

# THE EMA MAGAZINE

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**FOCUS**

**ESOS SPECIAL**



SCOPE 3 CARBON EMISSIONS



TIPS FOR ESOS ENERGY AUDITS



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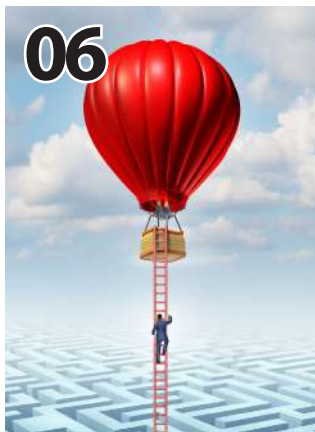




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by Gillian Brown, Senior Manager – Sustainable Design at Lloyds Banking Group, and Vice Chair of the EMA Board of Directors



## Dear Reader,

Welcome to the latest edition of The EMA Magazine.

Over the last 20 years, it would seem that the energy management sector has been plagued with an ever growing list of legislative reporting requirements, over and above the already voluminous internal reporting considerations in many organisations. Many industry professionals within the sector ask whether this additional reporting burden is in fact making any difference in reducing the UK's carbon emissions, especially when conscientious organisations are already taking their own actions and achieving good energy and carbon reductions.

ESOS has been a key reporting requirement of the UK Government in the move towards greater energy efficiency. According to figures from the [ESOS post implementation review](#), the scheme has so far resulted in estimated annual energy efficiency savings of 1.65TWh from buildings, 1.51TWh savings from industrial processes, and 0.52TWh of fuel efficiency savings across the ESOS population. The evaluation of the Scheme also showed that there are organisations which would not have carried out energy surveys or undertaken energy reduction measures if it was not for the mandate as part of the ESOS programme. This very clearly shows that ESOS has the potential to make a substantial change towards energy efficiency and reduction of carbon emissions across the UK.

Whilst the Phase 3 compliance notifications are yet to be submitted, the Phase 4 is already underway. Both phases require more information to be provided than in any previous phase. There has been a decrease in the de minimis energy consumption, the mandatory completion of an ESOS report, and completion of an action plan and annual progress update to name but a few of the enhanced changes.

This issue of The EMA Magazine offers insights into the ESOS requirements and compliance processes from approved ESOS Lead Assessors, and we hope you find all contributions interesting and insightful. Enjoy.

Yours,

**Gillian Brown**



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The EMA would like to thank to the above contributors for their time and effort in providing the content and making this issue possible. Their willingness to share experience and knowledge is exemplary and inspiring, and we hope it will encourage others to come forward and contribute in the future.

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### ABOUT EMA

The Energy Managers Association (EMA) was set up in February 2012 and represents Energy Managers across all industries. Our priority is to improve the position of energy management experts and their profession and act as their united voice. We aim to develop the skills, knowledge and experience of professionals through our training, high-quality peer to peer guidance and best practice exchange.

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COURSES,  
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By Craig Love, Associate Director, Climate Impact at Scottish National Investment Bank



# How to Solve a Problem Like Scope 3 Emissions?

Measuring and accounting for Scope 3 emissions is a challenge facing organisations across all sectors, and is even more challenging for those starting out on their journey. As many of you are aware, there is a myriad of information online! If not, take one second out of your day to type Scope 3 emissions into your favourite search engine. You are immediately hit with definitions, guidance and good practice articles, as well as companies offering services, tools and thought pieces, all aimed at providing information and more importantly examples of what a complete footprint will look like across the three scopes.

Having worked in the environment, sustainability and climate change sector since 2012, I have undertaken countless footprinting exercises, and have found that ultimately the secret to understanding your total

***"You cannot manage what you cannot measure"***  
**Peter Drucker**

impact across all three scopes is good carbon management practices and data.

The importance of carbon

management and accounting is sometimes a lost or forgotten element when we consider our impact on the climate. We live in a target led society driven by government policies and legislation, therefore, it is understandable that this is the focus of many senior leaders within organisations. This need for a target, and therefore a "number" to reduce, can drive decision making and skew the development of a boundary and what will be included in each scope. Embedding good carbon management practices across an organisation to inform decision making should ensure the clarity of your emissions, transparency of the approach being taken, as well as a clear sense of direction towards developing an appropriate target.

While the inclusion of Scope 3 emissions may seem like a different beast than measuring and reporting Scope 1 and 2, it is ultimately the same process, just a different data set. The importance of starting to think about the inclusion of these sources as part of your overall impact is vital, as in reality for most, these combined sources are likely to be far greater than those included in Scope 1 and 2.

The availability of good data is probably the biggest barrier for many organisations when it comes to an expanded carbon footprint, with many Scope 3 sources readily scoped out on this basis. However, as noted previously, the implementation and embedding of carbon management practices across your own organisation, and ensuring that these practices become the "norm" should lead to your value chain also using these principles.

## Where to Start?

The truth is, there is no right or wrong way to start your Scope 3 calculations (a heavily caveated statement!). While it may seem like a daunting task, particularly when considering what should be scoped in or out of a boundary which includes Scope 3, an often-missing factor is that you don't immediately need to have all the answers or even the datasets, as long as you are transparent in your decision making.

Once again this aligns to good carbon management practices. If you have outlined in your plans and strategies why particular decisions have been made in a transparent way, it provides a sound footing for

anyone working in this space.

That said, trying to measure Scope 3 emissions across a whole value chain is an intricate and complex process. While shooting for the stars might align with wider goals, it is unlikely that a complete dataset will appear overnight. The quality of data is also likely to vary across the different categories of Scope 3 and will require information from both primary and secondary sources for both upstream and downstream emissions.

### Categories and Measurement

The image below provides a great visual representation of the 15

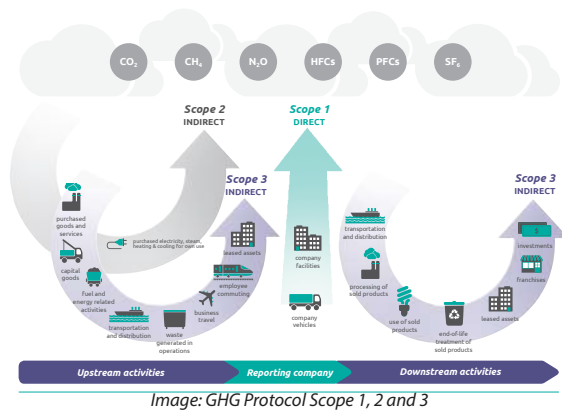


Image: GHG Protocol Scope 1, 2 and 3

categories of Scope 3 and it is one we will all be familiar with. There are multiple variations online and I wouldn't be surprised if it guides initial decision making for those at the start of their measurement journey, or even those looking to expand their boundary to incorporate elements of Scope 3, and just purely based on the small images themselves.

Studies have shown that humans process visual data 60,000 times faster than any other type of data, and based on the image above, those tasked with defining a boundary are going to be drawn to the images which are most relevant to a company's day to day operations.

While this type of decision making might seem strange, it is probably the best way to start measuring or expanding Scope 3. Prioritisation should always be given to sources where data is more readily available, essentially capturing sources within your direct business control, such as business travel and waste. Each of these sources can be measured using the same methodology as measuring Scope 1 and 2, with data collected from primary sources such as utility meters or monitoring activities established in your strategy, plan or even bills you have paid.

Expanding a boundary beyond this "operational reach" is where measurement will become difficult, especially if you are seeking to meet certain reporting or disclosure requirements. It will require input from both primary

and secondary sources and might even entail input from experts in these areas to ensure that your measurement reflects current thinking or climate science.

Accessing the relevant GHG protocol provides a good foundation for those looking to measure Scope 3 emissions. However, trying to measure across all 15 categories and using the guidance can be really time consuming and lead to more questions rather than answers, particularly if you are unsure where to start.

The approach on the right provides a step by step process for the incorporation of Scope 3 emissions into your wider boundary.

**1. Identify your Sources**  
*Plan*  
Identify and confirm your relevant Scope 3 sources, establish a data hierarchy and review the availability of information. Consider the control/influence you have over these source.

**2. Gather the Data**  
*Who to engage with?*  
Identify relevant stakeholders from whom you can gather relevant data for each source of carbon emissions you have identified in your boundary (e.g., electricity supplier).

**3. Calculate the Emissions**  
Use the specific methodology outlined by the GHG Protocol.

**4. Incorporate Emissions into your Baseline**  
Combine Scope 3 emissions with the rest/the total of all sources, which provides a carbon footprint baseline.

**5. Identify Reduction Actions**  
*Which projects to focus on?* Once you have measured your emissions, it is important to select areas of focus for reduction. Typically focus would be on the largest emissions sources, based on measurement. However, consideration should also be given to whether these sources are under direct control or influence.

**6. Set a Target**  
Following the identification of areas of focus for emissions reduction, it is important to set a target which is realistic, measurable, achievable, relevant and time-bound ('SMART').

**7. Monitoring Progress**  
Emissions data in subsequent years should follow the same process as the first four stages. However, instead of setting a baseline, you are providing information on progress following the development of the baseline. Performance towards the target should be reported annually.

**Reach your Target!!!**

The tables below show the upstream and downstream sources which set out each of the GHG Protocol's 15 Scope 3 emissions sources with an overview description of what would be included, and more helpfully, a small summary of what you would be required to measure. While there is more detail involved, showing a small summary like this can really inform initial decision making by assessing your areas of focus.



## SCOPE 3 CATEGORY AND CALCULATION SUMMARY - UPSTREAM ACTIVITIES

(Scope 3 Calculation Guidance | GHG Protocol)

CATEGORY & DESCRIPTION	SUMMARY OF METHODS FOR CALCULATING EMISSIONS
<p><b>CATEGORY 1</b>  <b>Purchased goods and services:</b>                      All upstream (cradle-to-gate) emissions of purchased goods and services.</p>	<ul style="list-style-type: none"> <li>• <b>Supplier-specific method</b> – collects product-level cradle-to-gate GHG inventory data from goods or services' suppliers.</li> <li>• <b>Hybrid method</b> – uses a combination of supplier-specific activity data (where available) and secondary data to fill the gaps. This method involves:                             <ul style="list-style-type: none"> <li>- collecting allocated Scope 1 and Scope 2 emission data directly from suppliers;</li> <li>- calculating upstream emissions of goods and services from suppliers' activity data on the amount of materials, fuel, electricity, used, distance transported and waste generated from the production of goods and services, and applying appropriate emission factors; and</li> <li>- using secondary data to calculate upstream emissions wherever supplier-specific data is not available.</li> </ul> </li> <li>• <b>Average-data method</b> – estimates emissions for goods and services by collecting data on the mass (e.g., kilograms or pounds) or other relevant units of goods or services purchased, and multiplying by the relevant secondary (e.g., industry average) emission factors (e.g., average emissions per unit of good or service).</li> <li>• <b>Spend-based method</b> – estimates emissions for goods and services by collecting data on the economic value of goods and services purchased, and multiplying it by relevant secondary (e.g., industry average) emission factors (e.g., average emissions per monetary value of goods).</li> </ul>
<p><b>CATEGORY 2</b>  <b>Capital goods:</b>                      Extraction, production and transportation of capital goods purchased or acquired.</p>	<ul style="list-style-type: none"> <li>• <b>Supplier-specific method</b> - collecting product-level cradle-to-gate GHG inventory data from goods' suppliers.</li> <li>• <b>Hybrid method</b> - a combination of supplier-specific activity data (as available) and using secondary data to fill the gaps. This method involves:                             <ul style="list-style-type: none"> <li>- collecting allocated Scope 1 and Scope 2 emissions from suppliers;</li> <li>- calculating upstream emissions of goods by collecting available data from suppliers on the amount of materials, fuel, electricity used, distance transported and waste generated from the production of goods, and applying appropriate emission factors;</li> <li>- using secondary data to calculate upstream emissions wherever supplier-specific data is not available.</li> </ul> </li> <li>• <b>Average-product method</b> - estimating emissions for goods by collecting data on the mass or other relevant units of goods purchased and multiplying by relevant secondary (e.g., industry average) emission factors (e.g., average emissions per unit of good).</li> <li>• <b>Average spend-based method</b> - estimating emissions for goods by collecting data on the economic value of goods purchased and multiplying it by relevant secondary (e.g., industry average) emission factors (e.g., average emissions per monetary value of goods).</li> </ul>



**CATEGORY 3  
Fuel and energy related activities (not included in Scope 1 or Scope 2):**

Extraction, production and transportation of fuels, and energy purchased or acquired.

- **Supplier-specific method** - collecting data from fuel providers on upstream emissions (extraction, production and transportation) of fuel consumed by the reporting company.
- **Average-data method** - estimating emissions by using secondary (e.g., industry average) emission factors for upstream emissions per unit of consumption (e.g., kg CO<sub>2</sub>e/kWh).

**CATEGORY 4  
Upstream transportation and distribution:**

Transportation and distribution of products purchased between a company's tier 1 suppliers and its own operations (in vehicles and facilities not owned or controlled by the reporting company). Transportation and distribution services purchased, including inbound logistics, outbound logistics (e.g., of sold products), and transportation and distribution between a company's own facilities (in vehicles and facilities not owned or controlled by the reporting company).

- **Fuel-based method** - determining the amount of fuel consumed (i.e., Scope 1 and Scope 2 emissions of transport providers) and applying the appropriate emission factor for that fuel.
- **Distance-based method** - determining the mass, distance and mode of each shipment, then applying the appropriate mass-distance emission factor for the vehicle used.
- **Spend-based method** - determining the amount of money spent on each mode of business travel transport and applying secondary (EEIO) emission factors.

**CATEGORY 5  
Waste generated in operations:**

Disposal and treatment of waste generated in operations (in facilities not owned or controlled by the reporting company).

- **Supplier-specific method** - collecting waste-specific Scope 1 and Scope 2 emissions data directly from waste treatment companies (e.g., for incineration, recovery for recycling).
- **Waste-type-specific method** - using emission factors for specific waste types and waste treatment methods.
- **Average-data method** - estimating emissions based on total waste going to each disposal method (e.g., landfill) and average emission factors for each disposal method.

**CATEGORY 6  
Business travel:**

Transportation of employees for business-related activities (in vehicles not owned or operated by the reporting company).

- **Fuel-based method** - determining the amount of fuel consumed during business travel (i.e., Scope 1 and Scope 2 emissions of transport providers) and applying the appropriate emission factor for that fuel.
- **Distance-based method** - determining the distance and mode of business trips, then applying the appropriate emission factor for the mode used.
- **Spend-based method** - determining the amount of money spent on each mode of business travel transport and applying secondary (EEIO) emission factors.

**CATEGORY 7  
Employee commuting:**

Transportation of employees between their homes and their worksites (in vehicles not owned or operated by the reporting company).

- **Fuel-based method** - determining the amount of fuel consumed during commuting and applying the appropriate emission factor for that fuel.
- **Distance-based method** - collecting data from employees on commuting patterns (e.g., distance travelled and mode used for commuting) and applying appropriate emission factors for the modes used.
- **Average-data method** - estimating emissions from employee commuting based on average (e.g., national) data on commuting patterns.

**CATEGORY 8  
Upstream leased assets:**

Operation of assets leased by the reporting company (lessee) and not included in Scope 1 and Scope 2 – reported by lease holder.

- **Asset-specific method** - collecting asset-specific (e.g., site-specific) fuel and energy use data and process, and fugitive emissions data or Scope 1 and Scope 2 emissions data from individual leased assets.
- **Lessor-specific method** - collecting the Scope 1 and Scope 2 emissions from lessor(s) and allocating emissions to the relevant leased asset(s).
- **Average data method** - estimating emissions for each leased asset or groups of leased assets based on average data, such as average emissions per asset type or floor space.

