



# Environment Sustainability and Climate Change Toolkit

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## Introduction

The National Fire Chiefs Council's vision for environment sustainability and climate change is to:

Protect our communities ... Protect our planet ... Protect our future.

We need our world and communities to be sustainable, not just for our generation but for future generations. It is easy to focus on the immediate and the local. It is harder to see that our actions now will have an impact in the UK, and a more significant impact in other parts of the world, not just today but in the future. This is a leadership challenge that is facing everyone on the planet. The challenge can seem too large and we might ask what difference the Fire and Rescue Sector can make?

The work of the National Fire Chief Council in relation to Environment sustainability and climate change is to make sure that the Fire and Rescue Sector is focused on supporting sustainable and safe communities. The Fire and Rescue Sector, alongside all public sector organisations, has a legal duty to act. The Climate Change Act 2008 commits the UK government to reduce greenhouse gas emissions by at least 100% of 1990 levels (net zero) by 2050. This includes reducing emissions from the devolved administrations (Scotland, Wales and Northern Ireland), which account for about 20% of the UK's emissions.

The Fire and Rescue Sector also has a moral duty to act. Rising temperatures will have the greatest impact on the most vulnerable in our communities, such as reducing food and water availability. Climate change is already having an impact on the Fire and Rescue Service; we are responding to new risks, e.g. wildfires, and new technologies designed to address climate change, e.g. electric vehicles, lithium-ion batteries and highly insulated buildings.

Traditional thinking may lead us to conclude that the answer lies in changing heating systems, insulating buildings, moving to an electric fleet and planting trees. While this work is essential, contributing to net zero, environment sustainability is much wider. The United Nations Seventeen Sustainability Goals broaden our thinking. They provide a broad set of outcomes which define what it means to be sustainable. The Fire and Rescue Sector may not be able to contribute to all of those outcomes, but many are relevant. We can indirectly influence change within our role and statutory functions, and we can have greater impact through collaboration within our sector and our partners.

Protecting the environment and mitigating and adapting to climate change are key parts of creating a sustainable future. However, Fire and Rescue Services do not exist to be sustainable. They exist to reduce risk and vulnerability through prevention, protection, and response activities. We have the choice as to whether to



## Assessment of current research, data, and information

[With thanks to the Local Government Association – parts of this toolkit have been reproduced and updated from the document ‘Climate Emergency – fire and rescue services: Local Government Association Report’ – see page 56].

This section provides an overview of research, data, and information, referring to global and UK commitments, and clarifies definitions.

The effects of the climate crisis were clearer more than ever in 2022. The Pakistan floods, and a devastating heatwave that hit India was made 30 times more likely by global heating. Dangerous heatwaves also hit parts of China, Europe, and the United States of America. The American West faced the most extreme megadrought in at least 1,200 years.

## Global Commitments

1. Climate change is a global issue. Much of the work underway in the UK is underpinned by international work done through the United Nations. The [sustainable development goals](https://sdgs.un.org/goals) (<https://sdgs.un.org/goals>) and the [Paris Agreement](https://unfccc.int/process-and-meetings/the-paris-agreement) (<https://unfccc.int/process-and-meetings/the-paris-agreement>) in particular, have provided the basis for work.
2. In 2015 the United Nations developed the [2030 Agenda for Sustainable Development](https://sdgs.un.org/2030agenda) (<https://sdgs.un.org/2030agenda>) containing 17 sustainable development goals. Sustainable Development Goal 13 specifically addresses climate change. It makes clear the need to take urgent action on climate change and its impacts. The United Nations has identified that between 1998 and 2017, direct economic losses from disasters were estimated at almost \$3 trillion. Climate-related and geophysical disasters claimed an estimated 1.3 million lives (<https://sustainabledevelopment.un.org/sdg13>). In the executive summary of their last assessment of progress in 2022, the United Nations said that:

“Policies currently in place with no additional action are projected to result in global warming of 2.8 degrees Celsius over the twenty first century.”

3. The UK Government has committed to the delivery of the Sustainable Development Goals ([THE 17 GOALS | Sustainable Development \(un.org\)](https://sdgs.un.org/goals) - , <https://sdgs.un.org/goals>). The aim of these is to provide a blueprint for ending poverty and other deprivations. The Sustainable Development Goals interlink work to improve health, education, improving gender equality and economic growth with tackling climate change.

The Paris Agreement was developed in 2015. It commits the UK and other countries to a global temperature rise this century of well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius (<https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>). The United Nations has

said that the implementation of the Paris Agreement is essential to the achievement of the sustainable development goals.

**The UK pledged, with other EU members, to agree to a 2030 target of at least a 40 per cent reduction in emissions below 1990 levels.**

4. The [United Nation's Intergovernmental Panel on Climate Change 6<sup>th</sup> Report \(https://www.ipcc.ch/assessment-report/ar6/\)](https://www.ipcc.ch/assessment-report/ar6/) has said that human-induced warming had already reached about 1.1 degrees Celsius above pre-industrial levels. Their 2021 report set out, with a high degree of confidence, that:

“The rise in weather and climate extremes has led to some irreversible impacts as natural and human systems are pushed beyond their ability to adapt.”

5. The Intergovernmental Panel on Climate Change has identified a number of far-reaching risks with a global increase in temperature to 1.5 degrees Celsius. These become more acute if the global temperature is raised by 2 degrees Celsius, including:

- Drought,
- Flooding,
- Wildfires,
- Heatwaves,
- Water supply,
- Rising sea levels,
- Marine biodiversity,
- Fisheries and ecosystems,
- Species loss and extinction,
- Risks to health and livelihoods,
- Human security,
- Food security, and
- Economic growth.

6. Limiting warming to 1.5 degrees Celsius will require a rapid escalation in the scale and pace of change, particularly in the coming decades ([https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15\\_Chapter4\\_Low\\_Res.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_Chapter4_Low_Res.pdf)). In 2021, the United Nations Secretary-General António Guterres said that “much bolder climate action is needed” to maintain international peace and security.

“No region is immune to climate disasters”.

and warned that “our window of opportunity” to prevent the worst climate impacts is “rapidly closing”.

[UN chief: Window to avert devastating climate impacts ‘rapidly closing’ | UN News \(https://news.un.org/en/story/2021/09/1100912\)](https://news.un.org/en/story/2021/09/1100912).

Headlines from the Sixth Intergovernmental Panel on Climate Change Report, which was widely referred to as a “Code Red for Humanity” included:

- Climate change is already affecting every inhabited region across the globe.
- Global surface temperature will continue to increase until at least mid-century under all emissions scenarios considered. Global warming of 1.5°C and 2°C will be exceeded during the 21<sup>st</sup> century unless deep reductions in CO<sub>2</sub> and other greenhouse gas emissions occur in the coming decades.
- Projected changes in extremes are larger in frequency and intensity with every additional increment of global warming.
- With further global warming, every region is projected to increasingly experience concurrent and multiple changes in climatic impact-drivers.
- Every tonne of CO<sub>2</sub> emissions adds to global warming.

7. Scientists stated that a northern hemisphere summer as hot as 2022 would have been “virtually impossible” without global heating and led to a record drought:

[\(2022 provisionally warmest year on record for UK – Met Office – https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2022/2022-provisionally-warmest-year-on-record-for-uk#:~:text=The%20fourth%20warmest%20summer%20in,UK%20record%20by%201.6C\)](https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2022/2022-provisionally-warmest-year-on-record-for-uk#:~:text=The%20fourth%20warmest%20summer%20in,UK%20record%20by%201.6C) .

8. In the UK, temperatures rose above 40°C for the first time. In Australia, hot seas led to the Great Barrier Reef suffering its fourth mass bleaching in just seven years:

[\(Record heat over Great Barrier Reef raises fears of second summer of coral bleaching | Great Barrier Reef | The Guardian – https://www.theguardian.com/environment/2022/nov/25/record-heat-over-great-barrier-reef-raises-fears-of-second-summer-of-coral-bleaching\)](https://www.theguardian.com/environment/2022/nov/25/record-heat-over-great-barrier-reef-raises-fears-of-second-summer-of-coral-bleaching) .

9. Flooding also struck around the world, including Nigeria, Australia, Venezuela, Thailand and Vietnam.

The UN Emissions Gap Report 2022 finds that the world must cut emissions by 45 per cent to avoid global catastrophe ([Emissions Gap Report 2022 \(unep.org\) – https://www.unep.org/resources/emissions-gap-report-2022](https://www.unep.org/resources/emissions-gap-report-2022)).

10. The [Lancet Countdown report on Health and Climate Change 2022](https://www.thelancet.com/countdown-health-climate) (<https://www.thelancet.com/countdown-health-climate>) shows the direst findings yet. At 1.1°C of heating (current level), climate change is increasingly undermining every pillar of good health and compounding the health impacts of the COVID-19 pandemic and geopolitical conflicts. The harms to health of extreme heat exposure are rising. They are affecting mental health and undermining the capacity to work and exercise. This has resulted in annual heat-related deaths in people older than 65 years increasing by 68% from 2000–2004 to 2017–2021.

11. More frequent and extreme weather events are increasingly affecting physical and mental health directly and indirectly, with economic losses particularly overburdening low Human Development Index countries.
12. The changing climate is exacerbating the risk of infectious disease outbreaks. It is also threatening global food security, e.g., heatwave days are associated with 98 million more people experiencing food insecurity in 2020 than in 1981–2010.
13. Despite these profound health impacts, mitigation efforts are not enough to avert a catastrophic temperature rise:
  - Carbon dioxide emissions from fuel combustion increased by 6% in 2021; and
  - agricultural greenhouse gas emissions have increased by 31% since 2000.
14. This inaction came with major health costs:
  - Fossil fuels contributed to 1.3 million deaths from ambient PM2.5 exposure in 2020.
  - The over-dependence on solid fuels, worsened by the energy crisis, increased exposure to indoor air pollution; and
  - consumption of carbon-intensive meat and dairy resulted in 2 million deaths in 2019 ([The Lancet Countdown on health and climate change](https://www.thelancet.com/countdown-health-climate) (<https://www.thelancet.com/countdown-health-climate>)).

## UK Commitments

15. The [Climate Change Act 2008](https://www.legislation.gov.uk/ukpga/2008/27/contents) (<https://www.legislation.gov.uk/ukpga/2008/27/contents>) is the key piece of legislation setting out the UK's approach to tackling climate change. The Act originally set a target for reducing greenhouse gas emissions to 80 per cent of 1990 levels by 2050. In 2019, the act was amended to reflect a new target for the UK: the delivery of net-zero greenhouse gas emissions by 2050 (compared to 1990 levels). It also introduced five-yearly carbon budgets, which place a restriction on the amount of greenhouse gases the UK can emit over a five-year period.
16. The Act created the [Committee on Climate Change](https://www.theccc.org.uk/) (<https://www.theccc.org.uk/>). This is an independent, statutory body whose purpose is to advise the Government and devolved administrations on emissions targets. It reports to Parliament on progress made in reducing greenhouse gas emissions and preparing for climate change.
17. The Act also requires the Government to produce the Climate Change Risk Assessment every five years. This assesses the current and future risks to the



UK as well as looking at opportunities from climate change. The Act requires the UK to produce a National Adaptation Programme for England. The last [Climate Change Risk Assessment](https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2022) (<https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-2022>) was produced in 2022 and set out eight priority areas:

1. Risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards.
  2. Risks to soil health from increased flooding and drought.
  3. Risks to natural carbon stores and sequestration from multiple hazards, leading to increased emissions.
  4. Risks to crops, livestock and commercial trees from multiple climate hazards.
  5. Risks to supply of food, goods and vital services due to climate related collapse of supply chains and distribution networks.
  6. Risks to people and the economy from climate-related failure of the power system.
  7. Risks to human health, wellbeing and productivity from increased exposure to heat in homes and other buildings.
  8. Multiple risks to the UK from climate change impacts overseas.
18. The Climate Change Risk Assessment enables the development of policies and activities that facilitate the reduction in long-term vulnerability to climate change.
19. [Environment Act 2021 \(legislation.gov.uk\)](https://www.legislation.gov.uk) (<https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted>) is the UK framework for environmental protection. It allows the establishment of new environmental laws about air quality, biodiversity, water quality and wider environmental protection. The Environment Act 2021 also allows for new powers to set binding targets for key environmental themes, including air quality, water biodiversity and waste reduction.
20. The Act allows DEFRA to deliver a wider range of environmental policies, and enables a legal framework for reforms to waste and recycling services. It also places requirements on Local Authorities for key themes about the environment.

