

Julie's Bicycle
SUSTAINING CREATIVITY



SPOTLIGHT

PROGRAMME

TRANSITIONING TO NET ZERO

PREPARED BY

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CREATIVE • CLIMATE • ACTION



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EXECUTIVE SUMMARY //

The climate crisis poses one of, if not the, greatest challenge humanity has ever faced. The world has warmed by 1.1°C since the preindustrial era as a result of human activity causing too many greenhouse gases (GHGs) to build up in our atmosphere. The climate crisis presents risks of more frequent and extreme weather events, severe impacts on human health, mass migration and vast disruptions to supply chains.

Scientists say that to avoid the worst impacts, we need to limit global temperature rise to 1.5°C by 2050. We can do that by ensuring all industries and countries halve total emissions by 2030 and reach what is known as **'Net Zero'** by 2050.

Some countries must do more to reduce emissions, and do so at a faster rate. A small number of industrialised countries are responsible for the majority of GHG emissions, and now must achieve Net Zero earlier than 2050. Mitigation is not a level playing field: developing countries will need more time to reach Net Zero.

This understanding of climate justice must be built in to the UK's response as an industrialised nation. Our emissions cuts must be faster and deeper.

The Spotlight programme is a key industry response from the cultural sector focused on achieving Net Zero.

It consists of 30 National Portfolio Organisations (NPOs) across 80 sites responsible for the highest carbon emissions with the Arts Council England portfolio. The programme forms part of the Arts Council England 2018-2023 sustainability strategy delivered by Julie's Bicycle, with technical support from Pilio. The Spotlight group have made significant reductions in their energy use since the start of the programme¹.

The purpose of this report is to provide guidance around what Net Zero means, why we need to achieve this, and how. This guide provides cultural organisations with an overview of the key sources of emissions for the cultural sector, and practical examples from organisations leading the way in their energy reduction journeys. Annexes provide an overview of technical solutions useful in particular, for venue-based organisations.

¹ For more information please visit the Spotlight page on the Julie's Bicycle [website](#)

What does Net Zero mean?

Simply put, **Net Zero means removing as many greenhouse gas emissions from the atmosphere as are being put into it.**

Recent guidance from the Science Based Target initiative (SBTi) says Net Zero must involve actual reductions of emissions in-line with what climate science tells us is needed to limit warming to 1.5°C². This is what's referred to as a 'science-based' target. Only the remaining unavoidable emissions can then be offset. This differentiates Net Zero from 'carbon neutral', which places greater emphasis on offsets to balance out emissions.

What does Net Zero cover?

An organisation's Net Zero target should cover all material sources of GHG emissions within its value chain. It is therefore important to define your organisational boundaries and understand the different sources of emissions.

The different sources of emissions are defined by the Greenhouse Gas Protocol and categorised into different 'Scopes'. These include:

- **Scope 1** – Direct emissions from owned or controlled sources (e.g. company owned vehicles, natural gas boilers).
- **Scope 2** – Indirect emissions from the generation of purchased electricity, steam, heating and cooling consumed by the reporting entity.
- **Scope 3** – All other indirect emissions that occur in an organisation's value chain (e.g. purchased goods and services, travel using vehicles not owned by the organisation and waste).

As with most organisations, Scope 3 emissions represent the largest proportion of the footprint for cultural organisations in Spotlight. Visitor travel and procurement of goods and services are the most significant emission sources.

In the Spotlight programme, most organisations are initially aiming to reach Net Zero for their energy-related emissions (i.e. Scope 1 and 2) as there is a greater ability to control these emissions in the immediate term. Some organisations are aiming to reach this target by 2030.

Achieving Net Zero (Scope 1 and 2)

There are a number of actions that organisations can take to achieve Net Zero for energy-related emissions. These include:

- **Avoiding emissions** – By identifying where power is not needed at all (e.g. 'switch-off' policies when lighting and heating is not being used).
- **Reducing energy use** – By implementing energy efficiency measures (e.g. Building Management Systems, LED lighting).
- **Replace energy sources** – By opting for low-carbon alternatives for electricity and gas.
 - Electricity – e.g. green tariffs, green suppliers, on-site generation
 - Gas – e.g. biogas, heat pumps
- **Offset residual emissions** – By balancing any unavoidable emissions with solutions that take carbon out of the atmosphere. This should only be the approach for any emissions you cannot feasibly remove by the previous actions.

