Sensitivity tests and assumptions

Table 11: matrix of assumptions included in the sensitivity tests.

Scenario	Description	High NPV	Central NPV	Low NPV
Disclosure savings	The max potential savings rate to energy consumption from disclosing energy use and EE recommendations.	6%	4%	2%
Operational Energy Rating System Overlaps	What proportion of the buildings stock is covered by operational energy ratings?	Large offices from 2023	Midpoint of the two weighted average savings rates	Large offices from 2023, all large buildings from 2025.
Private Rented Sector overlaps/Point of Purchase overlaps	Energy savings that can occur when the building is rented or owned by large businesses.	Max potential energy savings reduced by 25%	Max potential energy savings reduced by 50%	Max potential energy savings reduced by 75%
Streamlined Energy and Carbon Reporting overlaps	The proportion of large businesses which already disclose energy consumption and planned/implemented energy efficiency actions under SECR.	95%	95%	95%
Admin burden of NZ audits	The percentage increase on the cost of traditional ESOS audits.	10%	25%	50%
NZ audit costs (time)	The percentage increase on the cost of traditional ESOS audits.	10%	25%	50%
Fossil fuel and carbon price assumptions	Value of future energy and carbon prices	High fossil fuel and carbon prices	Central fossil fuel and carbon prices	Low fossil fuel and carbon prices

Annex 5: Modelling approach

Modelling the counterfactual

135. As described in section 5, the counterfactual was modelled to incorporate current ESOS policy. The energy savings that ESOS has delivered are embedded within the EEP reference case, which is used as the starting point for modelling in-scope buildings energy consumption and industrial energy consumption. Although the EEP provides enough granularity to model the impacts of the proposed options on the transport sector, these benefits and costs have not been modelled in the IA because of a lack of robust evidence.

Using the Non-Domestic Buildings Model

136. The Non-Domestic Buildings Model (NDBM) is a BEIS model that uses evidence from BEES and wider sources to model the impacts of energy efficiency and heat decarbonisation technology pathways on the non-domestic buildings stock. The model was used to determine the EEP-consistent baseline for buildings consumption and was also used to estimate the capital costs required to deliver disclosure-based energy savings.

Capital, hassle, and operational costs:

137. The capital, hassle and operational costs estimated in this IA were calculated by applying a £m-per-TWh rate to the energy savings achieved in each scenario. This is therefore a function of the energy savings and is extremely sensitive to the assumptions applied to calculating benefits. This is described in detail in Section 8, where the risks and uncertainties with this approach were covered. For buildings, the capital costs were derived from the NDBM outputs. The NDBM was set to install “all measures” that fell under a 2-year payback threshold, which provided an illustration of the maximum technical potential energy savings that ESOS recommendations could deliver. A 2-year payback threshold was chosen given the evidence from the ESOS Evaluation which indicated that cheaper recommended measures such as lighting were most likely to be implemented[99].

138. The highest installed measures in the technical potential run (compared to the baseline) were in behaviour and awareness, followed by thermal controls and thermal efficiency[100]. The top three measures installed can be seen in table 12,

[99] ESOS evaluation: https://www.gov.uk/government/publications/energy-savings-opportunity-scheme-esos-evaluation-of-the-scheme

[100] For more information on the definitions of the energy efficiency measures used in the Non-Domestic Buildings Model, see BEES: https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees.

below, which shows the net number of installations. Lighting measures were not among the top three, but this is because they are already heavily installed in the baseline, where their cost effectiveness means that replacing existing light bulbs with LEDs is often among the first steps taken to improve a building's energy efficiency.

Table 12: Top three measures installed

Measure	Estimated net number of measures installed
Behaviour and Awareness	200,000
Thermal Controls	190,000
Other Thermal Efficiency	170,000

Disclosure costs

139. The costs to the businesses of complying with the mandated disclosure element of the proposals has been estimated using data from the CRC phase 2 evaluation. Data on the costs per compliance activity was gathered, including the costs of familiarising with the requirements of the new regulations. This was then scaled up for the total number of businesses in scope and was then adjusted to account for the proportion of firms that are already in scope of SECR, which involves many of the proposed activities[101].

Estimating Net Zero audit costs

140. The cost of a Net Zero audit was estimated based on assumptions for the additional time it would beyond that required for a conventional ESOS audit. These assumptions have significant uncertainties and the assumptions provided in Annex 2 reflect a range of scenarios that could apply, depending on the design of the Net Zero element itself. The estimated cost of a Net Zero audit has two components: 1) the additional admin burden this constitutes; and 2) the cost in auditor time of conducting the more complex audit.

Estimating auditor time requirements

141. ND NEED data was gathered on the number of buildings occupied by large businesses in England and Wales[102]. However, the number of buildings with business size information is only available for a fraction (32%) of the buildings

in the ND NEED database[103]. Building numbers were therefore scaled up to account for the missing business size information. To do this the proportion of non-domestic buildings with business size information that were occupied by large of very large businesses was calculated (17%). This proportion was then applied to the total number of non-domestic buildings in ND-NEED (1,656,000). This gave an estimate of around 289,000 buildings occupied by large and very large businesses in England and Wales.

142. Data on the building stock can be segmented to provide a sectoral overview as well as a breakdown by size bands using ND NEED. Missing size band information was split across the observed categories to provide an estimated breakdown of the buildings occupied by large and very large businesses. Sectors were split into two categories: factories and other buildings, where other buildings included all non-factory sectors[104]. The data was cut in this way to differentiate between the costs incurred as part of auditing industrial sites, which are expected to be more complex in nature, compared to buildings in other ND NEED sectors. Once building bands had been calculated to account for missing information, results for England and Wales were scaled up to cover buildings in Scotland and Northern Ireland[105].