## Definitions and Differences

21. The term 'Net-zero emissions' is often confused with other terminology. This can lead to conflicting approaches in respect of reducing climate impacts. The Institute of Environmental Management and Assessment Pathway to Net-Zero course offers the following definitions to support understanding (Institute of Environmental Management and Assessment Pathways to Net-Zero Course Learner Notes, 2022):

- **Net-Zero:** refers to a state in which greenhouse gases going into the atmosphere are balanced by removals out of the atmosphere.



- **Carbon Neutral:** companies, processes and products become carbon neutral when they calculate their carbon emissions and compensate for what they have produced, e.g., through offsets.
- **Climate Neutral:** An actor's activities result in no net effect on the climate system. Any greenhouse gas emissions or other activities with warming effects are fully compensated by greenhouse gas reductions or removals or other activities with cooling effects.
- **Absolute/True Zero:** No greenhouse gas emissions are attributable to an actor's activities. Under this definition, no offsets or balancing of residual emissions with removals are used.

## National Operational Guidance – Environmental Protection

(National Operational Guidance (NOG) is the foundation for developing operational policies, procedures and training for firefighters to deal with incidents effectively and safely. It is 'industry good practice' for UK FRS to draw on. <https://www.ukfrs.com/guidance/environmental-protection>).

22. The highest priority for fire and rescue services at an incident will always be the safety of the public, personnel and other emergency responders. They must also consider possible damage to the environment, whether caused by the incident or the response to it.
23. Partnerships between environmental agencies and fire and rescue services are a key part of any strategy to control pollution. This approach is underpinned by national working agreements, memoranda of understanding and local working agreements.
24. The regulations under which fire and rescue services must take steps to prevent or reduce environmental damage include:
  - Environmental Damage (Prevention and Remediation) (England) Regulations (<https://www.legislation.gov.uk/ukxi/2015/810/contents>).
  - Environmental Damage (Prevention and Remediation) (Wales) Regulations (<https://www.legislation.gov.uk/wsi/2009/995/contents>).
  - The Environment Liability (Scotland) Amendment Regulations (<https://www.legislation.gov.uk/ssi/2015/214/contents/made>).
  - The Environmental Liability (Prevention and Remediation) Regulations (Northern Ireland). (<https://www.legislation.gov.uk/nisr/2009/252/contents/made>).

25. Fire and rescue services should:

- Include environmental risk information within operational risk management plans.
- Carry out joint visits and inspections of high-risk sites with environmental agencies and share information about potential hazards.
- Consider pollution prevention information contained in risk information.
- Implement the environmental protection measures identified in operational risk information.

## Evaluation methods and tools

This section discusses evaluation methods and tools, key performance indicators, benchmarking, accounting and auditing, emissions, environmental management systems and impact assessments.

### Why do we evaluate?

1. Fire and Rescue Services who progress environmental and sustainability performance may consider evaluating performance in a number of areas given the potential this has for delivering benefits. These benefits include:
  - Improved resource efficiency – by evaluating performance in a number of key areas such as energy consumption and waste generation, organisations may be able to identify potential wastage and savings opportunities.
  - Improved supplier relationships – organisations who are aware of their environmental performance may be more effective in identifying future requirements from supply chains.
  - Service innovation – effective evaluation and measurement of environmental and sustainability performance may help organisations identify areas where service improvement could take place.
  - Employee recruitment and retention – Organisations who effectively measure and monitor environmental progress continue to place themselves in positive positions for employee attraction and retention.
  - Legal compliance – Measuring environmental and sustainability performance places an organisation in the ideal position to monitor and demonstrate compliance with environmental obligations.

# Key Evaluation Methods and Tools – Sustainability & Environmental

## Key Performance Indicators (KPI's)

2. Key performance indicators (KPI's) are a suite of quantifiable measurements used to gauge organisational performance against a set of environmental criteria. Crucially, Key Performance Indicators can help an organisation assess environmental performance against environmental targets and support comparison of performance with peer organisations.
3. Typical monthly and quarterly environmental and sustainability Key Performance Indicators that can be developed with a reasonable level of effort include:
  - Carbon footprint (tCO<sub>2</sub>e).
  - Electricity consumption (kWh).
  - Gas consumption (kWh).
  - Fuel consumption (litres).
  - Water consumption (m<sup>3</sup>).
  - Business travel (miles/km).
4. Benefits of establishing Key Performance Indicators include:
  - Supporting strategic planning and overcoming of key environmental risks.
  - Enable the organisation to hold environmental performance to account.
  - Support continual improvement.
  - Identify environmental progress against sustainability targets.

## Utilities Benchmarking

5. Utility benchmarking is a fundamental asset management practice. It includes tracking, analysing and reporting the utility consumption and costs associated with a building or group of buildings. This usually includes the consumption of electricity, gas and water but can extend beyond this to cover other utilities and fuels.

6. The benefits of utilities benchmarking:

- Improvement in building performance.
- Tracking of billing errors and issues with energy consuming plant.
- Identification of energy and financial savings.
- Informs planning and identification of energy efficiency investments.
- Supports development of energy management performance metrics.

### Key Steps for Utility Benchmarking

7. A number of key steps can support an organisation in developing a utilities benchmarking tool:

- i. Develop an understanding of the organisation's building portfolio – establish the number and type of buildings.
- ii. Identify utility providers and a utility benchmarking lead.
- iii. Establish an approach to collecting utility data.
- iv. Develop a benchmarking toolkit or invest in a third-party energy management portal.
- v. Develop approach for entering data into energy benchmarking toolkit.
- vi. Develop utility benchmarking reports.

8. When benchmarking utilities, organisations may wish to consider the use of normalising factors within their reporting in order to help compare performance of specific elements. These can be used for utilities benchmarking but also apply to wider environmental reporting, including greenhouse gas accounting, e.g.

- Energy consumed (kWh) per m<sup>2</sup> of gross internal area (GIA).
- Fuel consumed (litres) per incident attended.
- Water consumed (m<sup>3</sup>) per employee (FTE).
- Carbon footprint (tCO<sub>2</sub>e) per employee (FTE).
- Waste generation (tonnes) per employee (FTE).

9. Utilities benchmarking plays a key role in estates moving towards net-zero.

The UK Government Property Function have developed the [Net-Zero Estate Playbook](#)

([https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1035417/Net\\_Zero\\_Estate\\_Playbook\\_1\\_.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1035417/Net_Zero_Estate_Playbook_1_.pdf)) which

sets out energy benchmarking methods and steps towards decarbonisation of the estate which organisations may consider.

## Greenhouse Gas Accounting

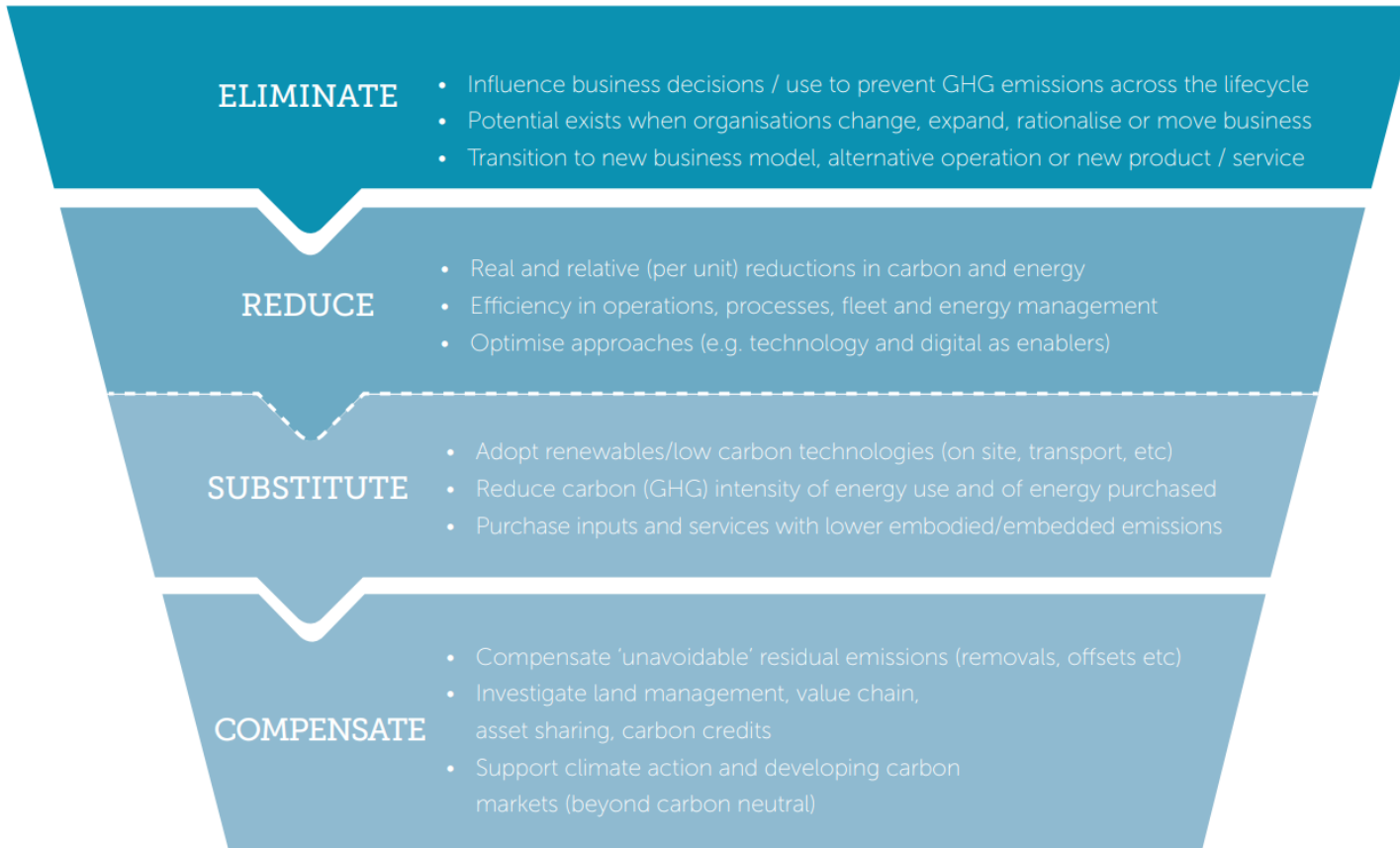
10. Greenhouse gas accounting is used to understand an organisation's emissions from greenhouse gases. Typically, greenhouse gas accounting enables an organisation to understand its direct and indirect carbon footprint.
11. Greenhouse gas emissions are broken down into scope 1, scope 2 and scope 3 emissions. When aggregated, emissions from these sources make up an organisation's carbon footprint.
  - **Scope 1 emissions** – emissions from sources that an organisation owns or controls directly, e.g., burning of gas for heating buildings or fuel for running fleet vehicles.
  - **Scope 2 emissions** – emissions that an organisation causes indirectly through purchased energy.
  - **Scope 3 emissions** – emissions that occur within the organisation value chain – these can occur from downstream and upstream sources.
12. The key steps for developing a carbon footprint inventory are:
  - Understand the scope and organisational boundary for emissions.
  - Collect activity metrics from a variety of internal sources.
  - Convert activity metrics into carbon emissions using established carbon factors, such as the ones found on the gov.uk website.
  - Determine the framework to calculate overall carbon emissions from scope 1, scope 2 and scope 3 sources. Usually, the greenhouse gas protocol is the most established framework used for calculating carbon footprints.
  - Report carbon footprint and establish targets for future improvement through a decarbonisation plan.
13. Guidance documents are available to support the measurement of greenhouse gases. They are as follows:
  - [Greenhouse gas protocol \(https://ghgprotocol.org/\)](https://ghgprotocol.org/) – the most globally recognised and used greenhouse gas accounting standard.
  - [Greenhouse gas reporting \(https://www.gov.uk/government/publications/greenhouse-gas-reporting-](https://www.gov.uk/government/publications/greenhouse-gas-reporting-)

[conversion-factors-2021](#)) – UK Government conversion factors – UK recognised carbon conversion factors to support greenhouse gas accounting in the UK.