**SCOPE 3 CATEGORY AND CALCULATION SUMMARY - DOWNSTREAM ACTIVITIES**

(Scope 3 Calculation Guidance | GHG Protocol)

CATEGORY & DESCRIPTION	SUMMARY OF METHODS FOR CALCULATING EMISSIONS
<p><b>CATEGORY 9</b>  <b>Downstream transportation and distribution:</b>                      Transportation and distribution of products sold by the reporting company in the reporting year between the reporting company's operations and the end consumer (if not paid for by the reporting company), including retail and storage (in vehicles and facilities not owned or controlled by the reporting company).</p>	<p>The emissions from downstream transportation should follow the calculation methods described in Category 4 (<u>Upstream transportation and distribution</u>). Companies may use either the fuel-based, distance-based or spend based method.</p>
<p><b>CATEGORY 10</b>  <b>Processing of sold products:</b>                      Processing of intermediate products sold by downstream companies (e.g., manufacturers).</p>	<ul style="list-style-type: none"> <li>• <b>Site-specific method</b> - determining the amount of fuel and electricity used and the amount of waste generated from processing of sold intermediate products by the third party, and applying the appropriate emission factors.</li> <li>• <b>Average-data method</b> - estimating emissions for processing of sold intermediate products based on average secondary data, such as average emissions per process or per product.</li> </ul>
<p><b>CATEGORY 11</b>  <b>Use of sold product:</b>                      End use of goods and services sold by the reporting company.</p>	<p>Calculation methods for direct use-phase emissions. Companies should first determine in which categories their products belong. The following products have direct-use phase emissions:</p> <ul style="list-style-type: none"> <li>• Products that directly consume energy (fuels or electricity) during use - involves breaking down the use phase, measuring emissions per product and aggregating emissions.</li> <li>• Fuels and feedstocks involves collecting fuel use data and multiplying them by representative fuel emission factors.</li> <li>• Greenhouse gases and products that contain or form greenhouse gases that are emitted during use - involves collecting data on the GHG contained in the product and multiplying them by the percent of GHGs released and GHG emission factors.</li> </ul> <p>Calculation method for indirect use-phase emissions from products that indirectly consume energy (fuels or electricity) during use or products that indirectly consume energy or emit GHGs, the reporting company should calculate emissions by creating or obtaining a typical use-phase profile over the lifetime of the product and multiplying by relevant emission factors.</p>
<p><b>CATEGORY 12</b>  <b>End-of-life treatment of sold products:</b>                      Waste disposal and treatment of products sold by the reporting company at the end of their life.</p>	<p>The emissions from downstream end-of-life treatment of sold products should follow the calculation methods in Category 5 (<u>Waste generated in operations</u>), with the difference that instead of collecting data on total mass of waste generated in operations, companies should collect data on total mass of sold products (and packaging) from the point of sale by the reporting company through the end of life after use by consumers.</p>
<p><b>CATEGORY 13</b>  <b>Downstream leased assets:</b>                      Operation of assets owned by the reporting company (lessor) and leased to other entities, not included in Scope 1 and Scope 2 – reported by lessor.</p>	<p>Downstream leased assets differ from upstream leased assets in that the leased assets are owned by the reporting company. The availability and access to information depends on the type of asset leased. For example, a company that leases vehicles may need to request fuel or mileage data from lessees in order to calculate emissions.</p>

### CATEGORY 14

#### Franchises:

Operation of franchises, not included in Scope 1 and Scope 2 – reported by franchisor.

Companies may use either of the two methods to calculate emissions from franchises:

- **Franchise-specific method** - collecting site-specific activity data or Scope 1 and Scope 2 emissions data from franchisees.
- **Average-data method** - estimating emissions for each franchise or groups of franchises based on average statistics, such as average emissions per franchise type or floor space.

### CATEGORY 15

#### Investments:

Operation of investments (including equity and debt investments and project finance), not included in Scope 1 or Scope 2.

#### Equity investments:

- **Investment-specific method** - collecting Scope 1 and Scope 2 emissions from the investee company and allocating the emissions based upon the share of investment; or
- **Average-data method** - using revenue data combined with EEIO data to estimate the Scope 1 and Scope 2 emissions from the investee company and allocating emissions based upon share of investment.

#### Project finance and debt investments with known use of proceeds:

- **Project-specific method** - collecting Scope 1 and Scope 2 emissions for the relevant project(s) and allocating these emissions based on the investor's proportional share of total project costs (total equity plus debt).
- **Average-data method** - using EEIO data to estimate the Scope 1 and Scope 2 emissions from the investee company and allocating emissions based on share of total project costs (total equity plus debt).

The tables above only provide a rough outline for the assessment of Scope 3 across the wide range of categories. Should this table or the earlier visualisation aid in your decision making for a new or expanded boundary, consideration should always be given to the GHG Protocol: Scope 3 Calculation Guidance to ensure that you have a full understanding of the measurements you are undertaking.

### Plans, Strategies and Wider Scope 3 in Practice

As part of my role at the Scottish National Investment Bank, I engage and work with our portfolio companies to enable a collective and collaborative effort to limit any negative impacts on the climate.

Within our recently published [Carbon Management Plan](#) we made a commitment that as a result of our investment, investees are required to establish and embed carbon management and accounting processes, and ultimately develop carbon management plans and net

zero strategies. We believe that this requirement will help future-proof portfolio companies as they grow, enhancing their own processes. This in turn leads to improved datasets with increased accuracy and ultimately allows them to consider Scope 3 emissions as part of their own boundary.

So, the question is, where does this fit in with Scope 3 in practice for the Bank? Well, the truth is, we don't directly control our investee companies and we apply an operational control consolidation approach to our own emissions boundary, which means we attribute our portfolio emissions under 'Scope 3, Category 15: Investments'. This means we account for a proportion of investee emissions in the reporting year, consolidating this to give our own Scope 3 emissions for reporting.

Using the Category 15 methodology

for an equity investment, we are required to collect Scope 1 and Scope 2 emissions directly from investees (which is where the establishment of good carbon management and accounting across your value chain is vital), and take the percentage share of those emissions in relation to the total value of the company.

This is only one example of how we calculate Scope 3 in relation to

Emissions from equity investments =  
sum across equity investments



our investments and again more information can be found in our Carbon Management Plan.

### The Importance of Understanding your Wider Climate Impact

While companies and individuals



can overcome a lot of obstacles and climate related issues themselves, the reality is that siloed thinking in relation to climate change will only hinder progress and ultimately lead to failure across all sectors.

As I said within the Bank's carbon management plan: ***"The challenge presented by climate change - both today and in the future – emphasises that we must not only better understand the impact the climate is having on us, the way we work and live, but also the impact that we are having on the climate"***.

Collaboration with all stakeholders across value chains or within sectors is needed to ensure that the minimisation of emissions and ultimately net zero goals are met, particularly as there is an urgent need to address climate change, its impacts and risks. This is not only through mitigation, but also adaptation and resilience activities.

Scope 3 measurement within your organisational boundary should be seen as a minimum approach. Areas such as investments to meet regulatory developments

***"Whether starting out or expanding your Scope 3 boundary, it is important to stress that these things are a journey."***

and product-level footprints are becoming increasingly required. Therefore, the importance of understanding the full climate change impact of a business through value chain assessment and the development of more effective GHG reduction strategies is to the benefit of organisations who embed these practices.

Whether starting out or expanding your Scope 3 boundary, it is important to stress that these things are a journey. You won't necessarily have all the answers or information and that's ok. Build in good practices and this will allow you to expand and grow your boundary over time, with a view to understanding your full impact in the future. This will allow you or your organisation to set appropriate targets and ultimately support the transition to net zero.

#### **Author's profile:**

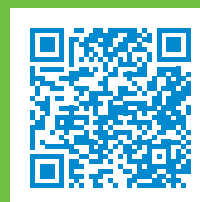
Craig is an internationally recognised climate change practitioner, with experience across the public, transport and investment sectors. He is a graduate of the University of Edinburgh, with an MSc in Carbon Management, a Member of the EMA and was named 2023 Sustainability Manager of the Year. He is also, Chartered Environmentalist and Fellow of the Institution of Environmental Sciences (IES), a Member of the College of Experts at the Office of Environmental Protection, Member of the Sustainable Scotland Network Steering Group and a Member of the Policy Committee at the IES.




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# Phase 3 Changes to ESOS Compliance

**The Energy Savings Opportunity Scheme (ESOS) is the UK's transposition of Article 8 of the EU Energy Efficiency Directive (2012/27/EU) into domestic law. It has been retained from EU law since the UK left the EU. The ESOS scheme is a mandatory energy assessment regulation for large organisations in the UK who meet the qualification criteria.**

During October 2023, UK Parliament passed the Energy Bill and subsequently confirmed the anticipated changes to Phase 3 of ESOS. These included extension of the notification deadline, changes to submission portal, as well as requirement for inclusion of additional information such as the inclusion of energy intensity metrics within the notification.

## **Impact of revised de minimis on ESOS outcomes**

One of the key changes is the reduction of the de minimis exemption allowance from 10% to 5%, meaning that participants must calculate areas of Significant Energy Consumption that cover at least 95% of a participant's Total Energy Consumption. Whilst the change was originally set out in the Government's Response to the ESOS consultation on 28th July 2022, Lead Assessors eagerly anticipated passing of the Energy Act in October 2023 for the final guidance to confirm this change. Ahead of the official confirmation,

some Lead Assessors and participants began working under the assumption of the new 5% de minimis exemption. However, those who began compliance activities early on in Phase 3 were at risk of redoing works that had already been completed.

Across other EU countries application of the de minimis allowance varies significantly. For instance, Luxembourg's legislation permits up to 20% de minimis allowance, whilst other legislation in Sweden specifies that this should be determined by the auditor (for non-significant energy users). The former use of a 10% allowance as laid out in the regulation 25 of ESOS previously matched the local legislation of Denmark and Germany. However, the revised 5% de minimis allowance brings it more in line with stricter allowances seen across some of the EU EED national legislation, such as legislation within Belgium, Italy and the Netherlands where a zero percentage de minimis allowance exists.

The rationale behind this change, as stated in 2022 by the then Department for Business, Energy and Industrial Strategy (BEIS), is to allow *"participants to realise more significant energy saving benefits from areas of the organisation that may not previously have been considered, but without placing disproportionate costs on participants"*.

## **Identification of energy efficiency opportunities**

The inclusion of a greater amount of energy within the ESOS auditing scope has presented businesses with the opportunity to identify further areas for energy savings, resulting in carbon and cost savings. Further, a more comprehensive assessment and accurate picture of a business's energy usage can be determined. Providing a more detailed insight can uncover previously overlooked sources of energy waste or inefficiency, which is likely to result in improvements in data quality, granularity and accuracy, if energy is subject to auditing. These positive impacts are echoed by 45 out of 80 respondents to the UK Government's consultation on the changes made to strengthen the ESOS scheme<sup>1</sup>. Of those in favour of the de minimis change, it was generally considered that it would allow organisations to identify further ways to reduce energy consumption and would encourage greater coverage of the scheme and improve data quality.

To date, the ESOS scheme has resulted in estimated annual efficiency energy savings of 1.65TWh from buildings, 1.51TWh savings for industrial processes, and 0.52TWh of fuel efficiency savings across the ESOS population. With the extended coverage of energy within the auditing scope of the

<sup>1</sup><https://assets.publishing.service.gov.uk/media/62e255eee90e07142f107ef4/energy-savings-opportunity-scheme-consultation-govt-response.pdf>

scheme, these energy savings figures are expected to increase and DESNZ estimate 28TWh total energy savings from the changes over the appraisal period 2023 – 2037<sup>2</sup>. These additionally identified energy savings could realise financial savings for participants within asset or fuel types that have sat within the de minimis for both previous phases, helping to greater expose energy saving opportunities in previously un-audited areas of a business.

By exposing potential energy savings that may not have otherwise been realised, the changes in ESOS compliance contribute significantly to advancing the Net Zero transition efforts. These potential energy savings represent untapped opportunities for reducing energy consumption, which in turn leads to lower carbon emissions and a more sustainable energy footprint. This aligns directly with the one of the overarching goals of the changes to ESOS – to ensure ESOS recommendations are consistent with the UK's net zero commitments. Furthermore, the identification and implementation of energy-saving measures driven by ESOS compliance changes result in tangible benefits beyond emission and energy reductions. These benefits may include cost savings, enhanced operational efficiency, and improved competitiveness in a rapidly evolving market landscape. As businesses adopt more sustainable practices to meet ESOS requirements, they contribute to

the broader transformation towards a low-carbon economy, supporting the transition to Net Zero.

### Implications for the ESOS assessment itself

From a practical point of view, the additional 5% of a participant's energy consumption that needs to be considered within the auditing scope has meant that, in some cases, the required number of audits has increased. Another impact, in some cases, has been the triggering of the inclusion of transport energy into the Significant Energy Consumption, which for previous phases, fell within the de minimis.



The sudden inclusion of transport within Significant Energy Consumption poses a challenge for participants who may lack the necessary resources to record transport data beyond mileage. The ESOS Impact Assessment<sup>3</sup> states that the time needed to assess a company's transport operations will depend on the availability and quality of the data on its transport operations. The Energy Saving Trust also estimates that an audit of a company car or van fleet tailored to a business's fleet operations

takes around five days. The ESOS assessment of a standard sized fleet is expected to require a similar level of expertise as building ESOS assessments, and so was assumed by the ESOS Impact Assessment in 2014<sup>4</sup> to cost £500 per day. For participants in the transport sector with more complex transport operations, the cost of analysing the transport fleet and identifying energy saving opportunities is expected to take longer and require a higher level of expertise (estimated at a cost of around £1,000 per day<sup>5</sup>).

The revised de minimis threshold and encompassing of further audits introduce a layer of complexity that may strain existing budgets and resource allocations that may have been secured well ahead of the changes being confirmed. DESNZ states that the additional costs for the changes in the current Phase 3 are estimated at £6,000 to £15,000 over 4 years<sup>6</sup>. The requirement for additional resources required by participants was noted as the primary concern of those who were not in agreement with the de minimis change during the Strengthening ESOS consultation from 6 July to 28 September 2021<sup>7</sup>. This financial burden, exacerbated by the pressures of post-pandemic recovery during Phase 3, could increase the risk of non-compliance and potential penalties for businesses that are unable to produce good quality audits or take shortcuts to fulfil their obligations. For businesses that already have an in-house Net Zero or Energy

<sup>2&6</sup> <https://www.gov.uk/government/publications/energy-security-bill-factsheets/energy-security-bill-factsheet-powers-to-strengthen-the-energy-savings-opportunity-scheme>

<sup>3&4&5</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/323116/ESOS\\_Impact\\_Assessment\\_FINAL.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/323116/ESOS_Impact_Assessment_FINAL.pdf)

<sup>7</sup> <https://assets.publishing.service.gov.uk/media/62e255ee90e07142f107ef4/energy-savings-opportunity-scheme-consultation-govt-response.pdf>



Efficiency strategy and who may perceive ESOS as a 'tick box exercise', the changes and resulting additional cost burden may redirect resources away from more impactful Net Zero initiatives due to increased compliance costs.

While the aim of these changes is to improve data quality and assessments, the changes to Phase 3 may leave participants without adequate time or budget to provide detailed data for effective profiling and assessment to support energy-saving recommendations. This is not a fault of the participant nor Lead Assessor, but rather stems from the timing of the Phase 3 changes and their alignment with planned business priorities. Had the de minimis change been confirmed earlier or prior to Phase 3, businesses would have had the opportunity to implement better data recording practices, whilst being able to effectively manage budgets and resourcing upfront in Phase 3.

### **Navigating the Phase 3 changes**

Phase 3 changes have had impact on Lead Assessors and auditing teams in the participating organisations or consultancies necessitating additional resources and administrative complexities to meet the heightened auditing requirements within a stretched timeline. For some organisations, the final assessments could only be conducted after the changes were confirmed by the Energy Act, which

became law in October 2023 to ensure that additional works were not completed in vain. This has meant that these final audits have been pushed into a tight timeframe, especially for Lead Assessors who are handling multiple ESOS assessments concurrently.