Table 13: buildings occupied by large and very large businesses in the UK.

Building use	b) 0 - 50 m2	c) 51 - 100 m2	d) 101 - 250 m2	e) 251 - 500 m2	f) 501 - 1000 m2	g) 1001 - 5000 m2	h) 5000+ m2	Total count
Factories	140	330	1300	2300	2200	2800	3000	12200
Other sectors	10800	49800	103000	65100	41200	43300	11200	324500

143. A breakdown of the sites in scope is provided in the table above.

144. To estimate the time cost of an ESOS audit being conducted, we incorporated assumptions made in the previous IA about the proportion of sites that would be audited as well as the daily cost of an ESOS audit for buildings and more complex sites, and the time required to audit sites with differing levels of

[103] ND-NEED 2021 - https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data-framework-nd-need-2021

[104] A fuller breakdown of the non-factory sectors can be seen in the main ND NEED report, here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936797/ND-NEED.pdf.

[105] For more information on the scaling process see Annex 9.

complexity. Moreover, the assumptions which estimated the proportion of commercial, industrial and transport firms in scope of the policy proposals were held constant with the previous IA[106].

145. For example, the analysis assumes that for all sites at least one site per enterprise is visited. Additionally, for non-factories, at least one and 5% of all other buildings is assessed. For industrial firms, at least one factory and 10% of all other sites are audited[107].

146. Given the total number of firms has changed since the original IA, the absolute number of commercial, industrial, and transport-related firms has changed correspondingly. Together, these factors constitute the main driver of the different costs of an ESOS audit between this and the previous IA.

Table 14: the estimated total cost of carrying out an ESOS assessment over the appraisal period:

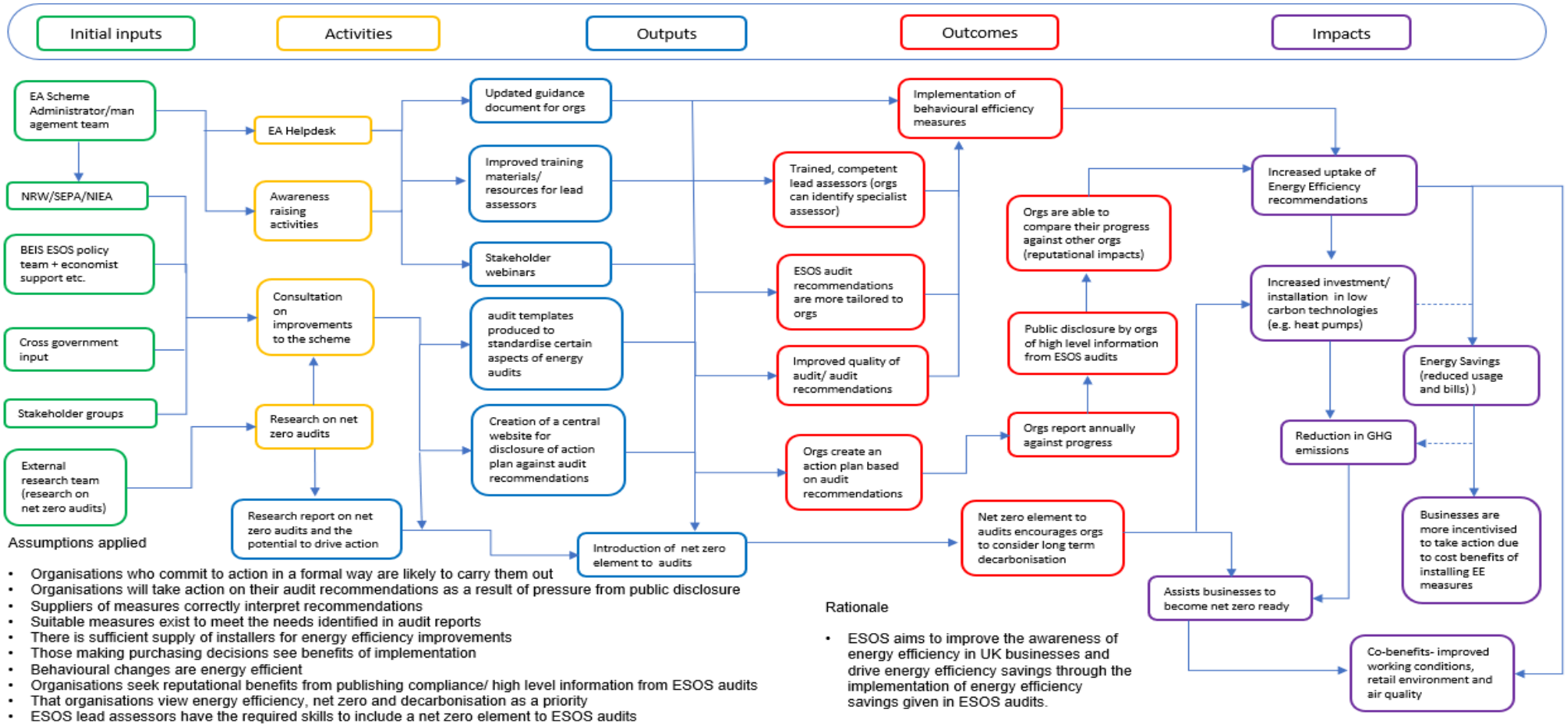
£m, 2020, costs are in present value terms	**Cost of a Net Zero audit (carrying out the audit)**
Optimistic	20
Central	60
Pessimistic	120

[106] More detailed information on the method behind determining the number of ESOS audits that would be carried out can be found here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/323116/ESOS_Impact_Assessment_FINAL.pdf

[107] This is an assumption that was carried over from the original IA, which can be found in the link above. The justification for this is the evaluation evidence that indicated that actual compliance costs were of the same order of magnitude as those in the original IA. Compliance cost information can be found on p.59 here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/650722/Evaluation_of_ESOS_Interim_process_and_early_impact_evaluation_report_FINAL.pdf.