²<https://sciencebasedtargets.org/resources/files/foundations-for-net-zero-full-paper.pdf>

Achieving Net Zero (Scope 3)

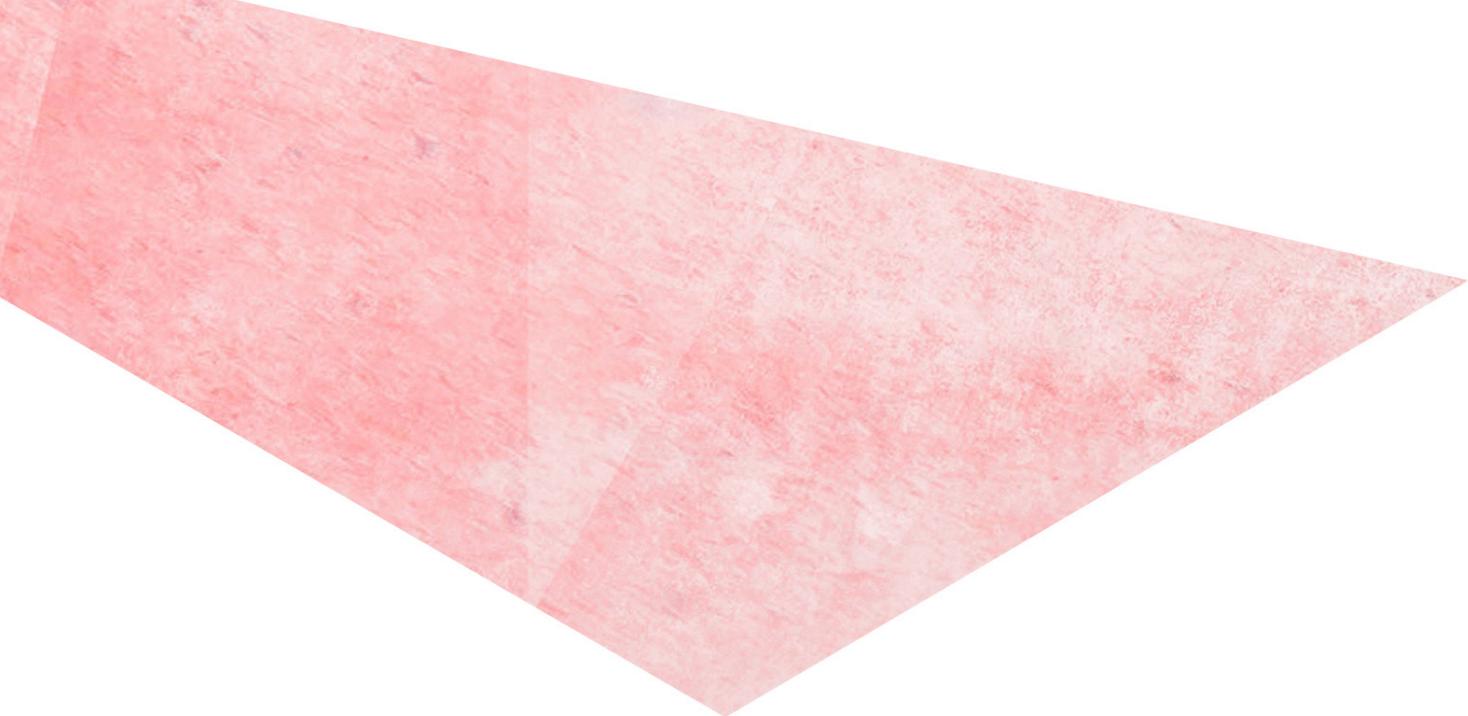
The recommended approach for Scope 3 is to engage the key stakeholders involved in the activity to start measuring these emissions more accurately and influencing positive behaviour change. The measures listed below outline what this might look like for each major source of emissions for cultural organisations:

- **Visitor/audience travel** – Encouraging and incentivising more sustainable forms of transport (public transport, walking, cycling and electric cars).
- **Procurement of goods and services** – Favouring suppliers that can provide more sustainable goods and services.
- **Business travel** – Encouraging web-conferencing instead of travel where possible and more sustainable forms of travel through a green travel policy where it is necessary.

To avoid the worst impacts of climate change, every organisation needs to play their part in reaching the Net Zero target, and organisations in the cultural sector are no different. While they too need to reduce the emissions from their operations, they are also uniquely positioned to use their platform to connect with and influence wider society.

MAIN REPORT – TRANSITIONING TO NET ZERO //





1. Introduction

The climate crisis poses one of, if not the, greatest challenge humanity has ever faced. The long-term warming of Earth's average temperature since the Industrial Revolution and its impacts on the climatic system threatens life as we know it. More frequent and extreme weather events, severe impacts on human health, mass migration and vast disruptions to supply chains are all expected as part of a warming world.

The scientific community is clear that the unequivocal cause of the climate crisis is human activity³. As a result of a society powered by fossil fuels and the destruction of nature, humans have and continue to generate too many 'greenhouse gases' (GHGs). The gases include nitrous oxide, methane, F-gases and carbon dioxide. While they occur naturally, trapping heat and warming the planet, our society has caused too many to build up in the atmosphere. Over half of all CO₂ emissions have been released in the last 30 years⁴.

Consequently, the world has warmed by 1.1°C since the preindustrial era, ending around 1850. While this increase may seem small, as a planetary average it has already had an enormous impact. The Intergovernmental Panel on Climate Change's 6th Assessment Report, released in 2022, states that climate change is causing substantial damages and increasingly irreversible losses to land ecosystems across every region of the world⁵. Scientists say we need to limit global temperature rise to 1.5°C by 2050 to avoid the worst effects of climate change. We are currently on course for a rise of 3°C.