The Phase 3 changes to the ESOS scheme have resulted in the extension of the ESOS deadline to 5th June 2024, and the subsequent delaying of enforcement action on non-compliance until 6th August 2024. The recurring changes to compliance have led to some difficult conversations for Lead Assessors in explaining the change of scope several times to clients. Additionally, the changes pose uncertainty and risk of compliance fatigue if deadlines are frequently extended. Constantly shifting deadlines can create confusion for participating organisations and make it challenging to plan and prioritise their compliance efforts effectively. Further, the changing deadlines may have posed significant challenges for invoicing projects, cash flow, resource allocation, administrative burden, client relations, and contractual considerations for ESOS Lead Assessors and the organisations they may represent.

The heart of the issue lies in the need for greater alignment between the Phase 3 changes and business planning cycles. The provision of sufficient lead-in time for ESOS

implementation changes could have allowed for businesses to be better prepared for compliance requirements, ultimately fostering more robust data collection practices and facilitating more informed energy audits. Let us hope for adequate advance guidance on the new mandatory elements in Phase 4 including the PAS 51215-1 Energy and decarbonisation assessment PAS standard.

Overall, opinions on ESOS Phase 3 changes to the de minimis may vary based on factors such as industry, company size, and environmental priorities. While some stakeholders may welcome the de minimis change for their potential environmental and economic benefits, others may express concerns regarding compliance costs and administrative challenges. However, the transition towards a sustainable energy future demands collective action and by acknowledging these challenges and proactively addressing them, businesses can navigate the evolving ESOS landscape effectively while advancing towards their Net Zero aspirations.

### **Author's profile:**

Emma is a Principal Consultant within Sustainability & Climate Change at WSP in the UK. Emma is responsible for ESOS compliance and implementation of energy and carbon savings projects & Net Zero strategies for clients across the built environment. She is an ESOS Lead Assessor accredited with the EMA.



# The Role and Impact of Being an ESOS Lead Assessor



**ESOS Lead Assessors are required to lead, review and approve energy audits and assessments and are vital in supporting the majority of participating organisations in the delivery of ESOS compliance. With ESOS Phase 3 compliance deadline around the corner, we asked three EMA registered ESOS Lead Assessors about their career, involvement in the compliance, and plans for Phase 4.**

**Interview with Mark Taylor, Director at Taylor Made Energy Solutions**



## How did you get into a career in energy management?

I drifted into energy management probably like a lot of energy managers - by accident. I was first asked to look at pumping projects for Welsh Water in 1995-96, then delved into tariff management and energy savings projects and it went from there. I gradually saved the company more money and in 2000 I became their energy manager on a secondment, and 6 months later it was my full-time job.

My energy management interest could be traced to British Steel where I was trained as an apprentice in industrial measurement and control. That for me is the backbone of energy management. Apart from the behaviour change, energy management is all about measuring and controlling something such as energy and fuels. It was a pure coincidence that I trained in

measurement and control because, no one had thought of it back then, but it was a perfect background for energy management. Other disciplines have been introduced to it since. That's what keeps energy management interesting, it's changing and moving all the time.

## How did you become involved with ESOS?

During the Phase 1 of ESOS, I completed site audits for other companies with ESOS Lead Assessors, but I wasn't a qualified ESOS lead assessor then. Straight after the first Phase, and because I was already doing the ESOS audits anyway as part of my consultancy business, I decided to become a Lead Assessor myself. I've been registered as a Lead Assessor since then.

## How has your involvement in ESOS evolved since Phase 1?

I take customers on gradually and only where I can do everything, including the site audits myself. I'm not comfortable signing off other people's audits. You just can't know whether they're right. As a result, I'm always going to be limited by how many customers I can work with.

My auditing processes have remained the same since Phase 1, but a site audit was always something I've done anyway. It was just about putting it into a format that fitted with ESOS requirements and refining it as the phases have gone on. With each phase, I've tried to get my audits, reports and overall assessments more user friendly, readable and explanatory, rather than produce a dry audit outcome and report that no one wants to read and action.

Companies acting on the identified savings opportunities is the bottom line for me. If they wouldn't take any of the actions and have just tucked the report in a draw, then I wouldn't feel that I've done my job in a way, because I obviously haven't put it across correctly. There are always no cost opportunities that can be flagged up in every energy audit and if participants are not even willing to act on those, I find that disappointing and frustrating.

## How were the recommended energy saving measures approached for each of the completed phases?

Directors often seem keen to

investigate the proposed projects on the day of the sign off, and some of them do take actions. But with others when the next day comes along energy saving projects slip their agenda. The newly added requirements of the ESOS Action Plans and Progress Reviews will hopefully keep ESOS in their sights.

When I re-visit my ESOS customers, it is nice to see that there is not one site yet where nothing has happened. Maybe not a lot has happened, but they have done something on all the sites. It's good knowing that ESOS is working, and they have taken on some of the recommendations. Unfortunately, for a lot of companies ESOS is still a tick box exercise. Personally, I think a lot of it is down to the quality of audits. In the previous phases, companies were given audit reports not worth the paper they're written on, and with no information to do anything about the implementation of opportunities, they probably haven't done anything about implementing the suggested opportunities.

**Have the perception and attitude towards ESOS compliance changed amongst companies with each phase?**

ESOS hasn't changed companies into energy saving demons overnight. In my opinion, the major change we have seen is the war in Ukraine and unrest elsewhere in the world, which has impacted energy prices. That has engendered the interest and become a huge driver

for companies to now put energy saving actions in.

Some companies have done quite a lot between phases but those companies would have done something anyway. However, ESOS gave them the means to do it, by having the projects worked up and sat in front of them. It enabled them to do it by explaining what it is they could do.

The premise of ESOS is correct, it's the right thing to have done and something like that was always needed. But I think ESOS has fallen on the fact that it had no teeth right



from the start. If people chose to do absolutely nothing, they had the option of taking no action. It should have been a lot tighter in terms of who was doing audits from the start too. Hopefully, Phase 4 will be better.

**How are you preparing for the ESOS Phase 3 compliance deadline?**

The biggest challenge of Phase 3 was working around uncertainty. It's been more difficult this

time because of the very late consultation responses, rule changes and confirmations, which slowed everything down. I've done a lot of audits in advance, but I've been waiting to get that final guidance before charging too far down the route in the reporting. I could not write up the final reports until the additional information was confirmed in late 2023. While some information was in the consultation response, I couldn't finalise it until I saw the ESOS Phase 3 Guidance. It's meant there's a lot more last-minute work than I would like.

My method of working hasn't altered but this time I am collecting slightly different sets of data because of the benchmarking. It can be a time-consuming and tricky exercise to obtain data like floor area or to even get companies to decide on a metric. A classic office building is straightforward but the standard metrics of either building, process or transport don't fit that well for all. For instance, an animal charity wanted

to try an activity metric, but it was difficult for them to work out how many animals had passed through and how long they were there for. Another example is a printing company that could not decide whether to use reams of paper or numbers of copies. It's not just about choosing one metric over another; it is having a metric that doesn't punish companies in future phases. If they expand or they do more, they want to make sure it is reflected in the metric. If the animal



charity treats a lot more animals in the next phase, they will use more energy. It would be unfair if they're just treated on a square meterage basis as it doesn't reflect their work.

The de minimis change has not worked that well for my customer-base. For instance, the 5% for one customer was made up of about 5 small sites. Given their very small consumption volumes, none of them have really benefitted from being audited and it certainly hasn't been worth the extra money for the type of findings that were in them. The 5% is important for big companies because it could be a huge amount of energy, but smaller companies are just forced to audit sites which aren't justified in either cost or energy saving terms. I understand why some of the ESOS changes are there, but they aren't hugely beneficial for some customers, and the change to de minimis is one of them.

Overall, most of the new changes are straightforward and reasonably sensible, and they weren't too difficult to include in my assessments.

**If you had the opportunity to change one thing in the ESOS compliance that would make your role of an ESOS Lead Assessor easier or would improve the scheme, what would you change?**

What I would have changed in Phase 3, is to get the act into gear earlier. For ESOS in general, I would change the auditing side and not let just anybody conduct the ESOS audits because it has just resulted in such poor audit quality delivered by clearly unskilled and unqualified people.

**What advice would you give to someone looking to become an ESOS Lead Assessor?**

Don't expect ESOS to be easy, or that it's just getting trained and ticking boxes. That's not what being a Lead Assessor means. If it's to be done properly, as it should be done, it needs to be taken seriously, and it requires a reasonable energy management background and skill level, and energy auditing experience.

There's a huge amount of fascinating and varying work out there, but it must produce reports and assessments that are usable and useful for companies rather than just seeing it as a way of making money.

**How do you view the future of ESOS for Phase 4 and beyond, and your role in it?**

I think ESOS is going in the right direction with what has been suggested for Phase 4, and including Net Zero and renewables is a sensible move. However, a balance needs to be struck between collecting and giving information which is valuable for the participant, and them paying Lead Assessors to collect information for the government. When it becomes a data gathering exercise rather than something practical, which is what I prefer, I will probably have to re-consider being a Lead Assessor. I'll see what the shape of Phase 4 is before I make a final decision.

I'm hoping for an update to Phase 4 that will expand the qualification date to give all of us lead assessors more time to work. Any Phase 4 consultation and/or DESNZ engagement should be in place later this year. I don't know if that's possible, but it's important to understand what information we will need to collect for Phase 4 and by when, to ensure a good outcome of audits and quality of the assessments.

**Interview with  
Katie Elmer,  
ESOS Lead  
Assessor,  
Business  
Development  
Manager  
at JRP Solutions Ltd**



**How did you enter the field of energy management and what have been the key factors influencing your career progression?**

I have always been passionate about the environment and nature. My entry into energy management started after I completed my MSc in Environmental Monitoring and Assessment in 1997, which included a six-month industry placement at an electronics factory focussing on energy and waste management. During this time, I successfully implemented several energy and cost reduction projects, and secured my first job in an Environmental Consultancy based in Coventry.

Initially, I held various sustainability roles but was drawn to energy management due to its clear impact on carbon, environmental, and economic metrics. Currently, at JRP Solutions, my energy role sits within the broader realm of environmental, social and governance (ESG).

**What prompted your involvement with ESOS and how did you begin your journey with this initiative?**

I was introduced to ESOS during its initial phase in 2015. I was part of the first group from the Energy Managers Association (EMA) to undertake the qualification process and become a Lead Assessor.

My involvement was driven by the recognition of a business need and opportunity for a certified Lead Assessor to adhere to new regulations. This role combined

my passion for sustainability with my project management and compliance skills. Since the start of ESOS I have signed off on over 200 assessments.

### **How has your role in ESOS evolved and how have stakeholder perceptions changed over time?**

My role has significantly evolved from initially establishing compliance frameworks to now advising on strategic energy and sustainability management practices. Initially, stakeholders viewed ESOS as a regulatory burden; however, as the tangible savings and operational efficiencies became evident, perceptions shifted to view ESOS as a valuable investment. Each phase has seen increased engagement and enthusiasm for energy optimisation.

ESOS has increased exposure to larger companies across various industries, helping me build longer-term relationships with clients and providing ongoing services such as monitoring, reporting, project implementation (including feasibility studies, renewables, de-carbonisation) and implementing energy-saving strategies and ESG/Net Zero support.

### **Could you discuss the approach taken towards the recommended energy-saving measures in completed phases and any notable achievements?**

In phases 1 and 2, the focus was on opportunities with the quickest payback periods. For example, in Phase 2, implementing advanced HVAC controls that reduced energy consumption by 20% within the first year, alongside automated control systems with paybacks of less

than one year and a reduction of approximately 20% in overall energy use. Behavioural changes alone have had significant returns (10-20% with minimal investment).

During Phase 3, there has been an observed increase in budget allocation for energy, reflecting a broader shift towards sustainability in corporate strategies, for example:

- **Increased awareness and commitment:** Over the past phases of ESOS, companies have become more aware of the potential cost savings and environmental benefits of energy efficiency projects. This has led to a greater commitment to



invest in energy management and sustainability initiatives.

- **Demonstrated ROI:** Companies that have implemented recommendations from previous ESOS phases may have seen significant returns on investment through reduced energy costs.

- **Regulatory and stakeholder pressures, targets and strategic long-term planning:** Investors, customers, and the public are increasingly demanding that organisations demonstrate responsibility in their energy use,

carbon footprint and broader ESG credentials.

- **Enhanced funding and incentives:** There may be more funding opportunities and financial incentives available now, such as grants, tax breaks, or favourable financing conditions for energy efficiency projects.

- **Technological advancements:** The continuous improvement and cost reduction in energy-efficient technologies and renewable energy sources make these options more attractive and feasible.

### **With the upcoming deadline for Phase 3 compliance, what preparations have you undertaken?**

Best practice advice for all phases of ESOS has included several critical preparations to ensure both compliance and maximisation of potential benefits for organisations.

Start energy audits well ahead of the deadline. This early start allows for thorough data collection, meaningful engagement with qualified assessors, and ample time to address any gaps in energy use data. Preparing early helps ensure that the audits are

comprehensive and accurate. The original advice was to undertake audits over the four years preceding the compliance date, but this did not anticipate recent events during Phase 3 (e.g. the new de-minimis ruling and reporting requirements). Hopefully this will be a key recommendation during subsequent phases.

Choosing experienced and knowledgeable assessors is crucial. These professionals should not only understand the regulatory requirements of ESOS but also be

able to identify the most effective energy savings opportunities tailored to specific operations.

It is essential to be meticulous in collecting detailed and accurate and real time data on all aspects of energy consumption. This includes not just direct energy usage, such as electricity and gas, but also indirect energy use like transportation. This detailed data collection helps in pinpointing more nuanced opportunities for energy savings.

Each phase of ESOS offers an opportunity to learn and improve, and help to refine the approach for this, and subsequent phases.

At the core of Phase 3 has been to ensure ESOS is integrated into broader ESG strategy and systems. The insights gained from audits should be used to build a culture of continuous improvement in energy efficiency within organisations. The introduction of annual Action Plans will be crucial to this.

The deadline to register on the Environment Agency's IT system remains as 5th June. However, organisations who are unable to submit their notification of compliance by 6th August will not face any fines. From an ESOS consultant's perspective, clear and constant communication has been important to allay any worries or confusion.

**If you could change one aspect of the ESOS compliance process, what would it be?**

I would advocate for a consistent reporting format (and supporting tools and information) with much clearer timelines and outcomes to enhance efficiency, and focus more on the actual goals of ESOS, transforming it from a regulatory requirement into a tool that actively

supports companies in their energy efficiency journeys. The delays in reporting during Phase 3 have significantly hindered the implementation of sustainability and energy projects in many organisations.

**What advice would you give someone looking to become an ESOS Lead Assessor?**

I would recommend building a solid foundation in energy systems and sustainability principles. Staying updated with regulatory changes and industry advancements is crucial. Networking with other professionals in the field can provide invaluable insights and opportunities. Having a strong team is vital; as a Lead Assessor, it is important to deploy the best technical personnel for surveys and a team of analysts to check data and ask pertinent questions.

**Looking towards Phase 4 and beyond, how do you see the future of ESOS, and your role in it?**

I anticipate that ESOS will continue to evolve, incorporating more advanced technologies and methodologies to drive sustainability. For Phase 4, I see my role not just as compliance-focused but as a strategic advisor, helping businesses integrate ESOS into their broader sustainability goals. Implementation will obviously be key, and demonstrating this will be crucial, so it will be important for organisations to partner with project specialists for many aspects of this.

Furthermore, whilst there is no set template for these, I welcome the annual Action Plans, and look forward to helping the organisations I work with keep their ESOS and Net Zero targets on track.

**Interview with Hür Bütün, Group Environmental Data Manager at INEOS**



**How did you get into a career in energy management?**

My day-to-day work deals with environmental aspects of ESG and reporting. However, I am also involved in energy audits within the framework of ESOS and the European Energy Efficiency Directive, as energy management is an inherent part of INEOS' operations and climate transition plans.

During my PhD, which focused on energy and resource optimisation for industrial systems, I had the chance to test the research tools I developed on INEOS sites as part of EU funded projects. It then felt natural to leave academia and start my industrial career at INEOS, a multinational conglomerate operating primarily in the chemicals sector (which is well known to be energy intensive), and support the company in its energy and climate transition journey.