Annex 6: Theory of Change and Logic Map

ESOS Logic Map



Assumptions applied

- Organisations who commit to action in a formal way are likely to carry them out
- Organisations will take action on their audit recommendations as a result of pressure from public disclosure
- Suppliers of measures correctly interpret recommendations
- Suitable measures exist to meet the needs identified in audit reports
- There is sufficient supply of installers for energy efficiency improvements
- Those making purchasing decisions see benefits of implementation
- Behavioural changes are energy efficient
- Organisations seek reputational benefits from publishing compliance/ high level information from ESOS audits
- That organisations view energy efficiency, net zero and decarbonisation as a priority
- ESOS lead assessors have the required skills to include a net zero element to ESOS audits
- Organisations have the required expertise to implement recommendations from a net zero element to ESOS audits

Rationale

- ESOS aims to improve the awareness of energy efficiency in UK businesses and drive energy efficiency savings through the implementation of energy efficiency savings given in ESOS audits.

Annex 7: Long Term Options

This annex describes considerations fortwo non-core options for secondary legislation that could be explored in the future in pursuit of additional energy efficiency savings delivered from ESOS.

Non-Core Option 1[108]: Impact of mandating measures within a certain payback period

Rationale for intervention

147. The rationale for strengthening ESOS aligns with the overarching rationale laid out in Section 2 (“Rationale for Intervention”) of this impact assessment. This subsection will therefore describe the rationale for mandating measures within a certain payback period as a specific approach to strengthening ESOS.

148. Energy efficiency improvements in Industry will need to achieve 4 MtCO2e per year by 2050 as outlined in the sixth carbon budget net zero pathway for industry. By maximising energy efficiency in the 2020s, the total cost of decarbonisation will be reduced as the level of emissions needing to be abated through expensive deep decarbonisation measures will be lower. Investing in energy efficiency improvements results delivers private benefits over the long-term, such as reducing businesses’ energy costs and increasing resilience to energy supply disruptions.

149. However, there are many barriers that prevent firms from investing in energy efficiency. For example, the Industrial Decarbonisation Strategy (BEIS, 2021)[109] described how businesses may not have sufficient information on the costs and benefits of energy efficiency, and therefore may not prioritise these investments. Mandating the implementation of ESOS recommendations bring eligible businesses up to a minimum level of energy efficiency management and investment and, in the medium-term, reduce these businesses’ costs.

Options for policy design

150. Options for mandating could include requiring participants to carry out all ESOS recommendations that are within a specific payback period. The payback period refers to the amount of time that it will take to recover an initial energy efficiency investment through energy savings. For example, the private rented sector minimum energy efficiency standard currently has a 7-year

[108] Option G in the long-listed options appraisal (can be found in Annex 2).

[109] Industrial Decarbonisation strategy, Chapter 5 page 60: https://www.gov.uk/government/publications/industrial-decarbonisation-strategy

payback exemption in place for relevant energy efficiency-related improvements. Further evidence and consultation would be needed on an appropriate payback threshold for ESOS.

151. Mandating the implementation of all ESOS recommendations within a specific payback period could be seen as a constraint on businesses to invest technology options and limit businesses' freedom to choose the best solution for them. An alternative option could therefore be to allow businesses to meet their ESOS obligation by carrying out alternative actions that provide the same level of savings within the same time period as the ESOS assessors' recommendations.

152. These policy options, and any others that might be deemed appropriate, would be considered in more detail in a further consultation if the Government were to pursue secondary legislation to mandate ESOS recommendations. Any mandatory requirement as part of ESOS would need to be effectively designed to ensure that legislation is effective at driving the required behaviour whilst minimising the costs to businesses of complying and the costs of monitoring and enforcing the scheme.

Analytical Approach and Impacts

Buildings

153. For commercial businesses in scope of ESOS where their buildings accounts for the vast majority of their energy usage, the scale of additional benefits from mandating recommendations is unclear, but may depend on the final design decisions and timing of other policies in this space. In particular, additional energy savings from mandating ESOS recommendations may be constrained by the existence and planned expansion of other non-domestic energy efficiency policies, which are expected to take full effect from the mid-2020s.

154. The interactions of mandating ESOS recommendations with the Operational Energy Rating System, PRS and PoP are outlined below. Ultimately, the measures in this IA serve as a necessary first step in an eventual move to mandating ESOS recommendations. This is because we do not yet have a regular, reliable flow of data on the measures that are recommended in ESOS audits. As a result, it is not yet possible to robustly estimate the impacts of mandating ESOS recommendations, but implementation of mandatory disclosure could rectify this evidence gap.

Interactions with an Operational Energy Rating System

155. As outlined in Annex 3, the operational energy rating system aims to incentivise behavioural and operational performance changes for companies

with private offices over 1000m^2 and potentially for all large buildings from the mid-2020s). Currently, ESOS can complement large businesses which are also in scope of an Operational Energy Rating through providing recommendations on the measures, which, if adopted, could raise the overall rating of their large buildings. ESOS would also cover buildings that are below 1000 m^2. The degree to which these energy savings are additional to ESOS is difficult to quantify at this time [110] – there is an argument that the annual cycle of receiving and disclosing Operational Energy Ratings would offer sufficient incentive for corporate awareness in the energy efficiency potential of the large buildings.