Despite this, we can still reach the 1.5°C threshold if we halve our total emissions by 2030 and reach what is known as '**Net Zero**' emissions by 2050.

Every organisation needs to play their part in reaching this target, and organisations in the cultural sector are no different. While they too need to reduce the emissions from their operations, they are also uniquely positioned to connect with and influence wider society.

³ https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Headline_Statements.pdf

⁴ <https://ieep.eu/news/more-than-half-of-all-co2-emissions-since-1751-emitted-in-the-last-30-years#:~:text=2020%2C%2009%3A45-,More%20than%20half%20of%20all%20CO2%20emissions%20since,in%20the%20last%2030%20years>

⁵ <https://www.ipcc.ch/report/ar6/wg2/>

Spotlight programme

The Spotlight programme is a key industry response from the cultural sector in achieving Net Zero. Consisting of 30 National Portfolio Organisations across 80 sites, the programme is the largest collaboration of cultural organisations working together to reduce carbon emissions in line with what science says is needed to limit warming to 1.5°C.

Spotlight forms part of the Arts Council England 2018-2023 sustainability strategy delivered by Julie's Bicycle, with technical support from Pilio. The programme has involved working with each organisation to set Environmental Impact Reduction Objectives (EIROs) for energy use in buildings, provision of 1-2-1 support, training events and resources as well as access to Pilio's energy and carbon monitoring and management software.

This resource has been prepared to assist Spotlight organisations and the wider arts sector to understand and implement Net Zero strategies.

2. Understanding Net Zero

What does Net Zero mean?

Scientists say all industries need to reach 'Net Zero' emissions by 2050 to keep global temperature rise to within 1.5°C above pre-industrial levels. This is considered to be a level of warming that avoids the worst impacts of climate change.

Simply put, Net Zero means removing as many greenhouse gas emissions from the atmosphere as are being put into it.

Recent guidance from the [Science Based Targets initiative](#) (SBTi)⁶ has stressed the importance of actively **reducing the amount of greenhouse gases released in the first instance** for Net Zero. This is opposed to merely 'balancing' the total emissions put into the atmosphere with projects that remove an equivalent amount, known as offsetting (e.g. planting trees to absorb carbon).

In fact, the SBTi says Net Zero must involve actual reductions of emissions in-line with what climate science tells us is needed to limit warming to 1.5°C. This is a 'science-based' target. Only the remaining unavoidable emissions can then be offset. This definition by the SBTi, with its focus on absolute reductions rather than offsets, is helping to avoid Net Zero becoming co-opted by misleading or inaccurate claims, known as 'greenwashing'.

Net Zero vs 'Carbon Neutral'

Until recently, **Net Zero** and **Carbon Neutral** were widely used synonymously. However, the recent SBTi guidance on Net Zero has distinguished the term by placing emphasis on reducing emissions in line with 1.5°C first, before balancing out remaining emissions with offsets.

In contrast, being **Carbon Neutral** does not necessarily require overall emissions to be reduced in line with 1.5°C. The total amount of emissions need only be compensated for by carbon offsets. This has been widely criticised for allowing those that can afford offsets to continue polluting as usual.

⁶ <https://sciencebasedtargets.org/resources/files/foundations-for-net-zero-full-paper.pdf>

What does Net Zero cover?

Achieving Net Zero emissions effectively reduces a carbon footprint – the total amount of GHGs released into the atmosphere by an entity over a set period of time – to ‘zero’. An organisation’s Net Zero target should therefore cover all material sources of GHG emissions within its value chain⁷. In order to identify the GHG emissions associated with your organisation, it is important to define your organisational boundaries and understand the different sources of emissions.

Boundaries

Defining the ‘boundaries’ of the organisation means identifying the operations it owns or controls. In doing so, an organisation selects an approach for consolidating GHG emissions for the purpose of accounting and reporting. Two distinct approaches can be used to consolidate GHG emissions: the equity share and the control approach.

Emissions sources

Once the boundaries have been determined, an organisation can then identify the emissions associated with its operations. The Greenhouse Gas Protocol defines different sources of emissions and categorises them into ‘Scopes’. The Scopes set out whether emissions were a result of ‘direct’ or ‘indirect’ sources and where in the value chain they occurred. The most common emissions within each Scope are outlined on the following page.

Equity share approach

Under the equity share approach, a company accounts for GHG emissions from operations according to its share of equity in the operation (equity share will normally be the same as the ownership percentage).

Control approach

Under the control approach, a company accounts for 100 percent of the GHG emissions from operations over which it has either *financial* or *operational* control. It does not account for GHG emissions from operations in which it owns an interest but has no control.