**How did you become involved with ESOS?**

INEOS owns and operates several sites in the UK, some of which are very significant energy users. Therefore, INEOS UK operations have always qualified for ESOS. I work within INEOS' ESG team, which has been carrying out voluntary internal energy studies not only in the UK, but also at our sites across the world for more than 15 years. My involvement is a natural continuation of what my team has been doing in previous phases of ESOS, as well as of the work I



carried out prior to joining INEOS. In addition, it feels right to perform the energy audits in house instead of working with third parties, as we are already familiar with the industrial processes and can best support our businesses, operations and sites.

**How has your involvement with ESOS evolved since your registration as an ESOS Lead Assessor?**

I started working at INEOS 4 years ago, hence I have only been involved in ESOS as of Phase 3. However, the team I am working with has been involved in ESOS since Phase 1, and also undertaken further energy studies at INEOS sites across the world, so I was onboarded with extensive know-how.

Comparing the previous phases of ESOS with Phase 3, it is evident that not only the requirements of the assessment are increasing, but so are the expectations of the quality of the reports and audits. It is also becoming more challenging to find feasible energy saving measures, as lower hanging fruits have already been collected through measures implemented in the previous phases.

**How were the recommended energy saving measures approached for each of the completed phases?**

Our sites prepared a long list of energy saving options in previous phases of ESOS, which was reduced into a short list of measures that are technically and economically feasible. Then the projects were

presented to the business boards for their approval. Measures with little to no investment, e.g., changing operating conditions, are implemented unless they have any implications on safety or product quality. Other measures with capital investments are sanctioned only after a detailed economic analysis demonstrated that they meet our internal payback criteria. We also need to take into account the scheduled down time of the installations as any new equipment can only be installed then. Therefore, in certain cases implementation of the measures can only take place in the subsequent phase of ESOS, and only if there is a turnaround or another planned outage that will provide the required conditions.

**How are you preparing for the ESOS Phase 3 compliance deadline?**

In view of the initial deadline (5th December 2023), we carried out all the energy audits in Q2 and Q3 of last year.

SHE managers, process engineers, and operations managers and we identified long lists of energy saving options. Afterwards, economical calculations of the projects were completed by the site experts, which we used as a basis to shortlist the projects that are both technically and economically feasible. We are currently finalising the reports and are well on track for the updated deadline.

**If you had the opportunity to change one thing in the ESOS compliance that would make your role of an ESOS Lead Assessor easier, what would you change?**

I would remove the requirement of carrying out energy audits every 4 years, especially for industrial installations. Unless there have been significant changes in the site layout, e.g., starting up a new plant, replacement/refurbishment of significant energy users etc., going through every single step of our processes in detail every 4 years does not bring us much added

value. Instead, we could organise energy reviews focusing on the long list of energy saving measures identified last time, technological advancements over the past 4 years, and updated business case of energy saving measures due to changing market conditions. This would make ESOS much more

solution oriented as we would be able to shift our focus from identifying the same inefficiencies to identifying new technologies/advancements that will help us improve our energy efficiency.



I am the Lead Assessor for 6 of our sites in the UK. I organised audits at these sites together with the site experts including energy/

**What advice would you give to someone looking to become an ESOS Lead Assessor?**

- **Stay up to date with the ESOS changes.** For example, decrease in thresholds or additional data requirements can have a significant impact on the scope of the work.
- **Ensure open communication with the stakeholders.** This was easy for me, as I engaged with INEOS internal staff, but I can imagine that it is not always the case when you are an external party. It is important to make it clear from the beginning that the work that we carry out for ESOS, if done properly, can be used for the benefit of the site.
- **Inform yourself about the processes and technologies that are involved in the site you are auditing.** You don't need to become an expert in those processes, but you need to know where to look for energy savings. Industrial sites are extremely complex and without proper preparation audits will be long and inefficient.
- **Follow the changes in economic conditions.** We have seen large volatility in the energy prices in the past few years which had direct impact on the business case of energy reduction projects. Thus, it is important to keep a close eye on the energy market.
- **Use this as a learning opportunity.** Being the Lead Assessor does not necessarily mean that you are the one with the best knowledge about the processes or certain energy conversion technologies. At every audit, try to learn from

the experts and use that knowledge in the next audits. This will create a snowball effect and help identify energy saving opportunities at sites that are already running nearly optimally.

**How do you view the future of ESOS for Phase 4 and beyond, and your role in it?**

I believe the requirements in the next phases will keep expanding, which has been the case so far. Energy saving measures that the sites achieved should be tracked with further scrutiny and expectation for further reduction projects should be proportionate, considering what has already been achieved. Our sites have been investing in energy efficiency heavily, not only because of regulations and compliance, but also because it makes a business sense. However, we are starting to reach the theoretical limits and will not be able to improve our energy performance drastically unless we see technological breakthroughs in near future. Expectations from ESOS assessments should take such facts into account. In addition, I expect to see more links with the climate transition plans as energy consumption and GHG emissions are directly correlated. ISO50001 is already amended to take climate change aspect into account; other energy management frameworks will follow this. From my side, I will be involved in the next phase as well and try to work with further sites which currently perform their energy audits with external Lead Assessors.

# VIRTUAL WORKSHOPS



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By Astley Fenwick, Owner of Astley Fenwick Consultancy and Dr Sean Casey, Lead Energy Engineer at Environmental Strategies Ltd



# Tips for ESOS Energy Audits

The Energy Savings Opportunity Scheme (ESOS) energy audit is an assessment of an organisation's energy consumption and energy efficiency that aims to identify tailored and cost-effective measures which could be implemented to save energy. The energy audit forms a key part of an organisation's ESOS compliance and in this feature, two ESOS Lead Assessors offer their practical approaches to undertaking ESOS energy audits.



**Astley Fenwick,**  
Owner  
**Astley Fenwick Consultancy**

## PREPARING FOR AN ENERGY AUDIT

It is important to make contact with the on-site representative as soon as possible and at least 2 weeks before the planned audit visit. I usually arrange a Zoom or Teams meeting and discuss the information required prior to my visit. The list below could provide the basis for a discussion, although it is for guidance only.

Request for information prior to the audit visit

1. 12-months of electricity and gas consumption, including qualifying date, indicating the total use for each month. This should be in the form of

*copies of monthly utility bills.*

2. *Half-hourly data for electricity for the same time period as above.*

3. *Details of transport fuel and company travel for the same time period as above.*

4. *Details of all air conditioning and chillers (F-Gas Register would suffice).*

5. *A3 layout plans of all floors of each building for annotation. Fire plan layouts would suffice if nothing else is available.*

6. *Operating hours of each department.*

7. *Any restricted areas and where special PPE is required.*

8. *Organise an employee to accompany me during the audit and ensure access to technical information regarding building services (lighting/power/heating/hot water etc.), along with all major energy consuming equipment.*

9. *Copies of previous ESOS reports, if produced for previous compliance period(s).*

Data collection: poor and good data

Poor data is that which is generally incomplete with regards to 12-months energy consumption

requirement and is also not readily available. This informs me that the participant is not striving to regularly monitor their energy consumption and set possible reduction targets. This is an occurrence which is not often met since most ESOS complaint companies are usually efficient with regards to energy record documentation. However, if data was missing, say for one month, then an average consumption figure may be estimated and used within the report. The acceptance of this method depends on whether the utility is seasonally affected, i.e., heating or cooling of buildings. In which case, the data may not be linear. Any assumptions or estimates must be specified within the ESOS Report.

Good data is that which can be clearly understood and with as many recorded values as possible. With electrical energy, half-hourly data is usually available which is excellent for highlighting energy being consumed outside of normal working periods. Unless



the operation is 24/7, but then the Christmas holiday period can show when the facility is shut down and energy consumption should be as low as possible.

### CONDUCTING AN ENERGY AUDIT

My first action with any on-site audit is to hold a pre-start meeting with the participant and my escort. This allows for:

- *A discussion about the business operations in general as well as any installed equipment in particular.*
- *A confirmation of the organisation's approach to energy management for which I use the Carbon Trust's Energy Management Matrix.*
- *An identification of any safety requirements with regards to the Health and Safety Executive (HSE), and areas which may be prohibited for access.*

Once on-site, I would initially visit the 'hidden'

areas such as plant rooms, boiler rooms, air compressors, large chiller plant and switch rooms. I would glean as much information from the equipment with regards to power ratings, operation times, maintenance procedures, and look at the general condition of the plant and surrounding areas. This can provide an insight of the participant's attitude to the control of efficiency measures and operating procedures. As an example, with compressed air systems I would review time control, operating pressure indicators and discuss if the control pressure is not too high. I would check to see if a variable speed drive is installed to control pressure and if the equipment is air cooled,

to ascertain if the waste heat can be used to heat up adjacent areas. Similarly with boilers, I would review time control, temperature control settings, if heat recovery is in operation and check for missing manifold and pipework lagging. As with the 'hidden equipment', all other building services should be reviewed during a walkabout with the escort, visiting every area of the site. During this exercise, I would gather data for the Significant Energy Consumption (SEC). This



should include everything that is used during the operation of the building. Three key questions are used for this.

- 1) *What does it do?*
- 2) *What power rating is it?*
- 3) *How is it controlled (i.e., automatic time control, manual control)?*

This may appear to be a long drawn out operation but it is important so as:

- a) *not to miss any equipment that is important, and*
- b) *to ascertain as much information as possible to form a close representation of the facility's SEC.*

### EVIDENCE COLLECTED DURING THE AUDIT

The type and number of all

significant energy consuming equipment. The list below is provided to indicate a 'typical' facility's equipment, although it is for guidance only.

- *All major plants to possibly include production;*
- *Motors (speed, control, etc.);*
- *Heating systems primary source (boilers/unit heaters);*
- *Compressed air systems;*
- *Lighting (internal/external);*
- *Air conditioning equipment;*
- *Domestic Hot Water (DHW) systems;*
- *Catering equipment and small power system (kitchen units, computers, AV, etc.);*
- *Electric space heating;*
- *Renewable energy systems.*

Further notes include:

- *Location and type of equipment annotated on A3 floor plans for reference;*
- *Photographs to draw attention to anomalies and also as an aide memoir to assist with the report;*
- *General condition of significant equipment, i.e., missing lagging, leaking pipes, temperature set points, time control settings (if used), control methods (if applicable), lighting control (manual/occupancy/daylight);*
- *Confirmation of verbal information received from the escort regarding the three key questions mentioned previously.*

### Tools for collecting evidence

It is important to understand that all audits should be carried out in a non-evasive manner and that no controls should be operated except by the escort. My main tools

# Become an ESOS Lead Assessor



Play a fundamental role in the Energy Savings Opportunity Scheme (ESOS) cycle by ensuring that organisations complete their ESOS compliance in line with the regulatory requirements and by its deadline.

## Why

Becoming an ESOS Lead Assessor is a great way to demonstrate your professional ability and step up to the next level in your career. If you achieve this professional status, you can state your sector focus and specialism, allowing you to provide even more value and expertise to the organisation you are working for. ESOS Lead Assessor could be an employee of an organisation which qualifies for ESOS ('in-house') or a third party consultant.



## How

Applicants who aim to become approved as ESOS Lead Assessors are expected to demonstrate a good quality and relevant professional energy assessment and energy auditing experience relevant to the PAS 51215 competencies and register with one of the ESOS Lead Assessor Registers.



## EMA ESOS Lead Assessor Approval Process

Applicants who decide to achieve their ESOS Lead Assessor approval and registration with the EMA will follow these steps:

1. Completion of an Application Pack
2. Attendance of the Become an ESOS Lead Assessor course
3. Completion of a written assessment
4. Completion of a Peer Review and Technical Interview

## What Next

Email us or arrange a call to discuss the requirements of the EMA application and approval process.





are my eyes and an inquisitive mind. The advantage being that this is my first time looking at the systems with a fresh mind and no paradigms in my mind. When asked why and what, the escort will often say: "We've always done it like that and it works." I also use a digital camera and where required a thermographic camera which can be used to indicate poor insulation. A 13A plug in voltage display is used to check to ensure voltage levels are not too high and ascertain if voltage control might be applicable.

### WRITING A REPORT

Listed below is a 'typical' list of the information that I would include within an ESOS Report. This follows the requirements of the Environment Agency for ESOS Phase 3. The report should be easy to read and understand, not too technical (calculations can be included within the Evidence Pack), but provide guidance to the 'decision makers' who could act on the recommendations.

An important subject to mention is that the recommendations and energy saving opportunities are for guidance only and indicate 'ball park' estimations. Before financial assets are committed, firm proposals and costs should be obtained.

- *Executive summary (including risks and uncertainties);*
- *Introduction (site details);*
- *Site energy profiles (benchmarking);*
- *Energy management practices – existing/proposed;*
- *Energy reduction opportunities (Net Zero);*
- *What next?;*
- *Appendices – assumptions/evidence pack;*

- *Conclusions;*
- *ESOS energy assessment report sing off form.*

### TIPS FOR ANALYSING ENERGY CONSUMPTION

Total Energy Consumption (TEC) is comparatively easy to provide based upon the utility and transport information provided by the participant. This is the first exercise to be undertaken before writing the report because it will highlight any areas which could fall under the de minimis statement of 5% of the TEC, in which case it may not be included.

Significant Energy Consumption (SEC) compilation is a fairly lengthy process but ensures that the information and data gathered during the audit visit represents a reasonable profile compared to the TEC. The exercise does, however, require estimation of operating hours and loading factors of the equipment, both of which can be noted and discussed with the escort during the audit. I find it extremely useful to use Excel software for this exercise.

For the electricity profile, I produce a graph indicating a monthly profile for the qualification period. Depending on the facility, this could indicate seasonal changes and holiday periods. Using the half-hourly data, I will produce two graphs which indicate the average yearly profile for the 24-hour period and also an annual profile for the daily totals. The former indicates the average profile of the electrical load and if consumption is significant outside 'normal' hours. The latter graph can provide a profile of normal demand against out of hours. This greatly helps to understand what amount of energy is being consumed during the time

when the building is not in normal use and hence wasting energy.

With regards to gas consumption, the information received from the participant is usually in the form of monthly use for the qualification period. Again, a graph is produced to indicate the monthly use. If the energy is used for heating only, it would be expected to fall to zero during the summer months. For heating and hot water services, a use for hot water should be noted in the summer. The use of degree day information will also be useful to ascertain the correct profile of the heating. However, if gas is used for production purposes then the profile will not be seasonally indicated and the information gathered and used in the SEC may be used for comparative purposes.

### TIPS ON SELECTING ENERGY SAVINGS OPPORTUNITIES

In most ESOS audits, I usually discover that the participant's approach to energy management is not significantly embedded within the company's operations. My first opportunity is to recommend that they produce an Energy Policy to steer the company in the direction of a formal approach. Included within this is the introduction of an energy monitoring system which will provide the basis for better control and understanding of their consumption. It is widely accepted that a minimum of 5% saving can be achieved by energy monitoring and setting reduction targets.

My next stage of looking for recommended savings is to look at those areas which require no or little capital expenditure. This could include reviewing set point control for heating and cooling, compressed air pressure control (the industry standard being



6bar), installing plug in timers for water heaters, vending machines, etc., training of staff to switch off equipment when not in use or occupancy sensors for lighting. These are examples only and there could be other suggestions for similar applications.

My latter stage in recommendations would be to assess the efficiency of the existing processes and equipment with a view to the costs to replace with more efficient type. A simple case would be the replacement of fluorescent lighting with LED type. Furthermore, the operation systems, for example of an air handling plant (AHU) and water pumps would be reviewed to ascertain if the motor's speed could be controlled using variable speed drives. For instance, if the air flow from an AHU is controlled via a damper in the unit, then installing a VSD could reduce the speed and thus save energy. All of the above suggestions will require some capital expenditure and I would review the attractiveness of proposals by using a payback criteria and recommending the lowest payback period at the 'top' of the list.