156. However, it is possible there would be additional energy savings from mandating ESOS recommendations where the Operational Energy Ratings and ESOS overlap. In this instance, compliance with a policy that carries enforcement actions, alongside disclosure at organisational level, would arguably serve as a strong driver for adopting some of the energy efficiency measures recommended in an ESOS audit.

157. In the short run, Government plans to use Operational Energy Ratings to provide regular accurate information on the performance of buildings in scope. This will be monitored against the Government's Net Zero commitments and whether buildings, portfolios of buildings or sectors are on a suitable trajectory to meet them. We will communicate targets with stakeholders and work closely with them where it becomes apparent sufficient progress is not being made. It may become necessary to require businesses to improve their ratings to a specific minimum standard to ensure Net Zero compatibility. The Government would consult on such a measure before using the power to make secondary legislation to implement this.

158. Were the Operational Energy Ratings to incorporate elements of the EPC-based policies, such as a minimum rating, ESOS could play a substantive role in providing information on the types of measures that could be adopted to raise the ratings that tenants and owners receive. However, the additionality of ESOS in this scenario will depend on the final policy design. Operational Energy Ratings will require an annual rating (in contrast to the 4-year ESOS audit and disclosure cycles) and this presents the possibility that tenants and owners of large buildings will already be willing to explore energy efficiency opportunities that help them meet a minimum rating, even in the absence of mandated ESOS recommendations.

[110] It is unclear how adopting measures recommended in an ESOS audit, where large businesses occupy a large office, would be additional to the options outlined in this IA. This is because businesses compliant with Operational Energy Ratings would receive an annual energy rating and be required to disclose this, so this disclosure aspect is arguably stronger than the mandatory disclosure aspect of ESOS. Arguably, if Operational Energy Ratings raised implementation of measures recommended by ESOS audits, this would raise the energy savings from the existing ESOS policy, rather than be additional to the interventions outlined in the IA.

Interactions with EPC-based policies

159. Existing PRS and planned PoP regulations use a set of Minimum Energy Efficiency Standards to incentivise the adoption of energy efficiency and clean heat measures in non-domestic premises. These policies use the EPC as the metric for assessing a building's performance against energy efficiency standards, and this focuses on measures that affect the fabric of a building. Introducing the mandating of ESOS recommendations therefore may deliver additional energy savings on PRS- and PoP-covered buildings, beyond those which ESOS would deliver via raising corporate pressure to act through public disclosure. However, as discussed in Annex 3, the requirements for building owners and occupiers under PRS and PoP regulations are likely to become more onerous through the next decade. The addition of mandating ESOS recommendations in conjunction with the compliance obligations faced under PRS and PoP may impose a disproportionate level of costs on business.

Industrial processes

160. However, for businesses in scope of ESOS where industrial processes account for a large proportion of their energy usage, mandating ESOS recommendations has the potential to deliver substantive energy and carbon savings – given that existing and planned regulation does not already cover this type of energy usage. The main costs for these businesses would be: the capital costs to businesses of making all the energy efficiency improvements covered by the new regulation; the increased cost of compliance for businesses, ESOS auditors and the scheme administrator; and any opportunity cost associated with making the energy efficiency investment. Meanwhile, the main benefit would be the energy bill savings associated with the energy efficiency improvements and the associated benefits of emissions savings for wider society.

161. Due to the significant uncertainty in the way in which this policy option would be implemented and the nature of magnitude of key costs and benefits, it is not possible to provide a meaningful quantified range of costs and benefits at this time. Instead, the main costs are benefits are laid out in more detail in Table 14 and some relevant considerations discussed below.

Table 15: Costs and benefits of mandating measures within a specific payback period.

Affected party	Costs	Benefits
Firms that have industrial processes in scope of new regulation on mandating	- Capital cost of making energy efficiency improvements - Opportunity cost of capital - Compliance cost - Installation and hassle costs	- Energy Bill savings - Improved resilience to energy prices changes
ESOS auditors	- Time spent familiarising with the new regulation	
Scheme administrator	- Additional cost of monitoring and ensuring compliance with new requirements.	
Society	All costs that are faced by the groups described above	All preceding benefits, plus: - Carbon savings - Air quality improvements - Social value of energy savings - Increased security of energy supply - Increase in investment in energy efficiency technologies - Increase in high-skilled jobs in the low-carbon economy

162. The benefits to society would likely be considerable as energy savings would scale up into positive monetised benefits in terms of social value of energy saved, carbon emissions savings and air quality improvements.

163. However, mandating business to invest in energy efficiency measures risks incurring an opportunity cost from crowding out a higher return from alternative investment that might take place in the counterfactual case. Some energy efficiency measures are not taken up because the return is below a typical hurdle rate of investment. In such instances, compared to the counterfactual case, firms would incur a net cost. However, there is also evidence that not all firms are well informed about the potential returns to energy efficiency investment, and it is also possible that the return from mandated investments

may be equivalent or higher than that those in the counterfactual case for some firms.

164. It is not clear how the scale of any net loss to businesses would compare to the likely considerable social benefits realised by reduced energy consumption, carbon emissions and air quality pollutants.

165. The higher the payback mandated, the higher the likelihood that firms would be investing below their typical hurdle rate and would therefore incur a net cost.