⁷ <https://sciencebasedtargets.org/resources/files/foundations-for-net-zero-full-paper.pdf> (page 10)

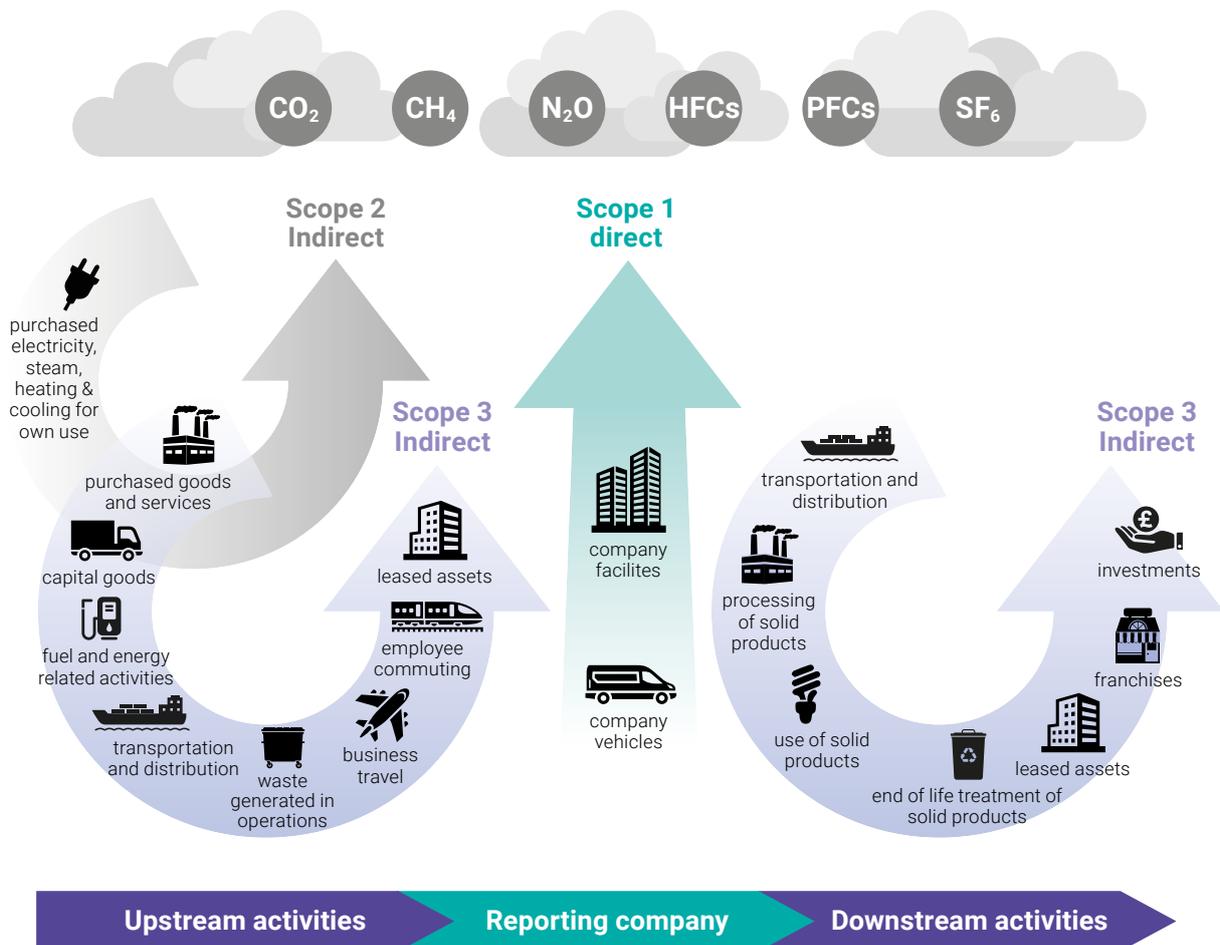
Emission sources within each Scope

The Greenhouse Gas Protocol provides the world’s most widely used GHG accounting framework, the Corporate Accounting and Reporting Standard.

The Standard categorises greenhouse gas emissions into three ‘Scopes’, which form the basis of measuring and reporting carbon footprints:

- **Scope 1** – Direct emissions from owned or controlled sources. The most common emissions reported under Scope 1 include fuels used in company owned vehicles, gas burnt in boilers to heat buildings and fugitive emissions from refrigerants.
- **Scope 2** – Indirect emissions from the generation of purchased electricity, steam, heating and cooling consumed by the reporting entity.
- **Scope 3** – All other indirect emissions that occur in an organisation’s value chain. Most commonly, these include emissions associated with purchased goods and services, travel using vehicles not owned by the organisation and waste, among others.

The image below lists all the sources of emissions identified by the Greenhouse Gas Protocol.



Source: Page 31, GHG Protocol Corporate Value Chain Accounting Reporting Standard

For most organisations, Scope 3 emissions represent the largest proportion of their footprint.

This is also true of cultural organisations, where visitor travel and procurement of goods and services tend to be the most significant emission sources. Unfortunately, emissions in Scope 3 are also the most difficult to accurately measure and reduce. This is because these emissions are out of the direct control of the reporting organisation.

Measuring and reducing Scope 3 emissions often depends on strong stakeholder relationships. In particular, engagement with suppliers and customers may be crucial to make interventions on Scope 3 emissions.