#### **TIPS ON ESTIMATING COSTS AND BENEFITS OF ENERGY SAVINGS OPPORTUNITIES**

The saving of energy is obviously the reduction of kWhs (energy used and time taken) associated with the equipment being reviewed. The most assured method of reduction is to reduce the time the equipment is in operation by improved control and possible training. The next option is to reduce the power required for the equipment by either replacing or introducing technology to become more efficient. I have already mentioned

VSDs but this could also include heat recovery systems on ovens, boilers, etc. Heat recovery from air cooled compressors could be another option. When estimating budget costs for recommendations it is advantageous to be able to have information such as SPONS which provide up to date information.

Payback periods, which in the majority of cases, the participant prefers when reviewing saving opportunities. Life cycle costs are very useful when reviewing the replacement of equipment with a more efficient type. For example, replacing a motor with a high efficiency one could reduce the energy consumption by some 5% saving £X per year. The cost of the motor being say £Y. Under normal payback scenarios this may not be acceptable. However, over the expected life time of the motor, the savings could be significantly higher due to greater efficiency, say £Z. Therefore, as long as £Z is greater than £Y it is seen as an energy saving. In most cases, the replacement of motors with a high efficiency type would only take place when the original motor has failed and repair work is greater than replacement costs.

#### **TIPS ON ENCOURAGING STAKEHOLDERS TO IMPLEMENT ENERGY SAVINGS OPPORTUNITIES**

Before I leave the premises, I always hold a 'wash up' meeting with the participant and escort to review my findings and discuss what proposals I may be including within the report. Generally, during the audit, there will be occasions where improvements can be identified and therefore discussed. During the meeting, it may be possible to gauge the opinion of the participant regarding their attitude towards the

suggestions.

Following the presentation of the report to the client, I will propose a Zoom or Teams meeting with the participant to review the report and the attractiveness of the recommendations. I try and assure the participant that I will be available to discuss the details of the recommendations within the future should they wish. Depending upon the level of involvement, I will state that no charge for this will take place.

#### **Author's profile:**

Astley is an ESOS Lead Assessor with almost 48 years' experience within the building services sector, and 35 years' experience with industrial power and process control systems. His specialities include power distribution, lighting, motor drives, HVAC controls, compressed air systems, building services design and maintenance as well as running stakeholders' engagement campaigns in his previous role as energy manager at GSK.



**Dr Sean Casey**  
**Lead Energy Engineer**  
**Environmental Strategies Ltd**

#### **PREPARING FOR AN ENERGY AUDIT**

After preliminary contact with the customer, a start-up meeting is held with a company representative to identify their Significant Energy Consumption (SEC) and an appropriate sample of their

sites for audit. Once relevant sites are identified as a representative sample of the client's activities and building stock, dates are agreed for the audits to be carried out on-site.

#### Data

Probably the most important part of the whole ESOS process is data gathering. We all want the data to be supplied to us in a clean format (date down one column and KWh/Miles/Liters down the next) or, even better, in half-hourly format from SMART meters with that rich granularity that allows you to delve into baseloads and other analysis. In reality, this is never the case, and the data usually dribbles in piecemeal via scraps of photocopied invoices and various spreadsheets with ambiguous column headings.

Poor data is the data you can't trust because it's not from a primary source. An example can be where you've had to extrapolate monthly figures out of quarterly gas invoices or estimating office electricity consumption using floor area from the landlord's whole building invoice. It's primary data that is best – monthly actual meter reads for electricity and gas (or other fuels) with little or no credit notes or, as previously stated, data from SMART meters. Unfortunately, I encounter good data rarely in the data gathering process and you need to develop methods for manipulating poor data to give you some level of granularity that you can do some work with – remember to note down any and all assumptions you've made during the process though, to allow others to track where you've got your final data from.

#### CONDUCTING AN ENERGY AUDIT

I undertake all ESOS audits as Type 1 Audits, as identified by ISO 50002. They are carried out with further detail provided where necessary to evidence potential energy savings. I use BS EN 16247-1:2012 as a template for the energy audit delivery process:

- *Preliminary contact;*
- *Start-up meeting;*
- *Collecting data;*
- *Fieldwork and on-site audits;*



- *Analysis;*
- *Report;*
- *Final meeting.*

Every audit will be different, whether they are site based or done remotely (common for fleet audits). I try to have all my data gathered in beforehand to have an understanding of the site's annual energy use/patterns and what fuels they use. One of the most important aspects to planning the audit is to have the correct person available and on-board for the audit. This is not always the top manager, although they can certainly be helpful, but more often than not, the facilities person or maintenance manager is the ideal person as they have an in-depth knowledge of

everything that happens on-site.

Try to gain an understanding of the main activities for each site before you visit as this will often dictate what you need to look at during the audit. For example, if it is a manufacturing site, what type of processes do they have and where are they using their energy – is it thermal, motive, pneumatic, hydraulic?

#### EVIDENCE COLLECTED ON-SITE

My main areas of focus when on-site are usually split into Heating, Hot Water, Production Equipment, Lighting, Air Handling & Air Conditioning, Office Equipment, Catering & Miscellaneous Equipment. For each of these I do an Energy Use Profile where I gather in as much evidence as I can under the headings below that allows me to produce an estimation of the energy split for the site.

- *Quantity (How many of each type);*
- *Equipment Rating (Watts if possible);*
- *Usage (Hours/Day -Days/Week – Weeks/Year).*

There are a multitude of tools that can be used to gather in this evidence, and these can range from cheap to expensive but, in general, I have found that having a pen, notebook and a camera or phone is usually adequate. Taking photos of wider areas, including equipment alongside individual photos of each piece of equipment and its rating label (if available), really helps when going through your audit notes to build up the energy split, especially if there is an extended period of time between the audit and write up.

## WRITING A REPORT

The new requirement for ESOS has made it mandatory for all participants to submit an ESOS report. All reports are there for an audience and therefore it is important that they provide the best information and story to the client. Use charts to present data in a concise format and clear tables where a chart is not possible. For both, always discuss the data as there will be insights that can be gained. Reports should have consistent formatting to make it easy for the reader and keep the language simple and precise. I generally structure my reports to follow these headings, though some reports will change depending on the client's request.

- *Summary Action Plan / Audit Based Recommendations;*
- *Lead ESOS Auditor / Company Director Sign-Off;*
- *Auditor and Audit Methodology;*
- *Summary of ESOS Phases I and II;*
- *Total Energy Consumption for ESOS Compliance Period III:*
  - *Total Savings Achieved During Phase III;*
  - *Top 5 Energy Consumers;*
- *Energy Intensity Metrics:*
  - *Fleet;*
  - *Buildings;*
- *Audited Sites Common Savings Opportunities;*
- *Group Total Energy Saving Potential;*
- *Top Low or No Cost Saving Opportunities;*
- *Top Investment Opportunities.*

## TIPS FOR ANALYSING ENERGY

## CONSUMPTION

There are many tools available to analyse energy consumption, but many are costly to buy, and need training and time to master. Try to develop your own, repeatable methods for analysis (i.e., develop spreadsheets that require minimal data input but generate multiple outputs). I regularly use self-developed spreadsheets for the following consumption data:

- *Heating degree day analysis;*
- *Cooling degree day analysis;*
- *Half hourly data analysis;*
- *Extrapolation of quarterly to monthly data based on typical consumption patterns.*



## TIPS ON IDENTIFYING ENERGY SAVINGS OPPORTUNITIES

My main tip for choosing opportunities would be to use all your senses when carrying out an audit. Don't just rely on what you can see or what someone tells you to be the case. What can you hear when on-site? Is there traffic noise from outside an office? This might suggest that the windows are not performing well. Is there a hissing noise on the factory floor? The pneumatic circuit may be leaking and the compressor running unnecessarily. Does any area feel too hot or too cold? The heating/cooling system may not be operating or controlled correctly

or there may be a lot of personal heaters in use. Can any daylight be seen around loading bay doors or are there any conveyors running without products on them? Also, talk to the employees as you are going around as they are the ones that are there all the time. They will be able to tell you, very quickly, if they have experienced any issues and this is a gold mine (usually).

## TIPS ON ESTIMATING COSTS AND BENEFITS OF ENERGY SAVINGS OPPORTUNITIES

I tend to align my use of Life Cycle Cost Analysis (LCCA) and Simple Payback Period (SPP) with the ESOS guidance. I use SPP for short term capital investments (less than 3 years) and LCCA for long term capital investments (more than 3 years).

The spreadsheets I have developed automatically calculate SPP for all my recommendations and I use this to order these in my Summary Action Plan / Audit Based Recommendations

tables. For the long term investments, my spreadsheets output both Investment Rate of Return (IRR) and Net Present Value (NPV) that allows the client to make informed decisions for larger capital outlays.

### Author's profile:

Sean is currently working as Lead Energy Engineer for Environmental Strategies Ltd. He has a diverse background in several fields including Engineering, Construction and Further/Higher Education. Sean holds a BEng in Manufacturing Engineering, an MSc in Energy Conversion and Management, and a PhD in Engineering.



# Types of Energy and Carbon Saving Measures in ESOS

The Energy Savings Opportunity Scheme (ESOS) Lead Assessors identify, advise on, review, and calculate financial costs and benefits, of energy savings opportunities based on the outcome of the energy audit. These recommendations play a key role in the ESOS and the aim to reduce organisational energy use.

**ESOS Lead Assessors Dr Mary Pothitou and Sam Arje explain their approaches to carrying out this step of ESOS compliance.**

## TYPES OF ENERGY AND CARBON SAVING MEASURES IN ESOS



ESOS provides a structured framework for organisations to assess their energy consumption, identify opportunities for improvement, and drive sustainability and energy efficiency. This can be achieved by implementing efficiency measures, leading to significant cost savings over time and reducing the environmental impact of organisations. Adopting energy-efficient practices and implementing measures can also enhance brand reputation and create a more sustainable and resilient business model, reducing reliance on resources as well as mitigating the risks associated with energy price volatility and climate change.

During my involvement in the delivery of ESOS compliance for national and multinational organisations, I conducted numerous site energy audits and gained firsthand insight into key opportunities within different business sectors, including real estate, the IT sector, and manufacturing. Energy auditing primarily focused on real estate, encompassing office buildings and data centres, with fewer cases in manufacturing.

By Dr Mary Pothitou, Certified ESOS Lead Assessor (EMA)



### GETTING STARTED

To gain a comprehensive understanding of significant areas for improvement, it was critical to engage with Facilities Management teams and those operating onsite energy equipment in order to obtain details on equipment operational activities, people energy practices, and transportation. I developed a methodology for requesting information and data, providing clear instructions and templates to facilitate conversations with stakeholders and gather required details on building characteristics, energy systems used onsite and transportation data. Supplementary information was gathered during the onsite surveys, including reviewing equipment characteristics and maintenance records, verifying building plans against actual installed equipment at the time of the audit, and assessing Building Management System (BMS) utilisation and software sophistication. Beyond collating and verifying energy data and relevant information on energy systems and transportation, discussions on organisational intentions, goals, and investment plans were essential to identify tailored, practical and cost-effective opportunities.

Energy consumption and transportation data, information on energy systems operations, and people energy practices were key elements to consider and analyse when identifying energy efficiency measures. Profiling energy consumption was also key to breakdown how energy is used by specific assets or activities. The types of energy and carbon saving opportunities can vary depending

on the specific circumstances of an organisation.

Efficiency

opportunities were dependent on factors such as the organisation's industry, operations, goals, building ownership or leasing, and investment constraints. Therefore, prioritisation of efficiency opportunities was necessary.

### FACTORS TO CONSIDER

To prioritise identified efficiency measures, the aspect of the importance to implement the measure in order to facilitate future energy auditing was considered. This would involve improving asset inventory, metering and submetering installations to improve the quality of energy data for future analysis, and methods to enhance transport data, for monitoring energy consumption and identifying issues and potential energy savings. Furthermore, higher energy savings and carbon savings with a shorter return on investment and ease of implementation were criteria considered for the prioritisation of the efficiency measures. This included 'quick wins' such as implementing lighting upgrades, optimising building shading to reduce heating waste or excessive cooling demand, and BMS optimisation. Additionally, HVAC system optimisation, such as improving pipe insulation and implementing smart controls which can lead to substantial energy savings, were prioritised in most cases compared to those measures which would require higher capital investment, time and effort to be implemented, as for instance renewable energy adoption, HVAC equipment upgrade, waste



heat recovery or free cooling and behaviour change initiatives. These measures were primarily applied to office buildings, data centres and factories.

### ESOS EXAMPLE

A practical example of an organisation with different types of buildings was a multinational company that provided information technology services and consulting, with over 100,000 employees worldwide, operating in 60 countries, including Europe and the UK. The IT company operated data centres and occupied office buildings in the UK and was in scope for ESOS due to the number of employees (exceeding 8,000 employees within the UK at the time of the audit). During the energy audit, the total energy consumption (TEC) of the UK portfolio (comprising 56 sites) was close to 280,000 MWh, including grey fleet transportation. The primary energy consumed was electricity for heating, ventilation, cooling, and small power use, with gas used solely for restaurant facilities and diesel fuel minimally used only for backup generators in the data centres. Due to the

implementation of the ISO 50001 energy management system for the operation of data centres, a number of sites were out of scope for ESOS, covering 65% of the total energy consumption. The organisation required to conduct energy audits for ESOS for those sites not certified to ISO 50001 in order to cover the remaining 35% of energy usage (approximately 100,000 MWh). A sampling approach was undertaken, considering sites (above 20,000m<sup>2</sup>) with significant consumption, representative of the portfolio (combining office area, data centre, restaurant facilities and parking areas) and sites owned by the organisation to be included in the audit. These sites accounted for 10% of the total energy consumed by the UK portfolio. The remaining 25% of total energy consumption consisted of sites mainly comprising office facilities leased with limited control over implementing energy efficiency measures.

### Short and mid-term opportunities

Most of the energy efficiency opportunities identified were short-term (defined as <5 years) and mid-term (defined as <10 years) capital improvements. These were

related to energy management practices, control enhancements, HVAC systems upgrades, application of renewable energy sources and behaviour change interventions for energy usage and transportation.

One of the energy management practices that was recommended included 'Energy Monitoring and Metering' involving the implementation of enhanced metering and submetering systems, along with an energy management programme to monitor energy usage. This enables data analysis and identification of areas for improvement in energy systems and equipment used onsite (e.g., HVAC, lighting, small power use). The metering and sub-metering system facilitates the disaggregation of energy consumption per end-use (heating, cooling, lighting, small power use) and enables monitoring of energy consumption, capturing unusual or excessive consumption. Due to the importance of good quality data to be accessed for understanding site performance, this efficiency measure is also applicable to organisations in various sectors (e.g., hospitality, IT sector, manufacturing, logistics/





warehouses). The anticipated financial investment in metering/ sub-metering systems was up to £30,000, considering the different sizes of the buildings and required equipment installations. The potential annual energy savings ranged between 420,000 kWh and 1,600,000 kWh, with annual cost savings of up to £120,000, and the estimated payback period was less than a year.

### Control improvements

A recommended 'control improvement' measure included the demand-side management via BMS optimisation and control of Air Handling Unit (AHU) fan motors. BMS optimisation allows real-time monitoring of energy consumption and performance benchmarking by comparing historical data and industry benchmarking to identify areas for energy efficiency improvements. The anticipated financial investment for this measure was £750,000, with annual energy savings of up to 550,000 kWh, and annual cost savings of up to £80,000, while the estimated payback period was around 10 years.

Improving control of AHU fan motors would enable more efficient operation of ventilation system for the control of temperature, humidity and air cleanliness. The estimated investment for this measure was approximately £37,000, achieving annual energy savings of up to 135,000 kWh, and annual cost savings of up to

£20,000, with payback period of two years. Generally speaking, optimising equipment operation and the scheduling of equipment maintenance ensure that energy systems operate at peak efficiency.

Examples of short-term capital investments included, the upgrading carpark lighting to LED with sensing control and



the installation of solar PV panels. Lighting upgrades to LED with improved control can achieve significant energy and cost savings, reducing maintenance costs and equipment replacement due to LED's longer lifespan compared to traditional lighting fixtures, especially in areas like car parks that benefit from daylight and minimal human presence. The anticipated investment for this measure was around £130,000, with annual energy savings of up to 450,000 kWh, annual cost savings of up to £65,000, and a payback period of two years.