166. The net impact on businesses is an important consideration and would need be examined in more detail in a supporting analysis and further consultation if the Government were to pursue secondary legislation to mandate ESOS recommendations. Any mandatory requirement would need to be effectively designed to minimise the costs to businesses

167. We would expect the costs associated with familiarisation and compliance for ESOS auditors and the scheme administrator to be negligible given the scale of the current total cost of ESOS.

Risks, uncertainties and unintended consequences

168. An important risk is related to the incentives and ability of ESOS assessors to provide reliable and accurate recommendations for energy efficiency improvements' payback periods. If eligible businesses disagree with ESOS assessors' initial recommendations or if assessors' predicted energy savings do not materialise (and therefore the payback period was incorrectly estimated), then there is a risk that disputes will arise between participants and ESOS assessors. An additional risk is that participants incentivise or put pressure on an ESOS assessor to include or exclude certain recommendations. Conversely, ESOS assessors may be incentivised to include specific energy savings measures or technologies that they or their company can profit from, rather than providing a balanced assessment of options.

169. A second risk is that there may be a financial or practical reason why ESOS recommendations with a payback period of less than five years are not already being implemented by firms that regulation would not address. For example, businesses may not to be able to access the funding or financing if the initial capital cost is particularly high or if there is a large amount of risk or uncertainty associated with the predicted energy bill savings.

170. Finally, there is significant uncertainty – and therefore risk – in any analysis because it is unclear what types of measures are recommended within ESOS

reports, so it would be difficult to robustly determine what the impact of mandating would be.

Non-Core Option 2[111]: Extend ESOS to medium-sized enterprises

Rationale for intervention

171. As with option G, the rationale for strengthening ESOS aligns with the overarching rationale laid out in Section 2 ("Rationale for Intervention") of this impact assessment. This subsection will therefore describe the rationale for an extension to medium-sized enterprises as a specific approach to strengthening ESOS.

172. Currently, ESOS only applies to large businesses and their corporate groups, and therefore small- and medium-sized enterprises (SMEs) are only subject to ESOS if they are part of a corporate group with a large corporation.

173. Medium-sized enterprises accounted for approximately 23% of all non-domestic businesses' electricity and gas consumption in 2019[112]. The aim of expanding ESOS to medium-sized enterprises would be to encourage businesses to tap into untapped energy efficiency potential by taking action upon getting an ESOS audit.

174. The Net Zero strategy outlined that for smaller businesses, behaviours are a barrier to improving energy efficiency. Behaviours are defined as awareness, prioritisation and maintenance. All of which are areas that ESOS could have a positive impact, particularly awareness and maintenance, as it forces the consideration of energy efficiency in business activity. Most respondents in the recent ESOS consultation agreed that information was a main barrier to energy efficiency for medium-sized enterprises and that most medium-sized enterprises do not currently have systems in place for monitoring and reporting on energy efficiency.

Options for policy design

175. Policy options mainly focus on the scale of the extension. ESOS could extend to all medium-sized enterprises or to a subset of medium-sized enterprises. There are around 36,000 medium-sized enterprises in England (41,000 in UK), which could put significant pressure on auditors and the scheme administrator if such widening happened in the short-term. Some medium-sized businesses would be already in scope of ESOS as part of a corporate group containing at least one large business. However, as with mandating ESOS recommendations, it is unlikely that there would be significant energy savings in non-domestic buildings from extending ESOS to medium-sized enterprises because the energy consumption of these buildings will be fully within scope of

[111] Option H in the long-listed options appraisal (can be found in Annex 2).

[112] "Non-domestic National Energy Efficiency Data-Framework 2021: supporting data tables", 2021. https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data-framework-nd-need-2021

other EE regulations from 2025 The operational energy rating system will incentivise behavioural and operational performance changes (for companies with private offices over 1000m^2, and the Energy Performance Certificate-based regulations (point of purchase and private rented sector) will drive building fabric improvements.

176. As such, the expansion could focus on a subset of medium-sized enterprises that consume a large amount of energy and use industrial processes. Eligibility criteria could use SIC code or NACE code (for example, there are 6000 medium-sized enterprises in England that undertake industrial processes), or it could use a specific energy usage threshold (for example, all medium-sized enterprises that use at least 40MWh per year). Any extension of ESOS to medium-sized enterprises would need to consider an appropriate consumption threshold and the impact on the balance of costs and benefits.

Analytical Approach and Impacts

177. The regulatory cost of extending ESOS regulation to a wider population would be the additional ESOS audit costs and compliance costs for all newly eligible medium-sized businesses. The scale of this would be dependent on whether ESOS was extended to all medium-sized enterprises or a subset of medium-sized enterprises.

178. Given the potential risks and issues with extending ESOS to all medium-sized enterprises, we will demonstrate how the costs and benefits may look if we were to extend ESOS to all medium-sized firms in the manufacturing and industry sector (using SIC code as eligibility). The main two categories of costs to businesses associated with the expansion would be the cost of auditing and any other compliance-related costs (for example, the time spent reading through relevant ESOS guidance). Based on the reported costs to business in the ESOS evaluation (2017), it is estimated that the total cost of compliance per firm for medium-sized enterprises would be in the range of £2,450 to £6,400 over the 4-year ESOS cycle (one audit)[113]. In a scenario in which we expand ESOS to industrial medium-sized enterprises' (around 6,000 firms in total), we estimate that the total cost to business would be £16m-£40m over the 4-year ESOS cycle, or £4m-£10m per year[114].