Where data often cannot be collected for Scope 3 emissions, they are normally estimated using other information that is available, combined with other proxy data.

The **UK Streamlined Energy and Carbon Reporting (SECR)** guidance⁸ makes Scope 1 and 2 reporting mandatory and Scope 3 voluntary, although identifying significant Scope 3 emissions sources is advised⁹. There is currently no agreed definition what Scope 3 emissions *should* be included and what can be left out. Instead, organisations should be transparent about the sources of emissions that have been included and excluded, and where estimations were used to calculate them.

The future of Net Zero in the UK

The UK Government has committed to reducing its GHG emissions to Net Zero by 2050 (although local and regional targets may differ). Before then, there is an interim target to cut emissions by 78% by 2035 compared to 1990 levels. The amended **Climate Change Act** (2008) has made these targets legally binding, giving assurance on the direction of travel for emissions reduction.

While it remains unclear exactly how the UK will reach its Net Zero target by 2050, the Government's 10 Point Plan¹⁰, published in 2020, sets out a number of focus areas. These include various areas of investment in the UK's green energy supply, with targets to increase the capacity of offshore wind, low carbon hydrogen and nuclear power. The decarbonisation of the UK energy mix will benefit organisations connected to the grid. The British Energy Security Strategy (published in April 2022) sets out the government's vision for the future of energy supply. The strategy has been criticised for not doing enough to secure short-term affordable renewable energy supply, opting instead to focus on nuclear power¹¹.

The recent formation of the Net Zero Scrutiny Group, a small collection of backbench Conservative MPs opposing many Net Zero policies, shows there is still some challenge within government to meeting crucial climate targets. The Group reportedly does not contest the science nor the need to reduce emissions, but argues the government's plans to achieve Net Zero by 2050 are too rapid and expensive. The Group does not acknowledge the economic benefits of moving to a Net Zero economy and does not reflect the consensus on the need for urgent action now.

⁸ [Environmental Reporting Guidelines \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/90422/environmental-reporting-guidelines.pdf)

⁹ The SECR is a regulatory framework that requires certain UK businesses to report on their energy and carbon use. This builds on the GHG protocol, which is an accounting tool to help understand, quantify and manage GHG emissions.

¹⁰ [10 Point Plan for a Green Industrial Revolution](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/90422/10-point-plan-for-a-green-industrial-revolution.pdf) (Nov 2020)

¹¹ The Carbon Brief provides an analysis of the energy strategy here: <https://www.carbonbrief.org/qa-what-does-the-uks-new-energy-security-strategy-mean-for-climate-change>

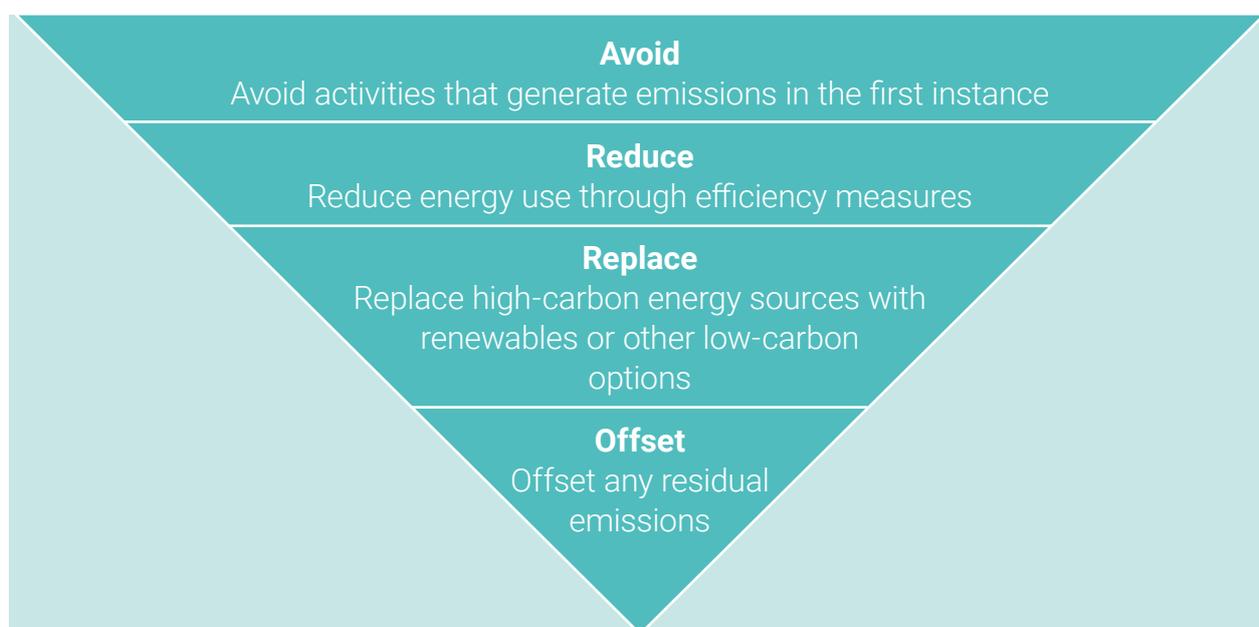
3. Achieving Net Zero (Scope 1 and 2)

Reducing emissions to zero across the entire value chain by 2050 is a challenge for all organisations and industries. While this is the ultimate aim, interim goals are useful to guide action. Often, this means setting a Net Zero target in the near-term for the emissions which an organisation has greater control over, namely those in Scope 1 and 2.