- [Environmental reporting guidelines](#) (<https://www.gov.uk/government/publications/environmental-reporting-guidelines-including-mandatory-greenhouse-gas-emissions-reporting-guidance>) – UK Government guidance to help companies deliver effective environmental reporting and greenhouse gas reporting.

14. Beyond measuring and reporting carbon emissions through greenhouse gas accounting, organisations typically progress to putting in place measures to reduce their impacts. These are taken as key steps towards a net-zero target. To support organisations in planning the management of greenhouse gases within their organisation, the Institute of Environmental Management and Assessment have developed the Greenhouse Gas Management Hierarchy (Institute of Environmental Management and Assessment Pathways to Net Zero). This was updated in 2020 to reflect the then emerging theme of net-zero:

## IEMA Greenhouse Gas Management Hierarchy (updated 2020)



Updated from original IEMA GHG Management Hierarchy, first published in 2009

Source <https://www.iema.net/>



## Understanding Scope 3 Emissions

15. Organisations are becoming more adept at measuring their climate impacts rising from scope 1 and 2 emissions. Beyond this, organisations progress into measuring scope 3 emissions, although the methodologies to undertake this are less established. Some scope 3 emissions are usually more accessible in their calculation than others, e.g., emissions associated with:
- Waste generation.
  - Water consumption.
  - Business travel.
  - Commuting.
16. Often, the most complex evaluation of scope 3 emissions is associated with supply chain emissions, i.e., emissions arising from purchased goods and services. Organisations can calculate these emissions using a methodology based on spend profiles within specific purchasing categories. More advanced calculations can be based upon supplier data related to specific purchased products and services. Whilst most organisations typically begin these calculations using the spend based methodology, progression towards supplier-based data only can be made through implementing a hybrid calculation method, using a blend of spend based calculations and supplier data based calculations.
17. Given the complexities involved with calculating scope 3 emissions, there is a specific Greenhouse Gas Protocol guidance document for the Corporate Value Chain (Scope 3) Accounting and Reporting Standard ([https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard\\_041613\\_2.pdf](https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf)).

## Emissions from Fires

18. Understanding emissions from fires could help Fire and Rescue Services protect the environment. Of all the greenhouse gases, carbon dioxide is considered the most harmful and prevalent greenhouse gas, with a significant long-term impact on climate change.
19. The case study at Annex D sets out an example of how Greater Manchester Fire and Rescue Service has attempted to estimate the contribution to carbon emissions from fires and firefighting.

## Environmental Management Systems

20. Environmental management systems help organisations to assess strengths and weaknesses in environmental management and performance. They aid the identification and management of significant environmental impacts as well as ensuring effective compliance with relevant legal requirements.

21. The key benefits of using an environmental management system include:

- Effective management of environmental impacts.
- Potential financial savings through increasing efficiency.
- Ensuring compliance with environmental legislation.
- Assurance in respect of environmental performance and benchmarks for improvements.

### **What does an effective environmental management system involve?**

22. The key requirement of an environmental management system is to show an organisation has measures in place to effectively prevent environmental harm. It should also show that the organisation is proactively taking steps to continually improve its environmental performance.

23. Typical measures to effectively put in place an environmental management system include:

- Initial assessment of how the organisation's activities may affect the environment.
- Ensuring compliance with all relevant environmental legislation.
- Gathering and analysing environmental data.
- Developing and communicating an environmental policy.
- Implementing procedures for controlling activities with significant environmental impacts.
- Identifying environmental risks and opportunities.

- Establishing targets for environmental performance and measuring progress.
- Defining roles and responsibilities for all employees.
- Delivering training and raising awareness relevant to environmental impacts.
- Establishing a periodic internal audit programme.
- Periodic management review of the environmental management system and gaining commitment from leadership.

24. Organisations pursuing an environmental management system may wish to show further commitment to environmental management with certification schemes such as [ISO 14001](https://www.iso.org/iso-14001-environmental-management.html) (<https://www.iso.org/iso-14001-environmental-management.html>), [The Green Ticks Scheme](https://www.brightgreenbusiness.org.uk/environmental-services/green-ticks) (<https://www.brightgreenbusiness.org.uk/environmental-services/green-ticks>) or the [Eco-Management and Audit Scheme \(EMAS\)](https://green-business.ec.europa.eu/eco-management-and-audit-scheme-emas_en) ([https://green-business.ec.europa.eu/eco-management-and-audit-scheme-emas\\_en](https://green-business.ec.europa.eu/eco-management-and-audit-scheme-emas_en)) commonly used. Certification for standards such as ISO 14001 is usually three years, after which time recertification through external audit will be required to maintain certification.

## Environmental Auditing

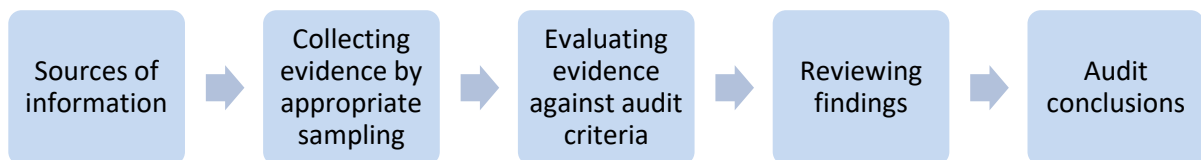
25. Environmental audits are an effective way of evaluating an organisation's environmental impacts and support decision making processes for environmental performance. Environmental impacts covered by an audit can cover the following issues:

- Energy.
- Carbon emissions.
- Waste.
- Water.
- Transport.
- Biodiversity.
- Procurement.

26. Benefits of environmental auditing include:

- Ensuring legal compliance.
- Reducing environmental impacts.
- Identifying opportunities for improved resource efficiency.
- Provides an effective foundation for an environmental management system.

27. The typical process for environmental auditing is:



## Environmental Impact Assessment

28. An Environmental Impact assessment can be achieved in several ways. It is helpful to engage with colleagues responsible for purchase and procurement, as well as the formulation of new processes, projects, and procedures. The key result is to make sure that all measures have been reviewed so that the environment and sustainable impact of new products or services has improved the organisation's impact on its operations and delivery.

29. Areas for consideration should include looking at improved performance in energy and reducing emissions from the organisation's operational and organisational internal measures. There must be, at both the initial scoping and tendering stages, an evaluation of the impacts and effects, with the following taken into account:

- Will this project/ product/ service impact on the organisation's ability to adapt to climate change and avoid unnecessary carbon emissions?
- Does this project/ product/ service prepare the organisation for the extremes of hotter/ drier summers, milder/ wetter winters, increased risks of flooding, higher intensive wind events, and greater risk to life?

- Does it identify the changing profile of the operational needs and type of incident response?
- Will it support staff during more frequent extreme weather events?
- Will this project impact on the organisation's ability to adapt to climate change and transition towards net-zero?
- Does this project/ product/ service require any fuel source in addition to what is used currently?
- Does the project introduce a cleaner or more efficient product/service?
- Have you considered what, if any, carbon effect the project/ product/ service could have on the overall organisation?
- Has the project/ product/ service considered how the carbon emission value could be mitigated and the potential cost?

30. Further elements should also be identified and considered:

- Increase or decrease of power, gas, or fuel usage?
- Increase or decrease in water use?
- Increase or decrease in waste production?
- Effects on air, land, or water quality.
- Effects on biodiversity and habitat loss?
- Effects on travel patterns of colleagues or local community.

31. The potential for in-depth impact assessment can extend to many other factors and include multi-department inputs. Elements of equality, diversity and inclusivity could also be included in impact assessments.

## Roles to support Sustainability, Environment and Climate Change

32. Fire and rescue services across the UK already employ and work with a wide range of skilled individuals who can support the delivery of effective environmental and sustainability action. These can be in all areas of fire and rescue services in both operational and support roles, and might include:

- **Sustainability Managers/Officers** – responsible for day-to-day delivery of sustainability and environmental management within organisations. They have a wide skill set covering subjects such as climate change and environmental management. They may have more specialist skills such as carbon reduction and waste management.
- **Energy Managers** – typically responsible for day-to-day management of energy consumption and purchasing within organisations. They are often technically capable in respect of energy efficiency and carbon reduction.
- **Facilities Managers** – may be responsible for day-to-day facilities management and may also have expertise in areas linked to sustainability such as waste management.
- **Estates Managers/ Officers** – responsible for day-to-day estates management and project delivery but are a key contributor to wider sustainability and carbon reduction initiatives.
- **Fleet Managers/ Officers** – typically responsible for day-to-day fleet management but are a key contributor to the delivery of sustainable fleet.
- **Procurement Managers/ Officers** – may be responsible for day-to-day delivery of procurement activity but often have skills in delivering sustainable procurement as well as ensuring the embedding of social value.
- **External Consultants** – employed by fire and rescue services to deliver specialist skills. These can be for a wide range of areas, e.g., carbon reduction, sustainable building design and sustainable construction.
- **Communications and Engagement** – responsible for day-to-day delivery of internal and external communications but often have skills in delivering communications plans for sustainability and environment.
- **Carbon Literate Staff** – a wide range of fire and rescue service employees have taken training courses to make them aware of climate change impacts and how they can address these.

- **Hazardous Materials Environmental Protection Officers** – responsible for interpreting and assessing environmental risks at operational incidents. They also advise incident commanders during the development of tactical response plans.
- **Environmental Champions/ Green Forums** – a number of fire and rescue services have environmental champion schemes, green forums or similar. These are voluntary roles where staff contribute to the success of environmental initiatives.



## Stakeholder and Partner Map

This section sets out an overview of key stakeholders, their influence and interest. This should broadly be the same across all regions, with some flexibility for local partners.

The graph following the tables maps the stakeholders with their weightings.