[113] https://www.gov.uk/government/publications/energy-savings-opportunity-scheme-esos-evaluation-of-the-scheme, "Evaluation of the Energy Savings Opportunity Scheme: Interim process and early impact evaluation report", page 53. This accounts for the cost of an audit and internal staff time spent. The overall cost of an audit may include the following: external consultant or assessor costs; training an internal assessor; software costs; and energy monitoring equipment and/or hardware costs. Internal time spent includes: finding out about and understanding the scheme requirements; deciding whether and through what route to comply with ESOS; procuring or training an auditor or assessor; supporting an auditor or assessor in compliance (for example, collating of organisational data); submitting the notification of compliance; reviewing and signing off the audit report; and considering whether and how to implement recommendations from the ESOS process.

[114] For the upper-bound estimate, we assume that the costs of ESOS to medium-sized firms will be the same as the costs to large firms. For the lower-bound estimate, we use the number of medium firms to large firms from the ONS and energy usage from ND-NEED data to scale down the costs. A central scenario would be the midpoint between these two estimates.

179. Extending ESOS to medium-sized enterprises (or a subset of medium-sized enterprises) may result in businesses making capital investments in energy efficiency improvements – which represent both an initial cost and a longer-term net benefit to the business through the associated energy savings. Such benefits, which accrue over the lifetime of the energy efficiency measures, would likely be considerable in aggregate. The social benefits from these savings would also accrue over the lifetime of the energy efficiency measures.

180. Such investments would, however, be voluntary, and we do not yet have sufficient evidence on the proportion of medium-sized enterprises that would invest more as a result of an ESOS audit; for example, the ESOS evaluation (2017)[115] only produced limited information on how ESOS has affected SMEs included within the scheme due to difficulties identifying the relevant subsidiaries from group-level reports. We will therefore not provide quantitative estimates of the costs and benefits associated with any energy efficiency improvements in this impact assessment. However, as already noted, we would expect the investment and associated energy bill savings to predominantly be from businesses improving the efficiency of industrial processes.

181. The benefits and costs are outlined in more detail in Table 15 below.

Table 16: Costs and benefits of extending ESOS to medium-sized enterprises

Affected party	Costs	Benefits
Medium-sized firms in scope of new regulation on mandating	- External cost – predominantly costs of auditing - Internal costs – staff time spent on compliance - Capital costs of installed energy efficiency measures	- Energy Bill savings by highlighting new opportunities for efficiency gains
ESOS auditors	- Costs associated with a rapid expansion of the market.	- Opportunities with market expansion; growth benefits
Scheme administrator	- Additional cost of monitoring and ensuring compliance with new requirements.	

[115] https://www.gov.uk/government/publications/energy-savings-opportunity-scheme-esos-evaluation-of-the-scheme,

Society	All costs that are faced by the groups described above	All preceding benefits plus: - Carbon savings - Air quality improvements - Social value of energy savings - Increased security of energy supply - Increase in investment in energy efficiency technologies - Increase in high-skilled jobs in the low-carbon economy

Risks, uncertainties, and unintended consequences

182. Extending the scheme would create substantial demand for ESOS assessors, and there is therefore a risk that the current market could not meet this demand. There are already some concerns around the availability of competent lead assessors[116], and increasing the scope of ESOS may result in the demand for lead assessors outstripping the supply. Depending on how responsive the assessor market is to an increase in demand, this may result in either an increase in costs for all businesses in scope of ESOS, or a decrease in auditing quality if new and inexperienced assessors are brought in to meet the demand.

183. There is some uncertainty on the proportion of energy-intensive and/or industrial medium-sized enterprises that are already monitoring energy efficiency. If ESOS regulation was expanded to a subset of medium-sized enterprises where most were already conducting audits, then the additionality would be very low, and the compliance costs of the expansion may be larger than the benefit on emissions savings.

184. There are already a number of funded schemes available for SMEs across the UK. Expanding ESOS could crowd out these opportunities unless they were accounted for specifically. For example, Ox Futures is an EU-funded organisation that provides free auditing for SMEs in Oxfordshire.[117]

[116] https://www.gov.uk/government/publications/energy-savings-opportunity-scheme-esos-evaluation-of-the-scheme, "Evaluation of the Energy Savings Opportunity Scheme: Interim process and early impact evaluation report", page 34
[117] https://oxfutures.org/grants/energy-efficiency/

Annex 8: Risks and Uncertainties

Data and Evidence

BEES

185. Due to sample size restrictions, the estimates of the energy consumption accounted for by buildings that fall within scope of the ESOS regulations are subject to a large degree of uncertainty. The BEES sample includes granular data on approximately 3,000 buildings compared to an estimated total 1.6m non-domestic buildings in England and Wales[118].

186. These estimates are used to map the buildings consumption in scope and from this the overlaps with other policies have been calculated. Since the size of potential energy savings is adjusted down where other policies overlap, potential revisions to the underlying building stock data could impact the benefit calculations and as such, the additionality of the policy. There is, however, work being undertaken internally to improve the evidence base and refine the understanding of non-domestic building stock.

187. A further limitation is that the estimates from BEES are a point estimate from 2014/15. This means that the actual proportions of the buildings stock which falls in scope of different policies may differ compared to the breakdown in the BEES data.

ND NEED

188. The Non-Domestic National Energy Efficiency Data-Framework (ND NEED 2021) provides data on the energy use of non-domestic buildings. It uses data from the Valuation Office Agency (VOA) on buildings such as size and sector, alongside data on metered energy use and data on businesses characteristics. Some of the risks of using this dataset are discussed below[119].

189. Data produced under ND NEED is gathered at the building level not the business level. As there is not a one-to-one relationship between buildings and businesses, this introduced some uncertainty into the data which could mean that the estimates of large business factory consumption, as well as data on the number of sites in scope need to be revised.