Efforts to reduce the indirect value chain emissions in Scope 3 may in the near-term

focus on measuring data more accurately and influencing stakeholders, before taking further steps to achieve zero emissions by 2050.

In the Spotlight programme, most organisations are initially aiming to reach Net Zero for their energy-related emissions (i.e. Scope 1 and 2) with some organisations raising their ambitions, aiming to reach this target by 2030. There are a number of actions that organisations can take to achieve this target. These form a hierarchy of good carbon management:



Avoid emissions

Avoiding activities which generate emissions is often the first step towards Net Zero. This involves identifying areas where energy is currently being used unnecessarily and implementing measures to prevent this wastage. Not only does this reduce emissions, but it also helps an organisation to reduce costs.

The typical measures to avoid emissions in buildings include making use of natural lighting, and implementing a switch off

policy for lighting and heating when they are not being used. Better yet, investing in smart lighting and heating can automate the switch off process through sensors and avoid unnecessary energy use.

Emissions can also be avoided from business travel where web-conferencing will suffice. For Scope 1, this involves reducing emissions from vehicles owned by the organisation, such as company cars.

During the pandemic, government guidance around the use of fresh air to reduce transmission has led to increases in energy use. Within the Spotlight programme **Unicorn Theatre** is investigating methods of conditioning which are lower energy use – focusing on plant room equipment and control – mainly Building Management System (BMS) deadband settings. Similarly, **Tullie House** were concerned about high energy use through the pandemic. A building energy saving audit conducted as part of the Spotlight programme and Creative Green services, showed an issue common to many museums – government guidance combined with a tight environmental envelope required for their artefacts, resulted in continuous air conditioning of incoming air. They are working with the BMS contractors to optimise the settings for a new regime – making fresh air contingent on occupancy.

Reduce energy use

All efforts to reduce energy use lessens dependence on fossil fuels and moves organisations closer to achieving Net Zero emissions.

It is not possible to avoid all activities which use energy and generate emissions. The next option is therefore to reduce *how much* energy is used by the activity through efficiency measures.

Energy efficiency in buildings can be achieved through a robust Building Management System (BMS). This can provide smart controls on lighting, heating and cooling in the building, automating



energy management to optimise efficiency. It is important to regularly check the settings on a BMS to ensure it is operating effectively.

Installing LED lighting throughout the building is another energy efficiency measure which can achieve energy savings of over 70% compared to traditional lightbulbs¹². Frequent building energy audits can identify any further areas where energy efficiency measures can be implemented. These measures are discussed in more detail in Annex A.

Opera North has a set of well-run buildings with excellent switch-off programs and energy use scheduled for building use. They use little mechanical cooling. Opera North completed the Energy Saving Opportunity Scheme in 2019¹³. This scheme is for larger organisations, but it is available for anyone to complete. Opera North started work on the formal documentation of their energy management – such that good practice would not be lost in case of staff changes. This led to the consideration of ISO50001 accreditation – which both confirms the well-run nature of the building and automatically passes the building through the next phase of ESOS. As a member of the Spotlight programme Opera North received energy management guidance and support with ISO50001 (an international energy management standard).

¹² [The Climate Group](#)

¹³ Open to organisations who employ more than 250 people, or have a turnover in excess of £44mn.

Curve Theatre has been developing their environmental strategy and policy to meet their commitment to climate action. As part of this process, they ran some consultations with external stakeholders to gather feedback, thoughts, and ideas of how to best connect and amplify their sustainability work with local partners. To ensure effective implementation of their strategy and policy Curve has recognized they need dedicated staff resources and are creating a new role for a Climate and Environment Manager. The manager will sit in the Estates team, but will be working across all departments to oversee Curve's efforts to minimise, reduce and report its environmental impact. As a member of the Spotlight programme Curve received support in writing the job description of responsibilities and competencies.

Replace energy sources

Once a Spotlight organisation has avoided or reduced energy-related emissions, it will need to ensure the energy it does use is from more sustainable sources. Replacing high polluting energy sources is crucial to achieving Net Zero.

It is currently easier to switch to low-carbon sources of electricity (Scope 2) than it is for heating, where most boilers are powered by natural gas burnt on-site (Scope 1). The following outlines the options available in each of these areas.