### Weighting

Sector	Organisation	Interest	Influence	Total
Central Govt	Business, Energy and Industrial Strategy	5	5	25
Central Govt	Dept. for Environment, Food and Rural Affairs	5	5	25
Central Govt	Home Office	5	5	25
Central Govt	HMICFRS	2	4	8
Funding	Salix	5	4	20
Emergency Services	Cross-Border FRSs	3	3	9
Emergency Services	Other Emergency Services	3	3	9
Rep. Body	Emergency Services Environment Sustainability Group	5	4	20
Rep. Body	Local Resilience Forum	3	3	9
Rep. Body	National Fire Chiefs Council	3	4	12
Internal	Corporate Management Board/ Senior Management Team	3	5	15
Internal	Operations, Response and Resilience	4	3	12
Internal	Fleet	4	3	12
Internal	Property Services	4	3	12
Internal	Green Forum	5	2	10
Internal	Internal Representative Bodies	2	2	4
Internal	Communications	2	1	2
Local Public Sector	Local Authorities/ Councils	4	4	16
Local Public Sector	Local Government Association	3	4	12

<b>Sector</b>	<b>Organisation</b>	<b>Interest</b>	<b>Influence</b>	<b>Total</b>
Env. Bodies/ Regulators	Environment Agency	5	5	25
Env. Bodies/ Regulators	Natural England	5	3	15
Env. Bodies/ Regulators	Drinking Water Inspectorate	3	3	9
Env. Bodies/ Regulators	Sewerage Undertakers	3	2	6
Private Sector	Construction	3	2	6
Private Sector	Suppliers	3	2	6
Private Sector	Media	3	3	9
Public	Community Groups	3	1	3
Public	General	2	1	2



## Grants

This section gives an overview of the grants available to support environment sustainability projects. However, as grant windows open and close, and available funding changes it will not always be exhaustive. As the aim of this toolkit is to be a live document this section will be updated at regular intervals.

**1. Salix Finance Limited** (<https://www.salixfinance.co.uk>) is a non-departmental public body, wholly owned by government. It is funded by the Department for Business, Energy and Industrial Strategy, the Department for Education, Welsh Government and the Scottish Government. It provides government funding to the public sector to improve energy efficiency, reduce carbon emissions and lower energy bills.

**2. Public Sector Low Carbon Skills Fund.**

(<https://www.gov.uk/government/publications/public-sector-low-carbon-skills-fund-phase-3>)

Provides grants for public sector bodies to access skills and expertise to unlock heat decarbonisation on their estate. This enables public sector bodies to put in place a heat decarbonisation plan, providing them with the information they need to develop future applications to the Public Sector Decarbonisation Scheme (see below).

- a. Phase three of the Fund opened in June 2022 and closed 24 hours later (it was oversubscribed with fully completed, good quality applications). This approach means that applications need to be ready so that they can be submitted as soon as the application window opens.

**3. Public Sector Decarbonisation Scheme.**

(<https://www.gov.uk/government/collections/public-sector-decarbonisation-scheme>)

The Department for Business, Energy and Industrial Strategy set up this scheme to help meet the Government's carbon emissions targets. It supports the aim of reducing emissions from public sector buildings by 75% by 2037, compared to the 2017 baseline, by providing grants for public sector bodies to fund heat decarbonisation and energy efficiency measures. It is designed to help upgrade heating systems in public buildings to ones often powered by cleaner, cheaper renewable energy, which will help reduce fossil fuels.

4. Phase one of the scheme was launched in 2020 and provided £1 billion in grants over the financial years 2020/21 and 2021/22; phase two provided £75 million for the financial year 2021/22; phase three was announced in 2021. This will provide £1.425 billion of grant funding from financial years 2022/23-2024/2025. Phase 3a closed to new applicants in November 2021.
5. The phase 3b application window opened on 12 October 2022. This allocated up to £635 million to public sector organisations, split by financial year, with up to £402 million to be allocated in 2023/24, and up to £233 million in 2024/25.
6. Public sector bodies that are contracting authorities in England as defined in the Public Contracts Regulations 2015 were eligible to apply for Phase 3b of the scheme; this included central Government departments and their arms' length bodies, local authorities and emergency services. Again, applications were assessed in the order they were received (the recommendation was that applications should be fully ready to submit when the portal opened).

#### **7. Workplace Charging Scheme.**

<https://www.gov.uk/guidance/workplace-charging-scheme-guidance-for-applicants>)

This is a voucher-based scheme which provides support towards the upfront costs of the purchase and installation of electric vehicle charge-points, for eligible businesses, charities and public sector organisations meeting the applicant and site eligibility criteria.

8. The grant covers up to 75% of total costs of the purchase and installation of EV charge points, inclusive of VAT, capped at a maximum of £350 per socket, 40 sockets across all sites.

#### **9. National Lottery Grants for Heritage.**

<https://www.heritagefund.org.uk/funding/national-lottery-grants-heritage-10k-250k>)

This is a funding programme for projects from £10,000-£5 million that connect people and communities to the national, regional and local heritage of the UK. Activities which can be funded include: Repairs and conservation, new staff posts, paid training placements and professional fees. This might be suitable for Fire Services and other emergency services which have listed buildings.

## 10. Youth Investment Fund.

(<https://youthinvestmentfund.org.uk/>)

£368 million funding available to deliver grants for up to 300 facilities that represent positive value for money, are environmentally sustainable, and enabled for young people.

## 11. eCargo Bike Grant Fund.

([eCargo Bike Grant Fund information – Energy Saving Trust](#))

(<https://energysavingtrust.org.uk/grants-and-loans/ecargo-bike-fund/>).

Funding has now closed but it might be worth checking for future windows. This fund invited organisations to apply for 40% of the total cost of eCargo bikes, up to a maximum of five bikes. Public organisations were able to apply subject to specific criteria. This might not be practical for all emergency services depending on the type and weight of cargo and distances travelled, but helpful information is also provided here:

<https://www.gov.uk/government/publications/e-cargo-bikes-grant-funding>

**12. Local authority funding** has been made available for e.g. travel, such as the provision of cycle storage to encourage staff to cycle to work rather than use cars; or tree planting.

**13. Local funding**, where area-specific funding may be available to local organisations.

**14. Payback model**, where capital expenditure now will be offset by energy savings in the future.

**15. Other sources of information** – the Crown Commercial Service has collated a (not exhaustive) list of open Carbon Net Zero grants into a single place. This provides information about a scheme's scope, eligibility criteria and how to apply. Details can be found here:

(<https://www.crowncommercial.gov.uk/buy-and-supply/carbon-net-zero/carbon-net-zero-funding-and-grants/>).

# National Decarbonisation Consultancy Contract

Since June 2022, members of the National Fire Chiefs Council Facilities Management and Construction National Strategic Task and Finish Group have been working towards adopting a more coordinated approach in efforts to adhere to national net zero targets, decarbonise their estates and promote green energy initiatives. The group is also seeking ways to improve the Sector's success in accessing central funding opportunities. As part of this approach, the Group sought to introduce a nationally aligned energy consultancy opportunity to support individual Services in accessing the capability and capacity they may require in achieving their sustainability aspirations.

## Delivery Scope

1. Following feedback from the Fire sector, the contract scope will expand over three tiers:
  1. Energy data and carbon emissions analysis, decarbonisation planning, feasibility assessments, and modelling of decarbonisation and energy efficiency opportunities.
  - ii. End-to-end consultancy support in the preparation and submission of funding applications; and
  - iii. End-to-end consultancy support in the design and delivery of decarbonisation and energy efficiency projects.
2. The National Decarbonisation Consultancy Contract will be available to all Fire and Rescue Services, who would enter into a direct arrangement with Faithful+Gould (a project and programme management consultancy with experience in delivering holistic sustainability and energy efficiency services). The intent is to mirror contract terms that will apply across the Sector, benefitting from economies of scale whilst enabling a suite of options depending on individual Fire and Rescue Service needs, including capacity and budgetary requirements. Faithful+Gould will work with individual Services to develop and agree an individual work package.
3. Fire and Rescue Services will be able to commission services delivered under any, or all, of Tiers (i)-(iii). They will also have access to adhoc specialist advice on general energy performance optimisation issues to help increase staff skills in this area.



## Appointed Consultant, Timescales and Next Steps

4. After an assessment of market options, the Group concluded that the optimum procurement route is a direct award to Faithful+Gould under the Pagabo Professional Services Framework Agreement for the following reasons:
  - They are one of Salix's technical advisors for the review and assessment of Public Sector Decarbonisation Scheme and Low Carbon Skills Fund applications.
  - They offer competitive hourly and day rates, which are fixed on an annual basis and are all-inclusive of levy and overhead and profit charges.
  - The appointment of a single consultant will support the successful implementation of a centralised approach in the planning, funding and delivery of energy efficiency and decarbonisation projects.
  - It will contribute to the upskilling of Fire Sector staff.
5. Over the next three months, the National Fire Chiefs Council Facilities Management and Construction National Strategic Task and Finish Group, led by the National Category Lead, has been managing and coordinating the implementation of the new contractual arrangements. These include, but are not limited to:
  - delivering a discovery phase with the view of defining the operational model and associated specification requirements.
  - Identifying and producing work packages based on need; and
  - determining rates and finalising the terms and conditions of contract.
6. The National Category Lead has also been working with Faithful+Gould to agree a set of more favourable consultancy hourly rates. The level of the agreed reduction in rates will be linked to the number of organisations who join this collaborative contract.
7. The new National Decarbonisation Consultancy Contract will be in place, and made available to all interested Fire and Rescue Services, no later than 15 May 2023.

## How to Express an Interest

- Interested Fire and Rescue Services and other Bluelight organisations may contact the National Fire Chiefs Council Facilities Management and Construction Category Lead, Elli Nikolaou, by emailing:

[fmconstruction.tfg@nationalfirechiefs.org.uk](mailto:fmconstruction.tfg@nationalfirechiefs.org.uk)

- General information and progress updates about the National Decarbonisation Consultancy Contract will also be available via the National Fire Chiefs Council Procurement hub at:

[FM and Construction | NFCC Fire Commercial Transformation Programme \(nfcc-procurement.org.uk\)](https://www.nfcc-procurement.org.uk)

## Emergency Services Environment and Sustainability Group Charter and Charter Tool

This section gives information about the Emergency Services Environment and Sustainability Group Charter and the Sustainability Charter Tool. It also explains how Fire and Rescue Services can get involved.

- In August 2022, following a long period of extreme weather, Ben Brook and Mark Rist, joint National Fire Chiefs Council leads for Environment and Climate Change and Sustainability, wrote to every Chief Fire Officer to:
  - Give an overview of the work of the National Fire Chiefs Council Climate, Sustainability and Environment Group.
  - Ask each Chief Fire Officer to consider providing resources for the task and finish groups.
  - Share case studies, good practice, data, research and evaluation methods to inform work in this area.
  - Ask if every Fire and Rescue Service would consider signing the Emergency Services Environment and Sustainability Group Charter.
- Their letter highlighted that when extreme weather becomes more frequent and a clear long-term pattern is seen, it is the climate that is changing. It explained that the recent extreme weather events had created an increased urgency and need in this area, and that discussions with the Home Office, His Majesty's Inspectorate of Constabulary and Fire and Rescue Services, and

the Local Government Association had brought this risk into greater focus. Climate, Sustainability and the Environment is not a stand-alone action or objective – it cuts across everything we do.

3. The letter included a copy of the Emergency Services Environment and Sustainability Charter. The Charter is included below. Any Fire and Rescue Service that has not signed up to the Charter is encouraged to do so.
4. For accessibility purposes, the briefing note is repeated at Annex C.