### Renewable energy opportunities

The application of renewable energy sources was recommended

to the organisation because renewables can provide partial energy independence and resilience against rising energy costs, fuel shortages and power outages, while reducing environmental impact of using energy from fossil fuels as green energy is generated onsite. The installation of roof-mounted solar PV panels covered

areas ranging from 800m<sup>2</sup> to 8,000m<sup>2</sup>, with anticipated investment between £100,000 and £1,000,000, annual energy savings from 100,000 kWh to 1,000,000 kWh, and payback periods of up to seven years.

### CONCLUSION

The above sample of measures detailed as part of the energy audit for the IT company were also applicable to other types of organisations, professional and bank

services using office buildings, manufacturing facilities, and logistics/warehouses. These efficiency measures are amongst the most common ones which can be identified in most energy audits, alongside the measure of replacing conventional lighting with LED and sensing control in buildings.

### Author's profile:

Mary spent over a decade in academia, earning an Engineering Doctorate (University of Reading) and completing the Business Sustainability Management training course (University of Cambridge). In late 2019, she transitioned to the industry in the UK, conducting energy audits mainly in offices, data centres and manufacturing for national and international organisations.

# ENERGY AND CARBON MANAGEMENT *ONLINE* TRAINING SCHEDULE

*Energy Management Theory Combined with Real-World Applications*

## JUNE

6th	SECR Compliance
7th	Become an ESOS Lead Assessor
14th	Net Zero Fundamentals and Strategies
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21st	Energy Monitoring, Targeting and Validation

## JULY

4th	Energy Auditing Techniques
5th	Reaching Net Zero
11-12th	Fundamentals of Energy Management
18th	Energy Procurement

## SEPTEMBER

13th	Energy Management in Building Services
20th	Essential HVAC Control and Optimisation
27th	Lighting – Basic Understanding

## OCTOBER

4th	Water Management
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## IN-PERSON COURSES

In addition to the virtual training courses, the EMA delivers two in-person courses:

- Understanding and Delivering Behavioural Change Programme course
- Turning Data into Energy Savings course

These courses are scheduled on demand and to express your interest, please email [jana.skodlova@theema.org.uk](mailto:jana.skodlova@theema.org.uk).

**For an up-to-date list of all our courses visit our website at [www.theema.org.uk](http://www.theema.org.uk)**

*"A huge amount of information on various systems found in building services. Delivered in a nice way where questions were encouraged."*

**International BEMS Manager – WeWork**

*"Excellent knowledge transfer and applicable tools, techniques and methodologies."*

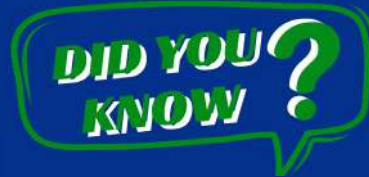
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The majority of the courses can be delivered virtually to teams or groups of stakeholders from the same organisation or industry in a standard format, or as tailored sessions (minimum 6 candidates). For a quote email [jana.skodlova@theema.org.uk](mailto:jana.skodlova@theema.org.uk) with your chosen course title and approximate number of staff. We can also develop new, bespoke material to fit your specific needs.

## TYPES OF ENERGY AND CARBON SAVING MEASURES IN ESOS



As an ESOS Lead Assessor, the “by the book” description of my role is to ensure compliance during the ESOS process for my clients. I prefer to think of my role as working to understand the client’s business, and use my experience and knowledge to advise on how their business operation can run in a more energy efficient way with very little or no impact on either staff satisfaction, client satisfaction or business success. Ultimately at the end of the ESOS process, I want the participating organisation to be ESOS compliant as a by-product of the journey we have been on together. Getting them ESOS compliant is never my sole aim in the process, although it is of course necessary.

### GETTING STARTED

I start every interaction with a client that meets the criteria to comply with ESOS with a kick off call, that typically lasts around an hour. This has two purposes.

- 1) to ensure my client fully understands the ESOS requirements and processes, and what I will require to assist in the process.
- 2) to get an introduction to their business operations and the way it runs, with little or no focus on energy, to ensure that my recommendations can be targeted

By Sam Arje, Senior Energy Consultant at TEAM Energy



and aligned as much as possible to their business operations.

This initial call helps me create an Audit Plan, which is where we document the ESOS process we hope to undertake; which buildings are to be audited, the reference period to be used, the energy data sources we will use and the elements of the organisation that are in or out of scope for ESOS.

### FACTORS TO CONSIDER

Before any site audits are conducted, I like, where possible, to have the data for that site well in advance, so I can see what their energy usage looks like for the building(s) to be audited. Where half hourly data is available I like to create an expected profile of the energy use for the day I am due to carry out the site audit. I always give the client the choice as to whether they would prefer to have a chaperone to assist me on the audit or whether I should carry out the audit alone. Both methods have their advantages and disadvantages. Working with a chaperone allows questions to be asked as we walk around, but could restrict what is shown to me. Working alone allows me free reign of the building and allows perhaps a more “real” image of what really occurs there, but means questions are restricted to after the audit.

During site audits, my most useful tool is a camera. I always check with the client if they are ok with me taking photos during the audit (obviously not capturing any people or confidential information in any pictures). However, backing up recommendations and opportunities in building audit reports with a photo of the offending behaviour, infrastructure,

technology or fabric is often more meaningful than paragraphs of written text. I would recommend that all ESOS auditors include photographs in reports where they are permitted to.

I try to write up at least the framework of the site audit within a week of completion. As ESOS Lead Assessors get more and more work, the closer to the deadline we get, sometimes this is not possible. But I have learned that writing up the report, while the actual site audit is still fresh in your head, can add more emotion and a personal touch to the findings. Rather than waiting longer and just going off the notes you made at the time as the site audit took place too long ago or several others have taken place since to remember some of the intricacies of the findings during the audit.

When writing up the audit, I always use the information gained during the kick off call and subsequent conversations to make the findings meaningful and appropriate to the organisation in question. For example, if I have audited a facility that is public facing, such as a retail unit or hospitality venue, I acknowledge that certain extravagant energy usage is expected in that environment to stand up to customer expectations. For example, for lighting displays that may be more decorative than operational in these environments, rather than suggesting removing them altogether, I would encourage (of course) replacing them with LED if not already done so, but focus more on controls such as timer settings that ensure they are off when no guests are present.







# Beyond the ESOS Compliance Notification Date

**The Strengthening the ESOS consultation and subsequent changes to the Scheme broadened several obligations that will need to be disclosed beyond the upcoming deadline for Phase 3 compliance in June. We have asked two ESOS Lead Assessors to share their perspectives on the added requirements.**



**Rob Leak**  
Director of Compliance Delivery  
Inspired PLC

Although the ESOS Phase 3 compliance date of 5 June is an immediate priority for eligible organisations, we must already look beyond it.

Following last year's [legislation changes](#), organisations no longer have the comfort of a 3-4-year breather. ESOS now comes with annual reporting: Phase 3 participants must publish an Action Plan by 5 December 2024 and report on progress against their targets annually.

#### WHAT IS THE CONTEXT?

The Energy Savings Opportunity Scheme (ESOS) was first introduced in 2014 to address the information failures and behavioural barriers to adopting energy efficiency measures, such as lack of visibility and poor-quality energy consumption data and reporting.

Until recently, qualifying UK organisations have been required to conduct an assessment of the energy usage in their buildings, industrial processes and transport every four years. In turn, this assessment provides tailored energy efficiency recommendations, which must be signed off by a board member. While the identified recommendations are intended to be reasonably practicable and cost-effective to implement, it is not mandatory to implement your ESOS recommendations.

Following the [ESOS Post-Implementation Review](#) and the external evaluations of the scheme in 2020, several areas that could be strengthened to improve the quality of ESOS audits and increase the uptake of energy efficiency recommendations were identified. The UK government also legislated a 2050 net-zero emissions target, and energy efficiency will play a key role in achieving this. Following further consultation, ESOS regulations were amended substantially in 2023.

#### WHY ARE ACTION PLANS BEING INTRODUCED NOW?

The Streamlined Energy and Carbon Reporting (SECR) Scheme,

introduced back in 2019, was originally anticipated to encourage organisations to act on their ESOS insights. However, this does not appear to have been as effective as first hoped. Changes to ESOS will lead to more organisations taking substantive action than under previous phases. These changes have also been welcomed across the energy sector, as ESOS reports will receive closer attention as their importance grows in energy efficiency planning.

Updated Phase 3 compliance guidance has already seen the inclusion of information about the next steps for implementing recommendations and a requirement to disseminate reports to subsidiaries. This will undoubtedly create much-needed awareness and transparency across organisations.

Phase 3 participants will be required to publish an Action Plan and progress updates in subsequent years. While it is still not yet mandatory to implement your energy efficiency measures, the Environment Agency, which regulates the ESOS scheme, will publicly disclose whether your organisation has stated what

actions it's going to implement and whether any action has been taken in the subsequent years through your annual progress updates. The board-level attention to these disclosures will encourage the increased uptake of recommendations — providing organisations with necessary cost and carbon savings.

**CHANGES IN REPORTING FREQUENCY**

ESOS Phase 4 is already underway. Unlike previous phases which focused on one compliance submission every four years, you will need to comply with annual submissions to the Environment Agency, as shown below.

**HOW CAN YOU DEVELOP AN ACTION PLAN?**

You will need to engage with your wider internal stakeholders to define an Action Plan that meets your business objectives, ambition and budget. Other business priorities and supply chain pressure must also be considered.

**ASSESSING YOUR RECOMMENDATIONS**

Your ESOS compliance report for

Phase 3 will include a variety of opportunities from low-cost and easy-to-implement options to those requiring significant investment, as well as more detailed consideration and planning. It is therefore important to carefully consider the opportunities identified within your ESOS submission and other outputs

**An ESOS Action Plan must include:**

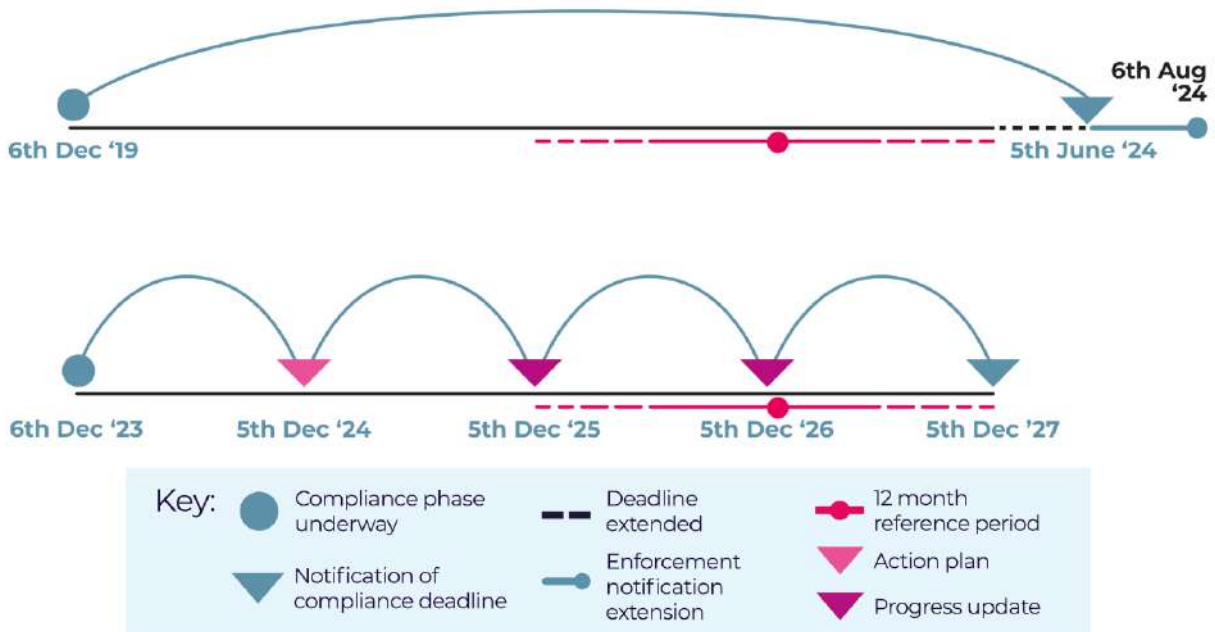
- a list of all the actions you intend to implement before the end of the action plan period;
- the month and year you intend to take the action;
- whether it was recommended by an ESOS energy assessment;
- an estimate of the total energy savings you will achieve during the action plan period and how the savings were estimated.

of your energy audits; which items you wish to include or at least explore further, on which sites and over what period.

While your ESOS Action Plan will be company-specific, recommendations typically include energy monitoring, low-carbon technologies or onsite generation. Some examples and considerations

are outlined below:

- Circuit-level monitoring will allow you to accurately report on your progress against targets as you introduce energy efficiency measures across your site(s). Circuit-level monitoring typically pays for itself within less than 12 months. The data-driven insights typically identify low-cost technical and behavioural issues and provide further justification for other efficiency projects requiring investment.
- Planned operational changes also need to be considered when planning your roadmap. For example, lighting upgrade projects may have been identified across three of your sites, but you are aware one of them may be vacated in 12 months' time. In this kind of scenario, you could invest in one site now and the second site next year, excluding the third altogether.
- Another example could be the identification of a large Solar PV project at one site, which due to capital investment is planned to be investigated further with the expectation of completing in two years' time.





In addition, your action plan may also include other opportunities identified outside ESOS, such as through your ISO 50001 compliance or CCA reporting. However, it is important to state which opportunities have been identified through your ESOS assessment.

### **COMPILATION OF EVIDENCE PACKS**

Evidence packs are already required under ESOS and they continue to be essential in building your action plan and measuring future progress. For each of the projects identified in your action plan, you need to demonstrate the energy savings that are expected to be achieved over the four-year period of the plan. The methodology used to estimate these savings needs to be clear and stand up to external scrutiny in case of any potential audit by regulatory bodies in years to come. Clarity of the methodology used to estimate savings will also enable organisations to measure and verify actual savings in future years. It's important to bear in mind that the responsibility of ESOS reporting for your organisation may be assigned to different people over time, so understanding the original basis on which estimates were made is essential.

### **HERE ARE SOME CHALLENGES YOU MAY FACE AND HOW TO OVERCOME THEM**

#### **1. Defining an action plan.**

One of the biggest challenges organisations will face is defining an action plan within the limited timeframe available. Wider stakeholder engagement will likely be required to review your proposed Action Plan and projects for inclusion, the time frame for implementation, available budget, calculation of savings, etc.

Ultimately, the plan will need to be approved and signed by a director-level (or equivalent) person within the organisation.

**2. Project scoping.** The recommendations within some ESOS reports could be relatively high-level and based on industry-standard assumptions. Once you have determined which projects meet your budget and ambitions, you may need to undertake a thorough cost-benefit analysis which considers your 12-month energy profile, energy supply contract and forecasted consumption, as well as conflicting projects. Larger investments also require more detailed feasibility studies or investment-grade audits to be carried out.

**3. Project management.** A lack of in-house knowledge and expertise can lead to bad energy efficiency investment decisions. In turn, failure to manage efficiency projects effectively can result in higher costs and projected savings not being realised. It is therefore advisable to review the in-house knowledge, skills and expertise, and fill in the gaps with upskilling or engaging a subject matter expert with a proven track record of delivering energy-efficiency projects and experience in your sector.

**4. Reporting on progress against target.** You will need to calculate your estimated savings for each of the projects you intend to implement, and then report on progress against your target. Participants may want to consider simplifying their reporting process. This is where having the right data automation and energy management software in place to provide accurate and reliable savings verification becomes a priority.

### **WHAT CAN WE TAKE AWAY FROM ALL THIS?**

These changes to ESOS present a significant opportunity for organisations to make cost and carbon savings, and strengthen their wider Environmental, Social and Governance (ESG) disclosures. Therefore, the time to engage internal teams and consider budget and resource requirements is now. You may engage your ESOS provider in creating your Action Plan, particularly where they may also be able to assist in reviewing and implementing future projects.