Low-carbon electricity

The UK's energy grid is decarbonising, with the government setting a target to achieve Net Zero emissions in the grid by 2035. This means that procuring energy from the national grid will lead to a de facto emissions reduction over time. However, progress against this target is

not a certainty and will not deliver Net Zero energy by 2030. Spotlight organisations attempting to achieve Net Zero in their energy use by this date will need to make proactive choices on where their electricity comes from. There are a number of options available:

i. Procure a green tariff

Green electricity tariffs associate your ordinary electricity use with renewables. This does not necessarily mean the electricity you use is generated by renewables, but rather a 'renewable energy certificate' has been bought. This matches the amount of electricity you have used and trades it with the same amount of renewable energy produced elsewhere, claiming the environmental benefits and theoretically 'greening' your supply. It is argued that these certificates don't create any structural change to the energy system, as 'dirty' energy is merely traded for renewable energy, although some green tariffs do make investments in renewable capacity. Green energy tariffs are generally considered the entry-level way of purchasing renewable energy.

ii. Procure from a green supplier

A better option is to purchase renewable electricity directly from a green supplier that only generates power from renewables, such as wind and solar. There is considered to have a greater additionality of environmental benefits as it directly supports renewable energy production.

iii. Self-generation of renewables

Self-generation is generally seen as the **best option for sustainability** as it adds additional renewable capacity to the grid. The most appropriate on-site option for electricity generation will likely be solar. Following the initial investment of installation, electricity supplied to the building will effectively be free. Surplus electricity can even be sold back to the grid.



Royal Opera House commissioned an energy strategy to better understand the energy use of the building and options for reducing energy and carbon emissions. The strategy is being used to inform the organisation's capital investment decisions for meeting the energy needs of the building with energy efficient and low carbon technologies. This strategy is helping lay the foundations as the Opera House meets its commitment to reducing its carbon emissions.

Sadler's Wells undertook a capital investment project to improve the energy performance of the building in 2015, which included a major LED lighting retrofit and installation of 83 solar photovoltaic panels on the auditorium roof and fly tower, which are now producing an average annual generation of 17,000kWh. Sadler's Wells is presently preparing its roadmap for meeting its commitment to be Net Zero by 2030, which includes scoping, increasing in solar photovoltaic panel array and joining up with the potential district heating¹⁴ scheme being developed.

Low carbon heating

In the UK, most buildings are heated by boilers that use natural gas. Because of this, the decarbonisation of heat is a challenge for the majority of organisations. Electric boilers are considerably more efficient, but as they only heat small amounts of water, they can't be used for large properties. The typical options available for low-carbon heating therefore include:

i. Natural gas boilers and offsetting

Currently, the cheapest option is to continue using natural gas boilers and then offsetting its impact. **This will not be a solution in the long-term** however, because it is not possible for the UK economy to meet its Net Zero commitment through offset projects alone. **Ultimately, the energy system must transition away from fossil fuel energy sources.**

ii. Green gas

'Green' gas generally refers to biomethane, which can be generated from multiple sources, including anaerobic digestion from waste, capture of landfill gas, and gasification of biomass. Biomass boilers have a better environmental impact than traditional gas, especially if biomass is locally sourced, but installation can be expensive.

¹⁴ District heating is where heat from a central source (or range of sources) is distributed to a number of buildings via a network of insulated pipes.

iii. Heat pumps

Heat pumps are a sustainable heating solution which extract heat from the ground or air, using only small amounts of electricity to do so. These offer many benefits, most notably significantly lower **emissions for heating**, although heat pumps have expensive up-front costs for installation. The UK government has recently outlined plans to incentivise the installation of heat pumps, but mainly to make it more affordable for homes¹⁵.

Hydrogen has been touted as a potential solution for low carbon energy, including for heating. However, the technology for a hydrogen gas grid and hydrogen boilers is currently not widely available and is prohibitively expensive. Therefore, waiting for hydrogen to enter the market is not appropriate for Spotlight organisations that have set a 2030 Net Zero target.

See Annex B for discussion about heat pumps versus hydrogen.

The Royal Shakespeare Company

(RSC) has a well-developed plan for moving their buildings to Net Zero. They have already invested in much of the infrastructure for ground source heat pumps – pipes and valves – for the theatre building but are waiting for the replacement to the renewable heat incentive before committing more investment. RSC has also investigated ground source for the office buildings and residential properties as well as considering water source heat – using the River Avon as a low carbon source of heat. As a member of the Spotlight programme RSC was provided technical advice on heat pump technologies and connected them with heat pump designers.

National Theatre has undertaken an energy efficiency project to understand energy demand throughout the building and installed extensive submetering to monitor usage, so action can be taken when usage exceeds expected levels. Alongside this there is a substantial annual rolling investment in moving to LED lighting both onstage and around the building's public and backstage spaces. In addition, the National Theatre commissioned a feasibility study to scope the potential of installing a Ground Water Sourced Heat Pump (GWSHP) using abstraction and recharge of groundwater from the London aquifer, which would enable the theatre to significantly reduce the use of natural gas.