## Appendix 1: Emergency Services Environment and Sustainability Group Charter



### EESG Sustainability Charter: Briefing note

#### Why was the Charter was developed?

The EESG Sustainability Charter has been developed by members from multiple Fire & Rescue Services and Police Forces to:

- Drive the collective action needed to address the challenges of climate change
- Assist all Emergency Services with their sustainability journey, whatever their starting point
- Include the latest developments of the global sustainability agenda
- Adopt the three principles of sustainability for inclusion in everyday operations

#### Explaining the sustainability journey



Wherever your organisation is on the sustainability journey you can incorporate the three sustainability principles adopted in the charter into core operations.

Social, economic and environmental aspects are for all Emergency Services to consider and commit to, and the Charter offers a solid foundation built on best practice and current topical issues, to ensure we are working to achieve common goals to embed sustainability into our activities processes and services.

#### Who should be aware of the Charter within your organisation?

The Charter is designed as a high-level strategic document, to be signed off by senior leaders such as Chief Constables and Fire Chiefs with a view to each organisation specifying how they are contributing to the overall Charter; referring to organisation specific strategies and programmes which are already in place.

#### The benefits of signing the charter

- Demonstrate collaboration with other emergency services through the adoption of common sustainability goals and aspirations
- Showcase our collective commitment to act responsibly and contribute positively to sustainability and share with the communities we serve.
- Provide a sustainability working structure which can be adopted by all emergency services whatever point of their sustainability journey.

#### Sustainability – the ongoing journey

The Emergency Services Sustainability Charter shall be managed by EESG and will be reviewed every three years. An annual update of group members sustainability journeys will be communicated every October, highlighting sustainability best practices employed and providing useful examples of sustainability projects.

## ESESG Sustainability Charter

The Emergency Services Environment and Sustainability Group (ESESG) includes members from UK Police Forces, Fire and Rescue Services, Ambulance Services and other Emergency Services. They meet to share best practices and discuss emerging technologies, government policy and legislative requirements.

This Sustainability Charter has been developed for members to pledge their support to

- work towards a set of common goals and aspirations
- embed sustainability within their own organisations
- achieve national and international sustainability objectives.

It will also enable members to identify positive effects on sustainability within their communities and manage any negative effects and risks.

All members shall consider the Sustainability Charter aspirations in the development and delivery of their own policies and strategies.

It is acknowledged that members are at different stages of their sustainability journey and will have different priorities depending on their core business activities and regional issues.

This Charter has adopted the [United Nations Sustainable Development Goals](#) to provide a consistent framework with consideration to all areas of sustainability. Key goals are linked under the People, Planet and Public Purse headings to enable all members to identify relevant areas of sustainability and incorporate these back into their own organisations.

### **For ESESG sustainability means:**

Reducing the negative impacts associated with our operations, whilst working towards positive and long-lasting outcomes for our planet, the people within our organisations, the communities we serve and the public purse.

Our organisation recognises that all emergency services have the potential to affect the local and global environment, society and the wider economy. We also recognise that climate change and global trends will continue to have an impact on the demands placed upon our emergency services. We need to be proactive in

recognising these impacts to continuously provide an efficient and effective service, and therefore aspire to:

## People

- Take action in our local areas to contribute to the transition to more sustainable cities and communities.
- Proactively manage our resources as communities change and develop to continue to be receptive to their needs.
- Provide our staff with the tools and resources required for them to make informed sustainable decisions both in the workplace and at home.
- Provide a safe and healthy working environment and improve wellbeing for all staff.
- Continue to improve equality, diversity and inclusion in our organisations and in the communities we serve.
- Reduce the harmful emissions associated with our operations, to improve local air quality, reduce pollution and enhance the wellbeing of our communities.

## Planet

- Work towards net zero carbon emissions through improving the energy efficiency of our estate and sustainable business and personal travel.
- Improve resource efficiency and adopt circular economy approaches to reduce waste and save money.
- Restore and enhance local biodiversity through the considered management of our estates.
- Adapt to inevitable climate change through proactively managing our ability to respond to extreme weather events and changes to service demand.
- Take action to avoid or mitigate pollution of water courses.
- Minimise our reliance on fossil fuels by actively seeking to generate renewable energy at our sites, and through the adoption of greener technologies and fuels for our fleet.

## Public Purse

- Use our spending power to promote and adopt sustainable procurement practices.
- Proactively manage the opportunities brought by new technologies to maximise financial budgets.
- Proactively prosecute wildlife crime.
- Support our staff and local supply chains to develop and maintain the skills needed to meet our organisational needs and sustainability goals.
- Maximise Social Value contributions through the contracts we procure.

By signing this Charter

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is agreeing to embed sustainability considerations throughout our organisation. We will measure and monitor progress and will strive to continually improve.

Signed

NAME:

TITLE:

DATE:

## The Sustainability Charter Tool

5. In order to track progress and to show the impact of Charter implementation at a national level across all emergency services, a prototype for an online tool has been developed: the Sustainability Charter Tool.
6. The aim of the tool is to create a user-friendly online way to track organisation-wide progress against each aspect of the Charter in an easy and cost effective way. It will also enable the following outcomes and benefits to be realised:

### At a national level

- The ability to clearly show how organisations are delivering, and supporting members to deliver, against agreed sustainability commitments.
- The ability to establish a baseline for sustainability implementation across organisations.
- The ability to use this intelligence to monitor progress and provide tailored support based on need.
- The ability to rate or score progress against the charter. This will identify opportunities to further reward and support organisations as appropriate.
- The ability to produce progress reports and infographics to show progress on sustainability.
- The ability to identify excellent practice and enable the sharing of this across all users of the system.

### For organisations using the tool

- Clear, practical support to help deliver sustainability.
- The ability to quickly develop a tailored sustainability action plan for their organisation, alongside national sustainability commitments.
- They will be able to compare progress against, and have a clear mechanism to see, what others are doing and share best practice.
- The ability to set their own baseline for sustainability implementation and monitor progress.

- Access to detailed and practical support for the actions they need to be taking, including links to guidance and more support.
  - Where an organisation has limited resource to work on sustainability, the tool will play a big part in supporting their sustainability journey, giving them structured guidance and support.
7. The initial development and support costs for the tool are £30,000, including content development, testing, launch and support. Once established, there will be user training and familiarisation sessions. Each organisation using the tool will pay an annual fee (around £500 per year). The tool is awaiting development and mobilisation pending funding.



## Annex A

### Case Studies, strategies and plans

This section provides case studies, strategies and action plans. As this is a live document further examples will be added as the document is updated.

- **Case Study one** – Drying room efficiency in practice, Greater Manchester Fire and Rescue Service.
- **Case Study two** – LED Lighting, South Yorkshire Fire and Rescue Service.
- **Case Study three** – Whitby Hydrogen Village.
- **Case Study four** – Avon Fire and Rescue Service and London Fire Brigade e-learning module.
- **Case Study five** – Avon Fire and Rescue Service – Per and Poly Fluorinated Alkyl Substances Fire Fighting Foam – Managing the Risk.
- **Case Study six** – Avon Fire and Rescue Service – Temperature in the Workplace standards
- Links to further case studie

## Case study 1

### Greater Manchester Fire and Rescue Service – Drying room efficiency in practice

1. In early 2014 Greater Manchester Fire and Rescue Service carried out a detailed study of the different technologies available to dry clothes in a 'drying room.' Many technologies exist but a controlled test of their efficiency and cost had not been widely published.
2. This work is applicable to any organisation that needs to dry large amounts of clothing or kit over a moderate amount of time. Five technologies for drying clothes were compared in several combinations. These reflected common drying room setups, as well as a control with no heating or dehumidification:
  - Dehumidifier,
  - Fan heater,
  - Central heating,
  - Infra-red panel,
  - Drying cabinet.
3. The test used the same clothing, doused with a fixed amount of water, in the same room at the same starting temperature and humidity each time.
4. The results in the following table show the energy, cost and time to dry clothes doused with 1kg of water in a 5.2m<sup>2</sup> room.

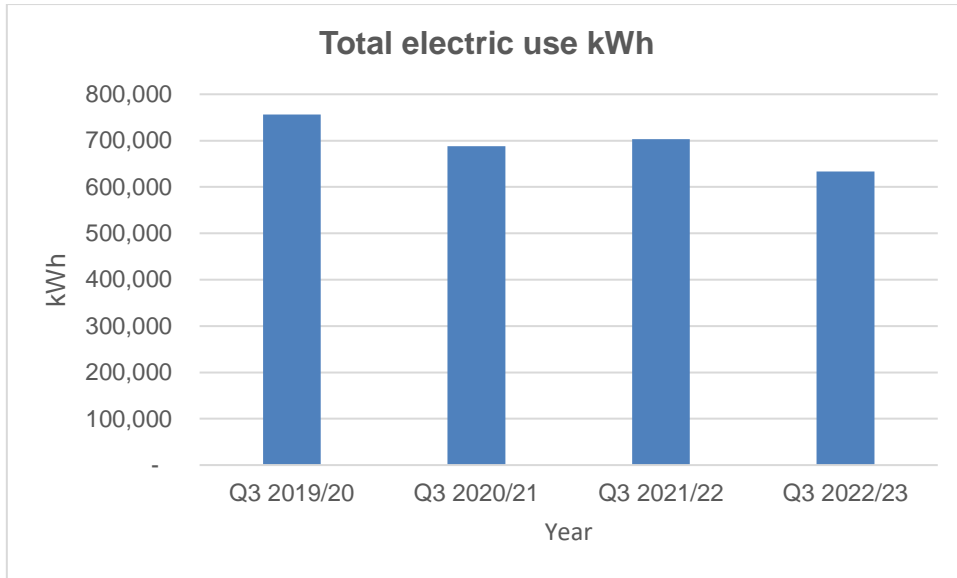
Technology used	Time taken to dry (hr)	Energy used (kWh)	£ Cost to dry
Dehumidifier	6:30	0.3	0.04
Dehumidifier and central heating	4:30	7.7	0.29
Central heating	5:00	10.1	0.35
Fan heater and central heating	4:30	7.0	0.58
Drying cabinet	3:30	6.16	0.71
Dehumidifier and fan heater	6:00	8.4	0.99
Infra-red panel and dehumidifier	4:30	9.6	1.13
Infra-red panel only	5:30	11.5	1.36
Fanheater	6:30	13.6	1.61
Control (nothing used)	9:30	-	-

5. The results demonstrated that dehumidifiers were the most energy and cost-efficient method to dry clothes. This efficiency does come at the cost of being amongst the slowest methods, although they take the same amount of time as a fan heater for a fraction of the cost.
6. Contact [sustainability@manchesterfire.gov.uk](mailto:sustainability@manchesterfire.gov.uk) with any further questions.