#### **Author's profile:**

Rob is a Director of Compliance Delivery at Inspired PLC. His team delivers energy and compliance solutions, including ESOS reporting. Rob has also participated in the new ESOS portal User Acceptance Testing to identify system issues and provide guidance for Phase 3 and 4 compliance.



**Adeayo Sangowawa**  
Team Leader  
Energy & Carbon Saving Team  
Energy & Technical Services Ltd

### **WHAT IS AN ACTION PLAN IN THE CONTEXT OF ESOS AND WHAT IS ITS PURPOSE?**

The energy savings opportunity scheme (ESOS) is one of the existing regulations that offers a guide for assessing and improving business energy efficiency. In order to strengthen ESOS and ensure that businesses are acting on these energy efficient recommendations,

it is now a requirement to produce an Action Plan. This ensures that all businesses that participate with the scheme are taking steps to reduce consumption and cost, as well as contribute to the UK's net zero commitment through reducing emissions.

The scheme is required to be reported every 4 years, 2 phases of the scheme have been completed and the 3rd phase of the scheme is ongoing as shown in Table 1 below.

Following the consultation for strengthening ESOS, the new regulations have requested that all participants (responsible undertakings) who qualified for ESOS in a given compliance period should produce an Action Plan. This should be done following the submission of the compliance notification and should set out the following requirements:

- *What to do to reduce energy consumption;*
- *When you intend to do it;*
- *Whether it was recommended through the ESOS assessment;*
- *What energy savings are expected to be achieved over the four-year period covered by the Action Plan;*
- *How these savings were estimated.*

Following submission of the Action

Plan, participants must submit an annual progress update against action plan commitments in the two subsequent years.

- *The ESOS Action Plan preparation and submission deadline for the third*



*compliance period is 5 December 2024, then the progress updates deadlines are 5 December 2025 and 5 December 2026.*

- *Each progress update relates to the 12-month period preceding the deadline*

The Action Plan periods that are covered over the subsequent years leading up to the next phase of the assessment is shown in Table 2 on the next page.

The only exception to producing an Action Plan is if the participant had had no energy responsibility during a compliance period and provided a compliance notification stating this.

The Action Plan must be signed

off by a board-level director (or equivalent) and submitted via the compliance notification system by the action plan deadline.

According to the new ESOS Regulations Guidelines, *"the purpose of the Action Plan is to require participants to consider what actions from the ESOS audit (or alternative compliance routes) they may wish to carry out before the next ESOS assessment, as well as plan future action to implement energy savings that they will make a public commitment to"*.

Not all actions set out in the Action Plan need to be recommendations from the ESOS audit; these may also be from measures recommended through an alternative compliance route (e.g., ISO50001) or other actions that participants may decide to carry out as part of their energy management strategy. However, participants should clarify the source of the recommended action in their Action Plan. Regardless of the ESOS compliance route, all participants' Action Plan requirements are the same. The Action Plan is aimed to be documented and publicly disclosed so that the organisation can use it to drive energy management actions. If savings do not meet the

Table 1

Phase	Phase 1	Phase 2	Phase 3	Phase 4
Compliance Period	6 December 2011 to 5 December 2015	6 December 2015 to 5 December 2019	6 December 2019 to 5 December 2023	6 December 2023 to 5 December 2027
Qualification Date	31 December 2014	31 December 2018	31 December 2022	31 December 2026
Compliance Date	5 December 2015	5 December 2019	5 June 2024 <sup>1</sup>	5 December 2027

<sup>1</sup>ESOS Phase 3 deadline remains 5 June 2024, the Environment Agency and Regulators for the Devolved Administrations will not take enforcement action against ESOS participants if they do not comply with this legal requirement provided that they meet both of the following conditions:

- *registration of their account in the new MESOS IT system has been completed by 5 June 2024, and*
- *they submit their notification of compliance by 6 August 2024.*

Table 2

Milestone	Dates
Compliance period	6 December 2019 to 5 December 2023
Action plan submission deadline	5 December 2024
Period covered by the action plan	6 December 2023 to 5 December 2027
ESOS Progress update 1 deadline	5 December 2025
Relevant reporting period to be covered by progress update 1	6 December 2024 to 5 December 2025
ESOS Progress update 2 deadline	5 December 2026
Relevant reporting period to be covered by progress update 2	6 December 2025 to 5 December 2026

required amount, that is fine as long as there is a methodology and reason for this. More information on the Action Plan requirements can be viewed in the latest [ESOS guide for Phase 3](#).

**HOW HAS IT BEEN RECEIVED BY CLIENTS?**

Previously, many clients regarded compliance with energy-saving schemes as a mere checkbox task, showing minimal interest in advancing beyond the initial requirements. However, this presents an opportunity for participants to reassess energy efficiency recommendations and strategically move towards implementation, offering additional benefits to businesses.

Most large organisations, having navigated through Phases 1 and 2 of the assessment, already have energy management strategies in place to ensure operational efficiency. Clients accustomed to producing Streamlined Energy and Carbon Reports (SECR) are well-versed in annual energy efficiency reporting; thus, integrating ESOS reporting should be manageable.

The primary obstacle participants face is securing funding to implement recommended measures. This financial hurdle adds pressure to comply, particularly when certain recommendations may not be financially viable.

However, it's essential to note that regulations don't strictly mandate adherence to all recommendations but rather emphasise informed decision-making and proactive steps towards improvement in energy efficiency.

While organisations aren't obligated to implement recommended actions, they can't simply draft an action plan and provide excuses for inaction. According to ESOS guidelines, failure to pursue savings actions or report any results will result in public disclosure that the participant has no intention of implementing energy-saving measures. This transparency requirement should incentivise organisations to earnestly commit to energy savings.

**BENEFITS**

1. Implementing an Action Plan streamlines the tracking process for both estimated and actual energy savings, facilitating better monitoring and management.
2. A well-defined Action Plan empowers participating businesses to establish clear targets and commit to achieving energy savings, fostering accountability and progress.
3. Taking proactive steps based on energy efficiency recommendations presents participating businesses with opportunities to significantly reduce energy consumption, costs,

and carbon emissions, contributing to both financial and environmental sustainability.

4. Organisations meeting ESOS requirements will likely be subject to SECR obligations as well. Including energy efficiency measures in the Director's report is a key component of compliance. By proactively implementing and annually committing to energy savings through an action plan, businesses fulfil a crucial aspect of streamlined energy and carbon reporting compliance.
5. Assigning specific responsibilities for each action item ensures clarity and accountability within the organisation, facilitating effective implementation of the energy efficiency measures outlined in the Action Plan.
6. As per the strengthening ESOS consultation, incorporating Action Plans from previous phases helps maintain the visibility of ESOS within the organisation between assessments. This practice prompts regular reviews of energy efficiency actions and encourages decision-makers to stay engaged in ongoing efforts to improve energy management.

**HOW HAVE YOU APPROACHED THE NEW REQUIREMENT?**

Before the enforcement of an Action Plan, I would issue an Energy Correction Measure (ECM) log to clients which serves as



a comprehensive summary of energy-saving opportunities. These opportunities are categorised based on recommendation types such as Lighting, Heating, Air Conditioning, Behaviour Change, and Control, making it convenient for clients to organise observations and recommendations. Additionally, clients can easily access information on estimated savings and costs associated with each recommendation and take next steps to implementation. Before moving ahead with an action plan, a thorough feasibility assessment is conducted to ensure effectiveness of actions to be taken forward.

With Action Plan requirement, the latest ESOS Appendix A3 template for Phase 3 recommendations provides a structured format for presenting actionable recommendations. It includes essential details such as Ownership and Completion Date, as well as Status updates. Moreover, the template incorporates suggested progress reviews for actions, highlighting key features to facilitate efficient monitoring and implementation. The Action Plan would contain the basic information as required in Section 12.3 of the

ESOS guide:

1. list of all the actions you intend to take to save energy, that you will carry out before end of the Action Plan period (which for Action Plans relating to the third compliance period is 5 December 2027)
2. for each action, the month and



- year you intend to take the action
3. for each action, whether it was recommended by an energy audit
4. for each action, an estimate of the total energy savings you will achieve during the Action Plan period through carrying out the action
5. for each estimate, the source of data used for the estimate
6. a combined estimate of the total energy savings you will achieve during the action period across all actions you will take
7. a breakdown of these savings by organisational purpose (buildings,

transport, industrial processes and other energy use)

An Action Plan Log will be created along this for progress updates following a similar template as shown in Table 3.

In summary, the importance of having an Action Plan in place cannot be overstated. Previously overlooked by businesses, it is now mandatory to document and publicly disclose an action plan, as per the new ESOS guidelines. These guidelines ensure a strategic approach to action planning, ensuring all relevant information is comprehensively documented. This facilitates effective tracking and implementation of energy-saving opportunities, ultimately contributing to improved energy efficiency and organisational sustainability.

**Author’s profile:**

Adeayo Sangowawa has been an energy consultant with Energy & Technical Services Ltd. since 2019. She is a Mechanical Engineer with a background in Building Services, Sustainable Energy and Entrepreneurship. Adeayo is also an Associate member of CIBSE and EMA. She is an ESOS Lead Assessor and Low Carbon Consultant with CIBSE.

Table 3

Action Number	Action	Date Logged	Logged By	Area	Responsible party	Completion Date	Status/ Note	Progress monitoring schedule	Next review of progress meeting
1	Replace existing lamps with LED equivalent.	23 <sup>rd</sup> March 2025	Steve Ray (Lead Assessor)	Lighting	Jonathan Ashton (Property Team)	1 <sup>st</sup> August 2027	Awaiting Supplier Approval	Monthly	24 <sup>th</sup> April 2025

**References:**

- [Strengthening the Energy Savings Opportunity Scheme \(ESOS\): Consultation on options](#)
- [Strengthening the Energy Savings Opportunity Scheme \(ESOS\): Government Response](#)
- [Comply with the Energy Savings Opportunity Scheme \(ESOS\): phase 3 Guidance](#)



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# Energy Management at Magna

**In this feature, we examine the diverse approaches to energy management that organisations in various industries and sectors have adopted. Join us as we explore the world of energy management in manufacturing and uncover the strategies and initiatives implemented by Markus Binder, Director of Energy and the wider Global Energy Team.**

## Background

We are a leading global automotive supplier with 342 manufacturing facilities and 104 product development, engineering, and sales centres in 28 countries. We have over 179,000 employees focused on delivering superior value to our customers through innovative processes and World Class Manufacturing. Our operations span five continents giving us a global footprint to support every major automaker in the world. Magna is taking a significant step forward in its commitment to sustainability and environmental stewardship by submitting net-zero emissions targets for validation by the Science Based Targets initiative (SBTi), the widely accepted benchmark for decarbonisation targets in line with the Paris Climate Agreement. The company's goal is to achieve net-zero emissions by 2050, with SBTi near-term commitments and 100% renewable electricity by 2030.

## What does energy management mean at Magna?

Our approach to energy management is the same across regions, groups and businesses.

We are organised in such a way that a global energy team with a responsible person in each region (North America, Europe, Asia) has developed a common strategy and roadmap for the coming years. Our approach is to build a structured organisation with our manufacturing sites. Each site has an energy officer who leads and organises the energy team. The energy team includes other key interdisciplinary departments such as purchasing, finance, human resources, planning and maintenance. The energy team meets once a month and works together to achieve successes and targets. The regional energy managers on the global energy team are closely linked to the site energy champion, working in the same direction on these activities and measuring our progress and achievements. An energy champion is responsible for identifying, implementing, and monitoring energy efficiency measures at our sites. He develops measures to improve energy efficiency and works closely with various departments to implement them. By monitoring energy consumption and adapting

the strategy, the Energy Officer helps to reduce our energy costs and works closely with Corporate's global Energy Team. In addition, sites are networked through regular ideas and benchmarking sessions, sharing their best projects and experiences with other energy champions. A strong energy management system is a key element in achieving our NET Zero goal.

## Have the company strategies been adapted to include a focus on Net Zero policy?

Yes, of course, without these steps it would not be possible to achieve the target.

Our net-zero targets build on initiatives that are already underway. We have achieved our target for energy intensity and direct energy savings via projects for 2023. We have also set ourselves the goal of using 100% renewable electricity at all our European sites by 2025 and at all our global sites by 2030. This will allow us to exceed our short-term SBTi Scope 1 and 2 decarbonisation targets by 2030. We also have absolute energy savings targets through energy projects that



will help us to continually reduce energy consumption and maximise energy efficiency, including the use of renewable energy technologies at our sites. For example, in the energy projects, the conversion of our heat supply to heat pump technology or biomass, as well as many solar energy projects, to mention just a few.

### **How does Magna deal with energy management?**

As I mentioned at the beginning, we have a structured approach through the Global Energy Team with the same approach, and we also have the tailwind of our ambitious energy savings targets.

Our principle is to minimise our energy consumption and maximise our energy efficiency, with the integration of renewable energy technologies at the top of the agenda. We are doing this very well;

thanks to several initiatives, we have implemented. Just last year, for example, we were very successful in the achievement of our energy targets for energy intensity to improve by 10% and direct energy savings of over 5% via projects for 2023, a fact of which we are naturally very proud, and which has been a source of motivation for us to be even more successful in the future. To give just a few examples, we have implemented projects around heat supply using biomass or heat pumps, which are completely fossil-free and reduce our CO<sub>2</sub> footprint, while the use of heat pumps also increases

energy efficiency. These examples are intended to show other sites that it is possible to operate without fossil fuels. We have also implemented photovoltaic projects at many sites in 2023 and many are currently being implemented in 2024.

The activity that we found useful are our Energy Walks / Treasure Hunts. An Energy Treasure Hunt is an event where participants from the Energy Team walk through a building and analyse energy consumption during non-production times. During the walk, energy wasters are identified and measures to reduce energy consumption are sought,



documented, to eliminate energy waste. The Energy Walk aims to raise awareness of the importance of efficiency and encourage participants to take measures to reduce and minimise during non-production times.

### **What areas of every day's business are most challenging in terms of energy management?**

All our production sites have an energy champion with an active energy team from different areas who implement energy efficiency measures in their respective business areas. As we have been using our

energy management approach for more than 15 years, many of the 'low hanging fruits' mentioned in energy management have already been implemented. There is still a lot of potential to reduce energy consumption, but this will become more intensive and costly over time. Both in terms of expertise and investment costs. The internal exchange of ideas and experience (across regions, countries, and groups) is already being used very well. In addition, we are focusing on strengthening our collaboration with external experts, as well as with customers, universities, and our

suppliers, so that we can address the challenges ahead even more effectively.

### **How is energy management viewed by the organisation's stakeholders?**

Energy management is not only a technical or economic issue for us, but also a matter of corporate

responsibility and culture. We also try to involve all our employees outside of the energy teams here, we can submit ideas via our continuous improvement departments, which is also very much utilised by the employees. In addition, there is a Sustainability Award & Innovations Award, where employees can submit their implemented projects and ideas, which are then evaluated and honoured by a jury.

### **Can you describe an energy management project that reflects the organisation's principles?**

We have many individual initiatives that are interlinked, but I would

like to explain one in more detail because we are very successful and proud of it - our MAFACT 6.10 Energy Reduction Assessment. Let me explain briefly.

The purpose of Mafact is to create a common but unique factory concept for Magna companies

around the world, based on common operating principles. One category is energy management, which is assessed twice a year at each plant. A score from 0 (poor) to 5 (world class) can be achieved. The questionnaire focuses on organisational practices, sharing of experience, data and analysis, KPIs,

energy saving projects undertaken, energy transparency, etc. It is a real challenge not only to achieve a World Class score of 5, but also to maintain that score year after year. This assessment provides valuable insight into a site's current energy management practices and areas for further improvement, helping our Energy Champion to improve step by step. In addition, we are working with tools to get an accurate picture of the projects implemented at each of our sites. The Energy Efficiency Tracker for example, is a global overview efficiency measures or activities already implemented by divisions worldwide. It helps us achieve our energy goals and track our progress. Energy Champions can identify Magna divisions that have already implemented certain

measures, enabling knowledge exchange from within the organisation.