[118] Figures used in the cost benefit analysis have been scaled up to reflect total UK building stock numbers. 1.6m building estimate is from ND NEED, BEIS, 2020 and covers England and Wales only.

[119] More information about the limitations of the ND-NEED dataset can be found in the limitations section of the report - https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data-framework-nd-need-2020

190. Moreover, ND NEED data cannot be split out by public or private organisations or by tenure. For this reason, the smaller BEES sample size has been relied on to generate estimates of the proportions of the non-domestic building stock which fall into different policies.

191. As outlined in this IA, ND NEED only includes data on metered electricity and gas consumption in England and Wales. Estimates therefore miss non-metered consumption, such as on-site generation and consumption estimates need to be scaled up to reflect the total energy use in Scotland and Northern Ireland.

Modelling assumptions

192. For the building stock, capital cost requirements have been modelled using a combination of the Non-Domestic Buildings Model (NDBM). The NDBM estimates a cost-effective package of technologies to deliver a certain level of energy savings. To generate the estimated capital costs which would be incurred due to ESOS reports being disclosed, a model run was calibrated to only install measures with a lower than 2-year payback period. This was then net off from the baseline, yielding both a net capex required in 2023 as well as the potential energy savings that could be delivered in this year.120121 The corresponding £m/TWh rate was applied to the energy savings estimated per year, to calculate the net capital cost requirements.

193. This is consistent with the evidence in the original ESOS Impact Assessment, which outlined that it was unlikely businesses would adopt any measures with a greater than 2-year payback period[122][123].

194. However, this is a source of uncertainty as in reality businesses may take up measures with greater than 2-year payback periods, which could raise the capital cost requirement resulting from disclosing ESOS reports. Since ESOS is a voluntary scheme and compliance under the proposed regulations does not require installation of new measures, the uncertainty around the capital and installation costs has been captured through sensitivity analysis depicting a range of scenarios around the probable energy savings that could be delivered through mandated disclosure.

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[120] Hassle and operational costs have been inferred from the size of capital cost. Using assumptions made in the Streamlined Energy and Carbon Reporting (SECR) IA, it is assumed that for non-domestic buildings, hassle and operational costs are around 20% and 2% of capital costs, respectively.

[121] Additional detail on the use of the Non-Domestic Buildings Model in the analysis is included in Annex 5, on the modelling approach. The NDBM uses BEES data to estimate the capital costs of measures.

[122] Payback period here is defined as the time taken for the private bill savings delivered by the measures installed to exceed the costs incurred from purchasing, installing, and operating the measure. A lower than 2-year payback period implies that the bill savings from the measure installed exceed the costs incurred within 2-years of installation.

[123] Energy Saving Opportunity Scheme (ESOS) – Final Impact Assessment, DECC, 2014. Available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/323116/ESOS_Impact_Assessment_FINAL.pdf.

195. As it concerns industrial process, a similar method has been applied to determine the capital costs required. However, the rate of capital cost needed per TWh of energy savings achieved has been derived from modelling undertaken for the SECR Impact Assessment. In the absence of more robust evidence, this rate has been applied to the energy savings which have been estimated. As outlined, hassle and operational costs have been inferred as fixed proportion of the capital costs needed[124].

196. The response rate to the policy may be slower than has been modelled. The existing approach is to front-load the costs resulting from compliance and subsequent adoption of measures. As a result, the analysis potentially overestimates the capital, hassle, and operational costs. These costs may be spread out more evenly over the appraisal period, which reduces their net present value. Similarly, the benefits that could be delivered may be spread more evenly across the appraisal period, reflecting delayed action following ESOS audit disclosure.

Policy overlaps

197. An additional uncertainty concerns the modelling of the consumption in scope across the UK. BEES data on buildings consumption was used to estimate the policy coverages across England and Wales. This was then scaled up to account for UK-wide consumption. However, at this point the evidence on non-domestic buildings policies in Scotland and Northern Ireland is unclear and therefore the consumption is assumed to be out of scope of PRS or performance-based energy rating policies[125]. Revising this would alter the net impact of the policy, as it could reduce the potential savings from disclosure if comparative policies that incentivise fabric and operational performance are in place in Scotland and Northern Ireland.

[124] Industrial process capital, hassle and operational cost assumptions were taken from the modelling behind the SECR impact assessment, published in 2018. The ratios of hassle and operational costs to capital cost were 19% and 3%, respectively.
[125] Evidence gathering is underway to clarify this and we intend to refine our approach at final IA stage.

Annex 9: Further detail on identifying energy consumption in scope

198. For this impact assessment, the impact on transport energy consumption has not been modelled alongside the relevant consumption of buildings and industrial processes. This was noted in section 5, on the Analytical Approach.

Buildings

199. The energy consumption of buildings occupied by large businesses has been estimated using the trajectory outlined in the 2019 Energy and Emissions Projections (EEP) reference case. This captures the impact of existing policies on energy consumption and so any impact of the proposed measures is additional to the policies already planned and implemented.

200. Our EEP consistent trajectory estimates a 7% energy consumption reduction for all commercial service firms between 2015 and 2023126. Since the level of granularity needed to isolate the large business-share of consumption is not attainable from the EEP, the Non-Domestic Buildings Model (NDBM) was used to estimate this. The NDBM was assigned a target of a 7% reduction in buildings energy consumption between 2015 and 2023. This provided an estimate of the total TWh consumed by large businesses buildings in 2023, which is the baseline for the analysis of impacts.