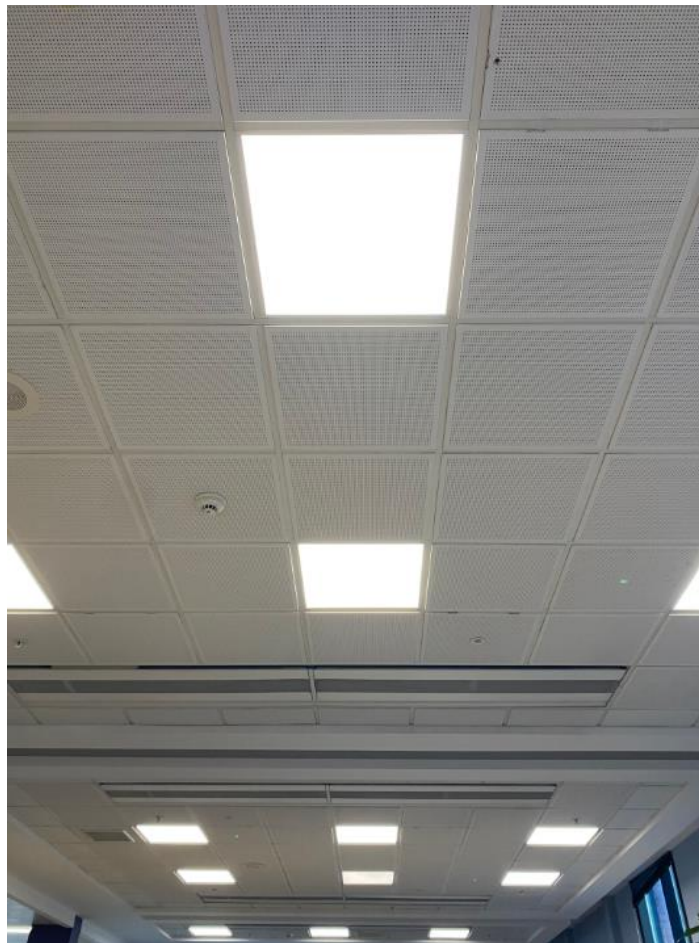
## Case study 2

### South Yorkshire Fire and Rescue Service – LED Lighting

1. South Yorkshire Fire and Rescue Service's estate consists of 21 operational fire stations, a training centre and a large Command Headquarters building. Like every energy user, the service has seen its costs spiral. Predicted costs for 2022-23 are more than double the level seen in 2021-22, despite usage remaining the same. This rise has put significant pressure on other budgets.
2. South Yorkshire Fire and Rescue Service has also pledged to reduce its environmental impact including its greenhouse gas emissions. Electricity use is a large portion of this, resulting in over 600 tonnes of carbon dioxide emissions in 2021-22.
3. These two factors led the service to consider how it could reduce energy use across its estate. It has:
  - Commissioned a new building management system to help manage heating better;
  - begun adding insulation;
  - accessed the government's Low Carbon Skills Fund to identify options to reduce emissions from its heating.
  - led to a review of lighting across its estate. The review found that 17 buildings had a mixture of dated lighting solutions, which had huge potential for energy and cost savings.
4. After a tender exercise through Lexica's Lighting Framework, the contract to install the new lighting was awarded to Energy Efficient Solutions.
5. During October and November 2022, Energy Efficient Solutions swapped 4,529 lights. In less than two months after the project ended, South Yorkshire Fire and Rescue Service saw an energy saving: compared to 2021, electricity consumption in the autumn reduced by 10%, saving around £20,000.



6. The new lights were also praised for their more modern and sleek look:



© South Yorkshire Fire and Rescue Service

7. With electricity costs predicted to rise again in 2023-24, the service will be adding a phase 2 to the project. This will involve adding passive infrared sensors to its estate in areas which do not need consistent lighting.
8. The finished project, including the LED lights and sensors, is predicted to save South Yorkshire Fire and Rescue Service £245,173 per year. This results in a payback period of 1.33 years and carbon savings of 392 tonnes per year.

## Case study 3

### Whitby Hydrogen Village

1. A Hydrogen Village is proposed in Whitby, near Ellesmere Port in Cheshire. The Hydrogen Village programme is part of the Government's Ten Point Plan for a Green Industrial Revolution. It is intended to show how a low-carbon alternative to natural gas could be used in the country's homes and businesses by converting around 2,000 properties to run on hydrogen for a period of two years.
2. Operated over the gas distribution network, overseen by Ofgem and partnered by British Gas, national and local government and the Health and Safety Executive, the scheme aims to inform key Government decisions in 2026 on the future plan for heating in the UK. A smaller Hydrogen Neighbourhood programme precedes it, involving around 300 homes in Scotland.
3. Hydrogen produced in the UK, Ellesmore Port is known for its significant petrochemical manufacturing experience, and does not produce CO<sub>2</sub> emissions, will be distributed using existing infrastructure and represents a reasonably simple change over for buildings already using gas boilers.
4. The Health and Safety Executive are underpinning this programme with research. This includes evaluating how easily hydrogen leaks can be repaired compared to natural gas, and understanding impacts on those leaks on the distribution network. This has shown similar leakage to methane gas after more than 380 experiments to enable risk assessments to be updated for using hydrogen in the UK's gas network.
5. Progressively older gas distribution metallic pipes are being replaced with plastic polyethylene pipes as part of the network upgrade programme. This reduces the likelihood of leaks. It also reduces the risk to the public while making the network 'hydrogen ready.'
6. Hydrogen gas presents specific risks to firefighters. While hydrogen is no more nor less dangerous than any other common fuel, it is different. Knowledge of its specific properties is needed to allow appropriate decisions to be made at the scene of an accident.

7. It is recommended that responders should be professionally educated to deal with hydrogen systems at pressures up to 100Mpa and temperatures down to -253 degrees centigrade (liquefied hydrogen) both outdoors and indoors. This would clearly cover the type of leak and distribution scenarios envisaged in the Whitby trials. At the time of writing, there is a funded European project considering a range of operational matters related generally to hydrogen (European Hydrogen Train the Trainer Programme for Responders. Fuel Cells and Hydrogen Joint Undertaking (FCH JU). Project Number: 875089. Project Acronym: HyResponder).



© Warwickshire Fire and Rescue Service



## Case study 4

### Avon Fire and Rescue Service and London Fire Brigade: Environment Matters e-learning module



© Avon Fire and Rescue Service

1. Avon Fire and Rescue Service and London Fire Brigade worked together with Rio Learn in 2019 to develop an e-learning module about the environmental issues at fire and rescue service sites.
2. The aim was to form a basic understanding amongst all staff of environmental issues and legislation relevant to fire service sites. This will help the organisations comply with relevant legislation and embed environmental best practice into day-to-day management of the stations. Although the module 'Fire and Rescue: Environmental Matters' is not designed to give operational guidance, many of the underlying imperatives and principles of environmental protection are the same.
3. The development of the module was a good opportunity for collaboration and a demonstration of leadership across the sector. It was endorsed by the National Fire Chiefs Council and Fire Brigade Union, and was developed with support from the Environment Agency. The module is mandatory for all staff at both Avon Fire and Rescue Service and London Fire Brigade, and is included in the induction programme for new staff. It is being used by a range of services, with Kent Fire and Rescue Service in the process of rolling it out.

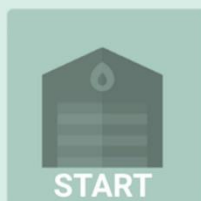
## Home

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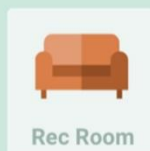
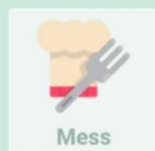
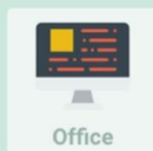
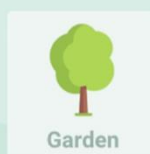
From this screen, you can either Take the tour (Start) in a preset order, or Find your own way around by choosing which scene to visit. Completing all sections will unlock the Quiz which will need to be completed before you exit the course.

Please select your path from the options below.

### Take the tour:



### Find your own way around:



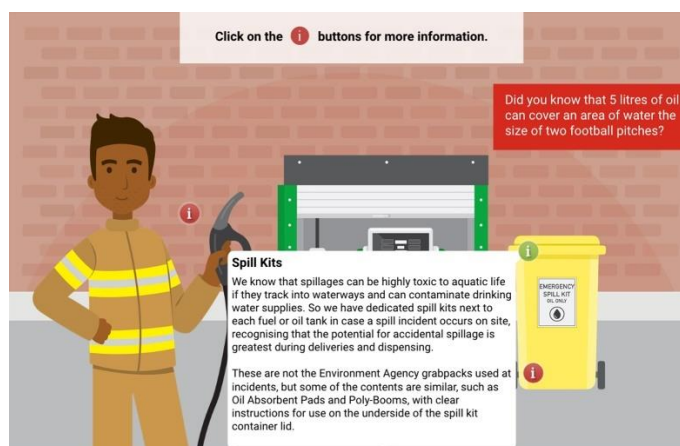
### Take the Quiz:



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4. The module takes staff on an interactive journey through the fictitious 'Green Brigade Fire Station.' It looks at energy, waste, water and well-being in different areas of the station and how these can be addressed, including:

- Using the right drains for vehicle washing.
- Best practice for hazardous waste.
- Use of depolluted scrap cars for training.
- Energy efficiency measures.



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5. If you would like to see a demo or find out more contact Rio Learn at [learning@rio.ai](mailto:learning@rio.ai).

## Case study 5

# Avon Fire and Rescue Service – Per and Poly Fluorinated Alkyl Substances Fire Fighting Foam – Managing the Risk

## Background

1. Avon Fire and Rescue Service identified the need to review its use of Per and Poly Fluorinated Alkyl Substances in firefighting foams in its Service area and to take voluntary action to assess and manage possible environmental risks resulting from the use of these substances. Key reasons being:
  - The growing evidence that these compounds are harmful to humans and other animals, do not readily break down and may stay in the environment for a long time, even after Per and Poly Fluorinated Alkyl Substances containing products have stopped being used.
  - Certain Per and Poly Fluorinated Alkyl Substances are banned or restricted (perfluorooctane sulfonate and perfluorooctanoic acid) although the use of shorter chain Per and Poly Fluorinated Alkyl Substances that are not specifically regulated, known as C6 compliant foams, are still permitted in England. However, with a proposal in the EU to restrict all Per and Poly Fluorinated Alkyl Substances in firefighting foam and UK legislation under review, it is likely that a time-frame will be adopted for transition to Per and Poly Fluorinated Alkyl Substances-free foams.
  - Increasing interest from regulators, e.g., the Drinking Water Inspectorate, about the use of Per and Poly Fluorinated Alkyl Substances foams in the Avon Fire and Rescue Service area.
  - The potentially significant costs of remediating land and water systems which have been contaminated with Per and Poly Fluorinated Alkyl Substances foams used and stored at Avon Fire and Rescue Service sites.

## Actions

2. With support from RPS Consulting, Avon Fire and Rescue Service is taking these actions:
  - Transition of the mobile fleet from Per and Poly Fluorinated Alkyl Substances-containing operational foam (aqueous film forming foams used in firefighting) to a fluorine-free foam. All fire appliances were decontaminated and changed to the new foam in November 2022. Samples were taken at various stages of the process for testing to confirm how successful the flushing process had been in removing Per and Poly Fluorinated Alkyl Substances contamination.



Source: RPS Consulting

- All remaining aqueous film forming foams stock disposed of in line with appropriate guidance.
- Transition of bulk foam to fluorine free, as well as working with key Control of Major Accident Hazards sites in the Avon Fire and Rescue Service area to also make the change to their on-site bulk foams [2023-24].
- Producing a Per and Poly Fluorinated Alkyl Substances Foam Management Strategy to document Avon Fire and Rescue Service's foam use, actions to mitigate risks, and to provide information and demonstrate intent to regulators and other stakeholders.
- A site prioritisation exercise of all Avon Fire and Rescue Service sites to assess risk about possible historic Per and Poly Fluorinated Alkyl Substances contamination. Depending on the outcome of these investigations, further actions will be determined which may include soil, groundwater and surface water testing, additional risk assessment and, if considered necessary, remediation or mitigation [2023-34].