These in turn serve as proof of target achievement, but also as a knowledge base for other Energy Champions. Everyone has access



to the data via a global dashboard and can check their status at any time. This transparency is one of the cornerstones of our energy management success.

**What is in the pipeline for the future?**

We are in the process of revising our Mafact 6.10 Energy Management Questionnaire, which is due every 5 years, to further improve standards. We are also working on a standardised internal energy management training programme to ensure that every Energy Champion has the necessary skills and knowledge, there is also an induction programme for new Energy Champions. This is designed to help them get started. In addition, we have developed an Energy Transition Programme to help our sites make the energy transition as effective as possible. It aims to minimise consumption, maximise efficiency, and use renewable energy sources to reduce the CO2 footprint. The Energy Transformation is divided into four phases, Identification;

Development; Implementation; Evidence phases. These are just a few of the current projects and goals we have on our roadmap for this year.

**Author's profile:**

Markus is passionate about renewable energy solutions and all ways to increase energy efficiency.

He started his career over 20 years ago as a plumber and for more than 7 years now has been working full time while studying for his university degree in Energy Management. He now works as Director of Energy at Magna International, following his passion every day.

**Global Energy Team**

ENERGY IS A CONTROLLABLE COST... IT'S IN OUR HANDS

**MAGNA**



By Becky Toal, CEO at Crowberry Consulting Ltd and  
Colin O'Brien, Operations and Sustainability Executive at Croke Park Stadium



**In this feature, we examine the diverse approaches to energy management that organisations in various industries and sectors have adopted. Join us as we delve into the realm of event organising and uncover the strategies and initiatives at Croke Park Stadium with Becky Toal and Colin O'Brien.**

### Introduction to Croke Park

As the home of Ireland's largest sporting and cultural organisation, the Gaelic Athletic Association (GAA) - Croke Park has played host to iconic moments in Irish sport & history, and to major cultural and international events. The stadium is one of the largest in Europe, with a capacity of 82,300 and can accommodate all types of events - from field sports to concerts, meetings to tradeshows and bespoke banqueting.

Since 1891 the site has been used by the GAA to host Gaelic games. The redevelopment of the stadium began in 1991 and has undergone numerous developments since. The GAA is part of the Irish consciousness and plays an influential role in Irish society that extends far beyond the basic aim of promoting Gaelic games.

At Croke Park, we take our sustainability as seriously as our sports. Not only do we have a world-class stadium, we're also proud to be a world leader in sustainable events. Our sustainability journey started back in 2007 and it's been one of our core values ever since. By making it a key part of our culture stadium-wide, it's become a way of life, putting us ahead of the game and

allowing us to smash our sustainability goals at every turn.

Croke Park is certified to four ISO standards. ISO 14001 for Environmental Management, ISO 20121 for Sustainable Events, ISO 45001 for Health and Safety, and recently, ISO 50001 for Energy Management. Proud of its long-established sustainability credentials, Croke Park was the first stadium in Ireland and Britain to secure both ISO14001 and ISO 20121 standards.

Our recent certification to ISO 50001 was driven by the need to address the impact of our energy usage, which has increased significantly during the energy crisis over the past couple of years. Whilst it has slowly steadied and decreased, we are keen to conserve resources and improve the bottom line through efficient energy management.

### What does energy management mean to Croke Park?

We are firm believers that you cannot manage what you don't measure. When it comes to energy usage and energy management, we measure everything. We have over 100 meeting rooms and 8 large event spaces, all covered by our Building Management System (BMS) and Energy Measurement

System (EMS). Our EMS shows exactly how much energy is being used and where, allowing us to identify any spikes in usage and to set KPIs in line with our energy reduction targets. Our EMS allows us to be proactive with systematic monitoring, control, and optimisation of our energy usage to conserve use and decrease energy costs. Our BMS allows us to have greater control of our energy, programming light, heat, and cooling in areas as and when they are needed. Our PPM schedule is extensive and robust and ensures all of our equipment and machinery operate at an optimal level at all times.

We are committed to continual investment and improvement in our energy systems and infrastructure as we tackle our significant energy uses (SEUs) to be as efficient as possible while seeking alternatives to fossil fuels. Communication and commitment from all our subcontractors is of utmost importance to our energy management strategy and forging those strong partnerships has been paramount to our energy management achievements.

### What is the strategy for Net Zero?

Croke Park has a goal of achieving net



zero by 2050 and to reduce carbon emissions by 51% by 2030 as set out by Ireland's Climate Action Plan and the Climate Action and Low Carbon Development Act 2021. Driving this will be the Science Based Targets Initiative (SBTi) which will set a clearly defined path to reduce emissions in line with Paris Agreement goals. We believe this is a gold standard framework in which to align ourselves and our objectives with.

To reduce our carbon emissions we are undertaking a number of projects. For example, we have recently introduced a 50-mile menu where all dishes come with a guarantee that every single ingredient used has been sourced within 50 miles of the stadium, including from Croke Park's own farm. The farm was launched in 2018 mainly for harvesting pitch turf, this reduces carbon emissions associated with importing turf from abroad.

We are currently taking part in an energy improvement programme called Excellence in Energy Efficiency Design (EXEED) which enables organisations to establish a systematic approach to design, construction, and commissioning processes for new investments and upgrades to existing assets. The EXEED Certified program aims to influence and deliver new best practices in energy efficient design management. As part of this programme we have identified opportunities for heat pumps to replace gas boilers, solar PV, and upgrading of AHUs.

We have upgraded 85% of the stadium's lights to more efficient LED bulbs and

the work continues there with a view to having all replaced by the end of this year.

**What areas of the day-to-day stadium's operations are the most challenging in terms of energy management?**

Croke Park has high and fluctuating energy demands, especially during events. The sudden surge in energy consumption for lighting, HVAC systems, sound systems, and other equipment can strain the power infrastructure and hence why we use 10 generators to help power different parts of the stadium for full capacity events.

The stadium has variable levels of use; we host events of all sizes intermittently. Predicting and accommodating the varying occupancy and usage patterns pose challenges in maintaining optimal energy usage during both peak and non-peak times.

We require specialised lighting for

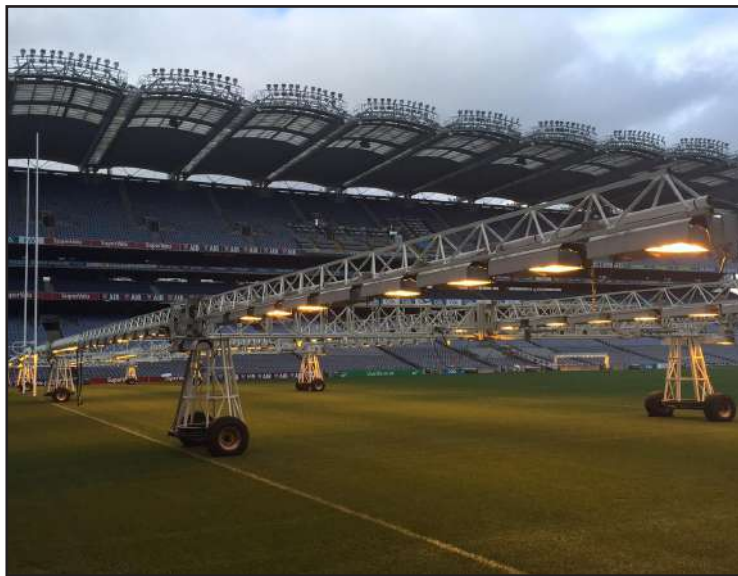
handle large crowds, varying weather conditions, among other variables. Balancing comfort with energy efficiency in such diverse conditions is a significant challenge.

Integrating renewable energy sources like solar panels or heat pumps into the stadium's infrastructure can be challenging due to space constraints, aesthetic considerations, and the intermittency of renewable power sources.

Older stadiums such as Croke Park has some outdated infrastructure that is less energy-efficient. A lot of our infrastructure, equipment, and machinery is close to end of life and some models are 30 years old. Significant investment is needed to upgrade our plant and machinery to be more sustainable and efficient, and retrofitting or upgrading these facilities to meet modern energy standards can

be a complex and costly process.

Keeping up with and adhering to evolving energy efficiency regulations and standards can be a challenge. Staying compliant with environmental and sustainability goals may also involve continuous adjustments to our energy management strategy. The phasing out of halogen and



incandescent bulbs for example, meant we had to replace all our older bulbs and fittings quicker than we might have planned to. We perform a full energy review each year as part of ISO 50001. If we are not meeting our goals and objectives set for that year, then we need to review our energy management strategy and action plan to ensure it is fit for purpose. Addressing

events, broadcasting, and safety. This includes powerful floodlights for night events and high-quality lighting for broadcasting. Designing and maintaining energy-efficient lighting systems that meet these specific requirements can be challenging.

Heating, ventilation, and air conditioning (HVAC) systems need to

these challenges often requires a comprehensive and integrated approach, involving collaboration between stadium management, energy experts and technology providers.

### **How do the stakeholders view energy management?**

Our stakeholders now more than ever are conscious of the impacts of our events. Event organisers want to know the amount of energy their event uses or the carbon footprint of their event. They want to know how they can make more environmentally friendly decisions and choices when it comes to hosting an event at the stadium and we work closely with them on that. Customers are choosing Croke Park because of our environmental certifications, giving them peace of mind that they are hosting their event in a sustainable venue. Our recently launched “50-mile menu” where all the ingredients come from within a 50-mile radius of the stadium’s front doors, really resonated with people as they have a genuine interest in where their food is coming from and the impact that has. Bands, artists and concert promoters are now including sustainability riders as part of their venue requirements. Items such as no single use plastics, water bottle filling stations, high efficiency water appliances, proper waste segregation, no food waste, promotion of sustainable travel and transport, and renewable power sources, are just some of the requests being made.

### **Can you give an example of an energy management project?**

Croke Park undertook an energy audit of the stadium in 2023 through the SEAI (Irish Funding). This project involved an appraisal of the energy consumption of the stadium to assess current performance with a view to reduce energy consumption. An appraisal of existing assets was undertaken, and energy efficiency opportunities

identified. In addition, opportunities for heat recovery were investigated and options to reduce electrical import from the National Grid. The audit identified the equipment and process that use the most energy, our significant energy uses, and we received a comprehensive list of actions to take in order to reduce our energy consumption over the coming months and years.

In 2023, we also implemented and received certification to ISO 50001 – The International Energy Management Standard. We worked with an energy consultancy to support our ISO 50001 implementation, gap analysis and team training. The standard has provided us with a practical way to improve energy use, through the development of an energy management system - EnMS for short. The standard helps safeguard our future by making a positive difference in the here and now while ensuring continual improvement.

### **What's in the pipeline for the future?**

A water harvesting project is due for completion in 2024 which will save a considerable amount of water and energy. We use on average 40,000m<sup>3</sup> of water per year which will be significantly reduced once we complete our water harvesting project in the coming months. The water harvesting tank will hold up to 900k litres of water at any given time and will be primarily used for pitch irrigation.

We plan to open a solar farm with a view to supply all of Croke Park’s electricity needs with the excess being exported back to the grid. We will continue to search for alternative methods of powering our stadium as we aim to move away from the traditional fossil fuels of electricity, gas and diesel. A long-standing goal and ambition is to find an alternative to single use plastics and reduce the use of plastic products altogether while promoting the circular economy.

We aim to promote more sustainable travel to and from the stadium, both for staff and match and event goers while working closely with the relevant transport authorities.

We will continue to review our supply chains to ensure we are using the best local suppliers where possible and will continue our promotion of local food sourcing and local menus. We endeavour to reduce the amount of waste we produce while maintaining our record of diverting all waste from landfill. We aim to reduce the impact our events have on the environment and on the local community by implementing the best sustainable practices possible.

From 2026, we will start reporting under the CSRD for the year 2025. The Corporate Sustainability Reporting Directive (CSRD) is the new EU directive that will take effect for large and listed companies, obligating them to share information on how they monitor a wide range of ESG issues and their impact on our planet.

### **Authors’ profiles:**

Colin O’Brien has a keen focus on sustainability, and is dedicated to implementing and managing the stadium’s ground breaking initiatives that push the boundaries of environmental stewardship whilst implementing an integrated management system encompassing key ISO standards. These standards cover Environmental Management, Energy Management, and Sustainable Events.

Becky is the CEO of Crowberry Consulting® Ltd based in both Dublin, Ireland and Chorley, UK. She has over 20 years of international experience in delivering ISO standard for energy, events and environmental management. Becky is a Chartered Environmentalist and member of the IEMA and EMA and holds three environmental degrees.





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# PRE-PLAN YOUR VISIT TO ALL-ENERGY & DCARBONISE

**All-Energy**, the UK's largest renewable and low carbon energy exhibition and conference and the co-located **Dcarbonise** open in a matter of days (**Glasgow's SEC, 15 and 16 May**). Now's the time to get ahead by registering to attend and starting to use the show's official App with its myriad features to help you set up your personal programme and even show you how to find specific exhibitors or conference rooms <https://www.all-energy.co.uk/theema>.

All elements of the duo of shows – the major exhibition with some **270 exhibitors**; the main conference and nine show floor theatres featuring **600+ speakers** over the two days; and the Civic Reception and Giant Networking Evening - are free to attend for all with relevant business or academic interests. Total attendance in 2023 was 9,706 and registrations for this year's event are tracking well ahead of those attained a last year.

Jonathan Heastie, Portfolio Director Energy and Marine at RX Global, who own and organise the duo of shows explained: "Both days begin with plenary sessions and Ministerial keynotes to set the scene. Humza Yousaf, First Minister of Scotland on Day One; and Gillian Martin, Scotland's Minister for Energy, Just Transition and Fair Work on Day Two.

"Both sessions have outstanding chairs – Dame Susan Rice DBE, FRSE, Chair of Forth Green Freeports on 15

May, and Professor Sir Jim McDonald, Principal and Vice Chancellor of Strathclyde University and President of the Royal Academy of Engineering on the 16<sup>th</sup>. Those political keynote addresses are followed by renowned speakers who, on the first day are eager to spread the 'Deliver now, at scale and with speed' message; and with the 'Great Grid Upgrade' in mind looking at 'Delivering a net zero system – how do we build a supply chain?' the following day."

The conference then breaks into 11 parallel sessions with every form of renewable energy coming under the conference spotlight in All-Energy; and the decarbonisation of the built environment, heat, transport, industry and cities/places in Dcarbonise. The grid upgrade sees more attention than ever before in the show's long history, being given to grid and networks, but not at the expense of the topics for which they are well known. Some, like REMA make welcome returns fielding an almost identical line-up to the thought-provoking session held in 2023.

"With two plenary sessions and over fifty 90-minute sessions the choice of topic is rich, there are some fascinating titles to catch the eye," said Jonathan Heastie. "Investment is dealt with in 'The Bear and the butterfly'. 'Maps, money and multiple benefits: City scale decarbonisation'; 'A Heat Networks Vision for Scotland: Boldly going where no-one has gone before';

'What are the equity challenges in delivering actions to reduce energy demand?' and 'The role of regulation in getting to net zero challenges and solutions' are just some that have caught my eye'. Now's the time to check out the full conference programme and add relevant ones to your personal programme.

"Don't stop there, open up the programmes for the show floor theatres too. They cover built environment decarbonisation; heat decarbonisation (with an overview of Scotland's 'Heat in Buildings' strategy a feature of Day Two); transport decarbonisation; future talent; transport decarbonisation; innovation; community and local energy; offshore wind; marine renewable energy; hydrogen and energy storage and the Research and Innovation Hub. You'll find plenty to catch your eye; and the App, with its Wayfinding feature, can make sure you get there by the best route."

This year the duo of events will have no paper catalogue, all part of RX Global's commitment to sustainability; so the exhibitor directory is accessed via the App. You can learn about every exhibitor before you even leave home, and set up meetings for a time and day that best suits you. A full set of App features can be found at [HERE](#).

"We look forward to welcoming you and also to your feedback," added Jonathan Heastie.

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