Industrial processes

201. To estimate the proportion of energy consumption from industry that is used for industrial processes (rather than building processes such as heating or lighting) ND-NEED[127] and BEES[128] data are used. In the ND-NEED dataset energy consumption from industry includes both energy consumption from industrial processes and energy consumption from building processes. By contrast, in the BEES dataset industrial energy consumption covers energy from building processes only. We can therefore estimate the proportion of industrial energy consumption that is used for industrial processes by comparing industrial energy consumption between these datasets. This

[126] Commercial services gas and electricity consumption is used as a proxy for business buildings energy consumption. Gas and electricity account for the largest proportion of all fuel consumption and so are a reliable indicator of the broader consumption pathway. The trajectory for large business energy consumption is inferred from the wider pathway of commercial service consumption between 2015 and 2023.

[127] ND-NEED 2020 - https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data-framework-nd-need-2020. In ND-NEED industrial consumption is consumption from factories (Table 3.1 & Table 4.1).

[128] BEES - https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees. In BEES industrial consumption is consumption from the industrial sector (Figure 3.1).

comparison is meaningful because the ND-NEED[129] and BEES[130] datasets have very similar coverage (both at the building level, both cover England and Wales only, both exclude the same building types). Using BEES and ND-NEED we can estimate that 25% of industrial energy consumption is from building processes (26 TWh/96 TWh = 25% (rounded to the nearest 5%)).

202. This means that 75% of industrial energy consumption is from industrial processes (rounded to the nearest 5%).

Table 17: Industrial Process Energy Consumption (ND NEED vs BEES comparison)[131] [132]

	Energy consumption 2016 (TWh)
BEES	26
ND-NEED	96

203. The EEP provides projected energy consumption of businesses within the industrial sector. To determine the suitable consumption in scope, the EEP reference case data on 'iron and steel' and 'other industry sectors' has been combined to reflect the total industrial energy consumption. However, since the EEP does not provide business-size information, ND-NEED has been used to estimate the large business share of consumption (see Table 2.)

Scaling England and Wales figures to the whole UK

204. As ND-NEED covers non-domestic buildings in England and Wales only, alternative data sources have been used to obtain estimates on the non-domestic building stock/non-domestic energy consumption in Scotland and Northern Ireland. These estimates are then combined to give UK-wide estimates that can be used to calculate an England and Wales to whole-UK scaling factor.

[129] For further information on ND-NEED coverage see the ND-NEED building stock section of the ND-NEED Methodology - https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data-framework-nd-need-2020

[130] For further information on BEES coverage see Section 2: Sampling and Scope of the BEES Technical Annex - https://www.gov.uk/government/publications/building-energy-efficiency-survey-bees

[131] Note, the BEES data covers 2016 only so ND-NEED 2016 consumption is used. The BEES data covers energy consumption from all fuel types, ND-NEED just covers electricity and gas consumption. It is estimated that over 80% of energy consumption in non-domestic buildings is from electricity or gas.

[132] DUKES 2020, Aggregate energy balances (DUKES 1.1 – 1.3), 2019. Final consumption. Industry, Public administration, Commercial and Misc are used as a proxy for non-domestic buildings. https://www.gov.uk/government/statistics/energy-chapter-1-digest-of-united-kingdom-energy-statistics-dukes.

Building number

Table 18: Estimated Non-Domestic Buildings Across the UK

	Number of Non-Domestic buildings	Data source
England and Wales	1,656,000	ND-NEED 2020[133]
Scotland	196,000	Scotland's non-domestic energy efficiency baseline: report, 2018[134]
Northern Ireland	77,000	NI Department of Finance, 2012/13 and 2020[135]
Whole UK	1,929,000	n/a

205. These figures can be used to calculate an England and Wales to whole UK scaling factor (1,929,000/1,656,000 = 1.16). This scaling factor can then be applied to any segment of the building stock to scale England and Wales building number figures to the whole UK.

Energy consumption

Table 19: Estimated Non-Domestic Building Consumption Splits Across the UK

	Proportion of UK non-domestic building energy consumption	Data source
England and Wales	87%	BEIS Non-Domestic Building Model (NDBM) based on BEES 2016 data.
Whole UK	100%	BEIS Non-Domestic Building Model (NDBM) based on BEES 2016 data.

206. These figures can be used to calculate an England and Wales to whole UK scaling factor (100%/87% = 1.15). This scaling factor can then be applied any

[133] ND-NEED 2020 - https://www.gov.uk/government/statistics/non-domestic-national-energy-efficiency-data-framework-nd-need-2020

[134] https://www.gov.scot/publications/scotlands-non-domestic-energy-efficiency-baseline/

[135] Business properties - https://www.finance-ni.gov.uk/articles/reval2020-frequently-asked-questions, Public buildings - https://www.finance-ni.gov.uk/publications/public-sector-energy-report-2012-2013

segment of the building stock to scale England and Wales consumption figures to the whole UK.

207. An England and Wales to whole UK energy consumption scaling factor could also be calculated using the subnational electricity and gas consumption statistics which contains information on non-domestic electricity and gas consumption for England, Wales, Scotland, and Northern Ireland[136]. This approach gives very similar results to the method outlined above.

[136] Regional and local authority electricity consumption statistics 2019 - https://www.gov.uk/government/collections/sub-national-electricity-consumption-data, Northern Ireland sub-national electricity consumption 2009 – 2019 - https://www.gov.uk/government/statistics/sub-national-electricity-consumption-statistics-in-northern-ireland. Regional and local authority gas consumption statistics - https://www.gov.uk/government/statistical-data-sets/gas-sales-and-numbers-of-customers-by-region-and-local-authority. Northern Ireland subnational gas consumption 2015–2019 - https://www.gov.uk/government/statistics/sub-national-gas-consumption-statistics-in-northern-ireland.