Source: RPS Consulting

## Further information

3. For more information about Per and Poly Fluorinated Alkyl Substances risk management: Nancy Tonkin, Technical Director, RPS Consulting:  
[nancy.tonkin@rpsgroup.com](mailto:nancy.tonkin@rpsgroup.com)
4. For more information about Avon Fire and Rescue Service's foam transition process: Martyn White, SM Technical Centre Manager, Avon Fire and Rescue Service: [Martyn.White@avonfire.gov.uk](mailto:Martyn.White@avonfire.gov.uk)

## Case study 6

### Avon Fire and Rescue Service – Temperature in the Workplace Standards

1. This document defines how we heat and cool our buildings to:
  - Provide a comfortable working environment for staff and other building users.
  - Follow Health and Safety Executive workplace guidance.
  - Efficiently manage energy use to control utility costs and minimise carbon emissions.
2. It also sets out the action required by all staff to help conserve energy and reduce costs.

#### Heating

3. Avon Fire and Rescue Service aims to heat our building to the following temperatures whilst occupied and within the heating season:
  - Offices, rest areas, meeting rooms and other occupied spaces: 19-20°C.
  - Appliance bays: Will not normally be heated, frost protection is used to maintain 10°C.
  - Gyms: 16°C.
  - Workshops (Nova Way): 16°C-18°C.

#### Additional information

4. Heating at larger sites is controlled by a Building Management System. At some sites, heating is zoned so temperature settings and heating schedules can be varied according to the times of occupation for each zone. Outside those times, heating will be set back to frost protection only.
5. Due to irregular hours of occupation at on-call fire stations (excluding Nailsea, Bath, Weston and Yate), offices and other occupied rooms will be heated according to a pre-set schedule to maintain minimum temperatures, protect equipment and building fabric. The schedule provides extended heating for drill nights. A boost button on the heating controllers allows building users to bring on heating outside the scheduled hours.
6. The normal heating season is October to April. If external temperatures outside these dates fall lower than 16 degrees for a period of four daytime hours or longer, heating controls will operate.



7. Dehumidifiers are provided for drying rooms on most whole time stations. Dehumidifiers remove excess moisture from the room, and anything placed in it. Additional heat is not required to dry items. They are a more effective way of drying kit, reduce problems of damp air and mildew, and avoid operating heating throughout the year. These are pre-set to Auto and between 40-50% RH (Relative Humidity), so the unit will switch on automatically when the humidity level in the room reaches 40-50%.
8. Tube heating is provided at on-call stations to help dry off damp kit. These are controlled by time-delay switches or manual controls.
9. If the ambient temperature in a particular space is shown to be consistently lower than expected, averaging more than 5% of occupied hours, Property Services will aim to increase this temperature by taking the following measures where possible, in this order:
  - Amend heating system set points.
  - Install thermostatic radiator valves.
  - Provision of efficient, tested portable heaters.
  - Upgrade heating system and/ or improve building fabric.

## Cooling

10. Avon Fire and Rescue Service aims for all occupied areas to be cooled through natural ventilation wherever possible and does not support the use of air conditioning for comfort cooling applications, due to its high installation, energy, maintenance and regulatory compliance costs. Cooling systems will only be installed if required by legislation, code of practice, for specific equipment or if the ambient temperature in an area regularly exceeds 26°C. Where air conditioning is already installed, it will be set to cool to no lower than the following values:
  - Communications/ IT equipment rooms: 24°C.
  - All other areas: 23°C and turned off when not required.

## Additional information

- 11 The temperature in Communications/ IT equipment rooms will be subject to regular reviews as technology develops and is increasingly designed to operate at higher temperatures.
- 12 Where the ambient temperature in an area regularly exceeds 26°C, averaging more than 5% of occupied hours, Property Services will aim to reduce this temperature by taking the following measures where possible, in this order:
  - Natural ventilation, i.e., opening windows and doors for airflow.
  - Solar shading, i.e., blinds or window tinting.
  - Provision of efficient, PAT-tested fans or portable cooling equipment.

- Improving mechanical ventilation.

## Responsibilities

### **Staff & other building users are expected to:**

13. Apply a 'common sense' approach to keeping their environment comfortable by:

- Wearing the most appropriate clothing for the weather.
- Closing windows and doors in winter.
- Turning down room thermostats when too hot or leaving the room.
- Opening windows and doors on warm summer days in areas with no air conditioning.
- Moving around to improve blood flow.
- Sitting in the warmest/coolest part of the room.
- Using blinds to reduce solar gain – these can be requested from Property Services if not already present.
- Ensuring radiators/cooling equipment are kept clear of furniture and clothing.

14. Recognise that Monday-Friday buildings, daytime occupied areas or other partially occupied spaces will not be fully heated or cooled out of hours.

15. Keep windows shut if air conditioning is operating.

16. Keep doors closed between the heated areas of your site and the unheated areas, such as appliance bays and lobbies.

17. Switch off all non-essential electrical equipment when not in use including plate/food hot cupboards, computers, screens, TVs, fans, photocopiers and lights (where manually controlled). As well as saving energy, this equipment can contribute significantly to heat gain.

18. Consider your work colleagues' thermal comfort and rearrange your work area if necessary, e.g. moving people who are too cold closer to radiators, or those who are too hot adjacent to windows.

19. Report any breakdown, underperformance of heating or cooling, or extremes of temperature to the Property Services Helpdesk.

### **Staff and other building users are not permitted to:**

20. Adjust cooling and heating system controls, beyond using the local room controls provided (such as thermostats, adjustable radiator valves).

21. Use portable heaters or fans unless issued by Property Services. This does not include hand-held fans.



## Individual requirements

22. Where an individual has specific requirements on health or other grounds, they should contact their line manager, who may undertake an individual risk assessment and will need to consider what reasonable adjustments could be provided, e.g.:

- Relaxation of uniform requirements.
- Rearrangement or relocation of work area.
- Use of hand-held fans.

23. Alternatively, individual members of staff can contact HR or the Health, Safety and Welfare team to discuss their requirements, request for an individual risk assessment to be carried out, and for consideration of additional reasonable adjustment(s) that could be provided.

## Property Services

24. Will respond to heating and cooling issues as detailed in this guidance.

25. Is undertaking a rolling programme of building refurbishment and improvements, including upgrades to heating, building fabric, solar shading and cooling systems to support this effort. This includes the consideration of unwanted sources of heat that contribute to over-heating such as hot cupboards, deep-fat fryers, excess fridges/ freezers.

26. Remove all unauthorised temporary heaters, fans and cooling systems in line with this guidance.

## Health and Safety Executive guidance and thermal comfort

27. The Health and Safety Executive recognise that thermal comfort or 'comfortable temperature' is difficult to define due to a range of environmental and personal factors, such as air flow, humidity, clothing and level of physical activity. It is therefore not possible to heat and cool buildings to the satisfaction of all building users, but the Health and Safety Executive recommend that the majority of people in a workplace are comfortable with the thermal environment.

28. Temperatures in the workplace are covered by the Workplace (Health, Safety and Welfare) Regulations 1992, which place a legal obligation on employers to provide a 'reasonable' temperature in the workplace. There is no law for minimum or maximum working temperatures, i.e., when it is too cold or too hot to work.

29. Recommended practice is:

- Health and Safety Executive guidance suggests an acceptable zone of thermal comfort for most people in the UK lies roughly between 13°C and 30°C.
- The Approved Code of Practice suggests a minimum temperature in workrooms should normally be at least 16°C for sedentary activities or 13°C if work involves physical effort.
- The Health and Safety Executive recommends that employers should consult with employees, or their representatives, to establish sensible means to cope with high temperatures. This document is intended to provide practical advice to alleviate such effects.

## Further information and case studies can be found at:

As mentioned at p5 parts of this toolkit have been reproduced and updated from the Local Government Association's document:

- **Climate Emergency - Fire and Rescue Services: Local Government Association report** - Fire and rescue authorities have a key role to play in responding to climate change at a local level, alongside local councils. This report, aimed at Fire and Rescue Authorities, provides a basis for having local conversations about adaptation and mitigation, as well as providing comments and case studies from a range of organisations and programmes working on the issue.

<https://www.local.gov.uk/publications/climate-emergency-fire-and-rescue-services>

- **Independent Assessment of UK Climate Risk (CCRA3)** An assessment of the risks and opportunities facing the UK from climate change.

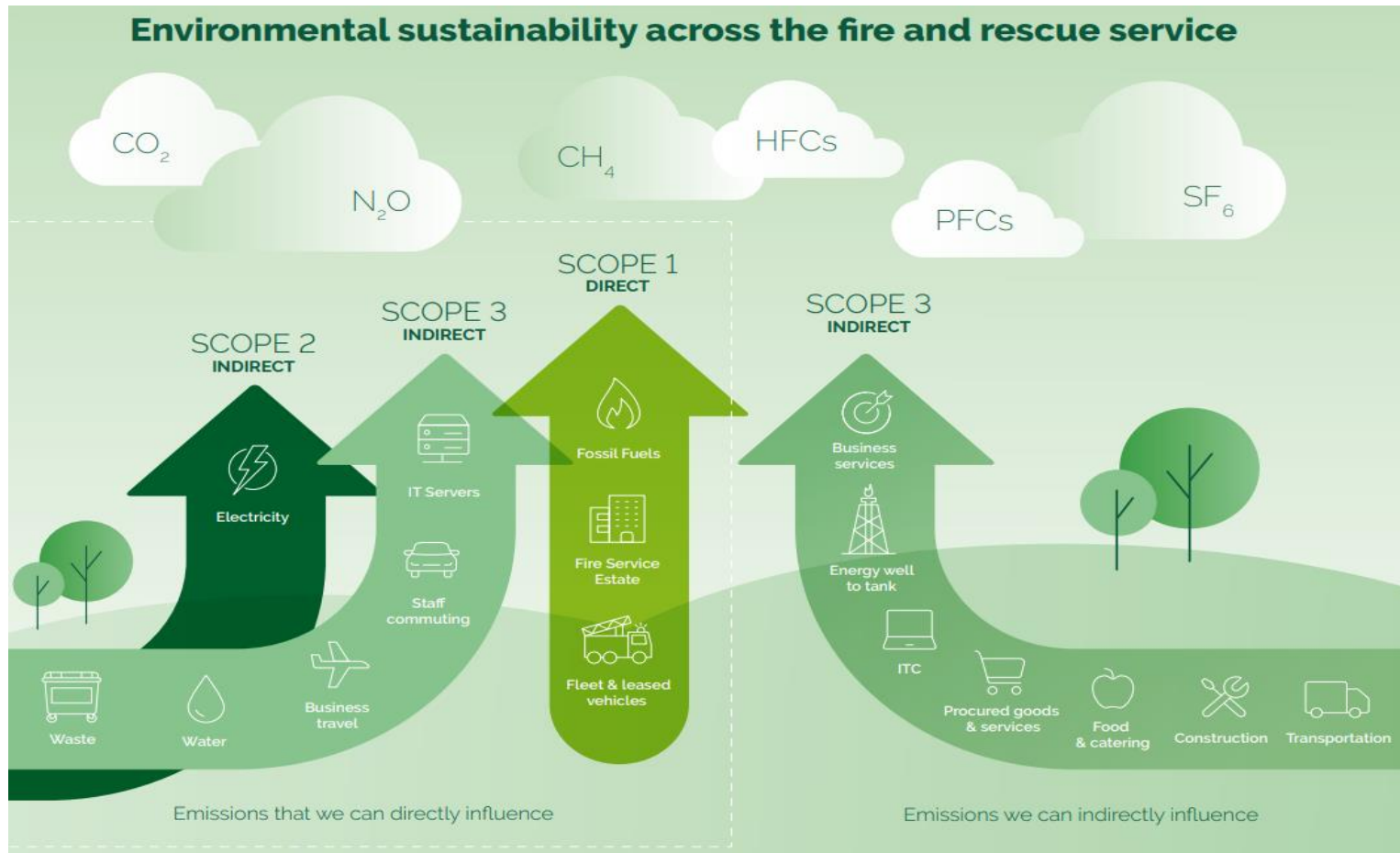
[UK Climate Risk](https://www.ukclimaterisk.org/) (<https://www.ukclimaterisk.org/>).

- **Kent Fire and Rescue Service**, environment and assets strategy

[Environment and Assets Strategy 2021 to 2025 | Kent Fire and Rescue Service \(fire-uk.org\)](https://www.kent.fire-uk.org/report/environment-and-assets-strategy-2021-2025)

(<https://www.kent.fire-uk.org/report/environment-and-assets-strategy-2021-2025>).

## Annex B Sustainability infographic



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## Annex C



# Emergency Services Environment and Sustainability Group Sustainability Charter: Briefing note

## Why was the Charter developed?

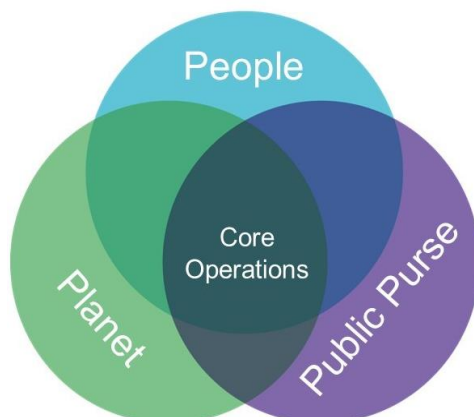
The Emergency Services Environment and Sustainability Group Sustainability Charter has been developed by members from multiple Fire and Rescue Services and Police Forces to:

- Drive the collective action needed to address the challenges of climate change.
- Assist all Emergency Services with their sustainability journey, whatever their starting point.
- Include the latest developments of the global sustainability agenda.
- Adopt the three principles of sustainability for inclusion in everyday operations.

## Explaining the sustainability journey

Wherever your organisation is on the sustainability journey you can incorporate the three sustainability principles adopted in the charter into core operations.

Social, economic and environmental aspects are for all Emergency Services to consider and commit to, and the Charter offers a solid foundation, built on best practice and current topical issues, to ensure we are working to achieve common goals to embed sustainability into our activities processes and services.



## **Who should be aware of the Charter within your organisation?**

The Charter is designed as a high-level strategic document, to be signed off by senior leaders such as Chief Constables and Fire Chiefs with a view to each organisation specifying how they are contributing to the overall Charter, referring to organisation specific strategies and programmes which are already in place.

## **The benefits of signing the charter**

- Demonstrate collaboration with other emergency services through the adoption of common sustainability goals and aspirations.
- Showcase our collective commitment to act responsibly and contribute positively to sustainability and share with the communities we serve.
- Provide a sustainability working structure which can be adopted by all emergency services whatever point of their sustainability journey.

## **Sustainability – the ongoing journey**

The Emergency Services Sustainability Charter shall be managed by the Emergency Services Environment and Sustainability Group and will be reviewed every three years. An annual update of group members sustainability journeys will be communicated every October, highlighting sustainability best practices employed and providing useful examples of sustainability projects.

## Annex D

### Understand the contribution to carbon emissions of fires and firefighting

This case study sets out an example of how Greater Manchester Fire and Rescue Service has attempted to estimate the contribution to carbon emissions from fires and firefighting.

#### Aim

- Understand the contribution to carbon emissions of fires and firefighting.

#### Objectives

- Introduce the methodology for predicting and reporting carbon emissions from fires.
- Propose a method for estimating impact of firefighting on carbon emissions.
- Including carbon factors in IRS.
- Historic trends in Greater Manchester Fire and Rescue Service as an example.
- Value for future carbon zero strategies.

#### Introduce the methodology for predicting and reporting Carbon emissions from fires

- a. In 2019 I published my research “model to predict carbon emissions from fires in the built environment,” validated by the University of Central Lancashire.
- b. Using data of reported fires from the Incident Recording System in Greater Manchester, I was able to develop carbon emissions factors for a series of typical fires and, in turn, estimate an average CO<sub>2</sub> emission for every fire, 865 kg.
- c. The method relies on a number of factors which include the extent of the damage in an identified area, compartment, or object of origin; information that is required for the Incident Reporting System, as well as estimates of the carbon load for each and the known chemical combustion processes.
- d. Results from a spread of typical fires (wheelie bins, skips, cars and compartment fires, including kitchens, bedrooms, lounges and offices) were tested to validate the methodology and to create a series of CO<sub>2</sub> factors inputted into the Incident Reporting System in order that emissions values could be automatically calculated. This created several years’ worth of emissions data for analysis.

- e. I was also able to use this for isolated incidents; Buncefield 2005 (194,000 tonnes of stored fuel yielded 597,574 tonnes of CO<sub>2</sub>), and an RDF fire in Salford in 2014 (1000 tonnes of stored refuse derived fuel yielded 1,184 tonnes of CO<sub>2</sub>).

### **Propose a method for estimating impact of firefighting on carbon emissions**

- f. I propose a similar method for the CO<sub>2</sub> emissions impact arising from firefighting operations, by using an estimate of the fuel used by firefighting appliances.
- g. Although often tasked for other duties, overwhelmingly firefighting appliances are engaged in travelling to and from, and tackling, emergency incidents. The annual fuel consumption for those vehicles can be reasonably used to estimate the CO<sub>2</sub> emissions.
- h. The fuel usage will include both fire and special service responses.

### **Including Carbon factors in Incident Reporting System**

- i. There is value in adding the CO<sub>2</sub> factors into the Incident Reporting System as this will offer cumulative total emissions for all or specific incident types over time for performance analysis.



## Historic trends as an example

j. I include some data from my published research for illustration:

Year	Greater Manchester Fire and Rescue Service fires	CO <sub>2</sub> @ 865 kg	England fires	CO <sub>2</sub> @ 865 kg
2010/11	18,276	15,808,740	228,407	197,572,055
2011/12	15,688	13,585,808	223,937	193,705,505
2012/13	12,027	10,403,355	154,456	133,604,440
2013/14	13,112	11,341,880	171,343	148,211,695
2014/15	11,669	10,105,354	155,037	134,107,005
2015/16	12,361	10,692,265	162,247	140,343,655
2016/17	12,412	10,736,380	161,997	140,127,405
2017/18	12,780	11,054,700	167,150	144,584,750

- k. The table gives a quick illustration of the estimated carbon dioxide emissions in Kgs for fires in both Greater Manchester and England, year on year from 2010/11 to the last UK Government statistical year, 2017/8. The variation in Greater Manchester is between just over 10,000 tonnes per year to almost 16,000 tonnes per year, with no obvious trend up or down over the eight-year time frame illustrated.
- l. To give context to the level of emissions, in 2016 the UK CO<sub>2</sub> emissions were estimated at 379 million tonnes, meaning the emissions from fires was 0.04% of that total.
- m. With regards to the Fire and Rescue Service response, and the extent to which firefighting/ emergency response adds to the CO<sub>2</sub> total, I looked at the total spend on fuel for the stations for one year and, as a result, for 2020/21. I

estimated the total CO2 emissions in Greater Manchester Fire and Rescue Service to be 337 tonnes CO2, or of the order of 3% equivalent of the CO2 emissions from the fires attended.

## Value for future Carbon Zero strategies

- n. Understanding the extent of the CO<sub>2</sub> impact of fires and responding to emergency incidents is the first step to identifying workable strategies to mitigate that impact.
- o. The scope for discussion can range from how emergency response vehicles are fuelled, installed fire safety provision and prevention campaigns, environmentally sensitive firefighting tactics and media, to building and furniture design, construction and manufacture.

## Methodology

- p. Two approaches to estimating the CO<sub>2</sub> emissions were used. The first, for building fires, was based on the carbon content per unit area of a defined compartment, e.g., bedroom, kitchen, office, generating a CO<sub>2</sub> factor for each. As the Incident Reporting System requires the incident commander to record the horizontal area damaged by flame and/ or heat in square metres, using the CO<sub>2</sub> factor the estimated emissions for that incident is calculated.
- q. The emissions value represents an estimate based on the average contents of a compartment type, and the estimate provided by the incident commander of the total area burned, governed by the Incident Reporting System data fields, e.g., estimating the carbon load in a bedroom produces a CO<sub>2</sub> factor of 33.44 kg CO<sub>2</sub>/m<sup>2</sup>, and a 5m x 5m bedroom would yield 836 kg CO<sub>2</sub>.
  - Approximately 5 x 5 metres squared contains:
    - Bed frame wood 100 kg 42 kg Carbon.
    - 2 x side tables wood 20 kg 8.4 kg.
    - Wardrobe wood 50 kg 21 kg.
    - Dresser wood 50 kg 21 kg.
    - Mattress PU foam 50 kg 32 kg.
    - Clothing cotton 100 kg 42 kg.
  - Total carbon load 228 kg.
  - Therefore, total carbon dioxide yield for a 25 m<sup>2</sup> bedroom is  $228 + 2.667 \times 228 = 836$  kg.
  - Therefore, the bedroom factor is 33.44 kg CO<sub>2</sub>/m<sup>2</sup>.
- r. The second approach for large scale or unique fire incidents was based on estimating the total carbon load, e.g., Buncefield had planning consent to store 194,000 tonnes of hydrocarbon products, and the most common Alkene molecule could reasonably be identified as octane, 84% of which is carbon.
- s. Assuming all of the hydrocarbon product was consumed, the total CO<sub>2</sub> emissions were estimated at 597,574 tonnes.

- t. The limitations of the model are a function of the Incident Reporting System in that in reports estimated area damaged is in blocks of 5s, 10s and 100s square metres, and therefore potentially creates a high estimate of damage reported. There are also built in assumptions in terms of the carbon content of the types of fires themselves, with averages used for wheelie bins, skips and cars, and the contents of the various compartments. However, the potential inaccuracies of this approach should not invalidate the methodology used for the model development. Rather, fine tuning of the values used for the carbon contents might be the focus of further study.
- u. In addition, using a similar approach, estimate the CO2 emissions for the transport fleet:
- 1 litre of diesel produces approximately 2.8kg CO2, and 1 litre petrol 2.3kg CO2.
  - Annual diesel/ petrol budget will give an estimate of total CO2 fleet emissions, based on fuel used rather than vehicle type.

## Accessibility

The National Fire Chiefs Council wants to make its documents accessible.

Where possible, in this document, this has included:

- The use of Microsoft Accessibility Checker, to aid:
  - The creation of paragraph banners.
  - Minimal use of tables.
  - Built-in title, subtitle and heading styles.
  - Adjusting space between sentences and paragraphs.
  - Adding alt text to visuals.
  - Adding accessible hyperlink text.
  - Using accessible font colour, and a high level of contrast between text and background.
  
- The use of ReachDeck-editor to place the text within the UK national average reading ability.