Offset residual emissions

The final tool for reaching Net Zero for Scope 1 and 2 is to compensate for any emissions which are unavoidable through offsets. This is where an organisation pays for an equivalent amount of carbon it produces to be taken out of the atmosphere elsewhere. For a Net Zero strategy to be credible, **organisations must actively reduce emissions as much as possible first, before offsetting only the remaining emissions.**

There is widespread scrutiny and debate over offsetting and which sorts are the most effective. To overcome the valid concern that offsets allow those that can afford it to continue polluting, the SBTi states in its Net Zero Standard¹⁶ that **an organisation must reduce its emissions in line with a 1.5°C pathway prior to achieving Net Zero with offsets.**

¹⁵ <https://www.gov.uk/government/news/plan-to-drive-down-the-cost-of-clean-heat>

¹⁶ <https://sciencebasedtargets.org/net-zero>

Offsets may be nature-based, such as planting trees, or socio-economic, like paying for more efficient cooking stoves in developing nations. Many organisations opt for verified offsets, which are certified by providers like the [Gold Standard](#) and [SCS Global](#).

Julie's Bicycle have put together an offset briefing paper, which you can read [here](#).

4. Achieving Net Zero (Scope 3)

Several Spotlight organisations are beginning to measure the emissions produced across their value chain, known as Scope 3 emissions. **Reaching the ultimate goal of Net Zero by 2050 will require the total reduction of these emissions.**

As with most organisations, Scope 3 emissions make up the largest proportion of the carbon footprint for cultural organisations in Spotlight. The most significant sources of emissions within this category include visitor/audience travel, procurement of goods and services, and business travel (in vehicles not owned by the organisation).

As the sources of Scope 3 emissions lie outside of the direct control of organisations, the recommended approach is to engage the key stakeholders involved in the activity. This engagement can help to start measuring these emissions more accurately and be a basis to influence positive behaviour change. The following outlines what this might look like for each major source of emissions for cultural organisations.

Leeds Museums & Galleries is able to connect two museum venues to a new heating network, which reuses heat already being produced at Leeds' Recycling and Energy Recovery Facility, which is enabling them to avoid using natural gas. The heating network forms part of the City's approach to become carbon neutral by 2030.

i. Visitor/audience travel

Over time, the emissions from visitor travel are likely to decrease with the onset of electrified trains and battery powered buses and cars. In the meantime, cultural organisations can conduct a survey to understand how visitors currently travel to the site. Depending on the most common routes, organisations can influence behaviour by:

- Encouraging and incentivising public transport, walking and cycling
- Installing electric charge points for cars

ii. Procurement of goods and services

An organisation's Scope 3 emissions from the goods and services it buys reflects the Scope 1 and 2 emissions of the supplier. Therefore, emissions from bought goods and services can be reduced through a procurement policy that:

- Encourages large suppliers to target Net Zero
- Favours suppliers with existing Net Zero ambitions
- Sets an internal carbon tax, guiding procurement choices towards lower carbon suppliers

iii. Business travel

Business travel counts towards Scope 3 emissions where vehicles are not owned by the organisation. This includes taxi journeys and travel on commercial trains

and planes. Staff commuting in personal vehicles is similar and sits as its own category in Scope 3. A business travel policy can reduce emissions from business travel by:

- Encouraging web-conferencing instead of travel where possible
- Establishing a distance-based travel hierarchy (e.g. no domestic flights) and promoting the use of public transport where possible
- Incentivising personal electric car usage (e.g. through charging points on-site)

5. Beyond Net Zero

Achieving Net Zero across Scopes 1, 2 and 3 by 2050 is an enormous challenge for all organisations, but if we succeed, we have a good chance of keeping global temperature rise to 1.5°C above pre-industrial levels and securing a liveable future.

However, that will not be the end of the story. Climate scientists tell us that after reaching Net Zero emissions in the middle of this Century, thereby balancing the amount of emissions we put into to the amount we absorb from the atmosphere, we will then need to remove even more than we produce. This is called '**climate positive**' or '**carbon negative**'. It is likely that this will depend on scaling-up carbon capture and storage technologies and nature-based solutions, such as rewilding.

FURTHER READING //

- GHG Protocol: Corporate Accounting and Reporting Standard (World Resources Institute, WBCSD) <https://ghgprotocol.org/corporate-standard>
- GHG Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard - Supplement to the GHG Protocol Corporate Accounting and Reporting Standard (World Resources Institute, WBCSD) <https://ghgprotocol.org/standards/scope-3-standard>
- GHG Protocol: Technical Guidance for Calculating Scope 3 Emissions (version 1.0) - Supplement to the Corporate Value Chain (Scope 3) Accounting & Reporting Standard (World Resources Institute, WBCSD) <https://ghgprotocol.org/scope-3-technical-calculation-guidance>
- Renewable energy information from the RE100: <https://www.there100.org/sites/re100/files/2020-10/RE100%20Technical%20Criteria.pdf>
- Science-Based Target initiative Net Zero Standard: <https://sciencebasedtargets.org/resources/files/Net-Zero-Standard.pdf>
- Julie's Bicycle Briefing Report: Putting a Price on Carbon: <https://juliesbicycle.com/resource/briefing-report-putting-a-price-on-carbon/>

ANNEX //

Annex A – How to Reduce Energy Use in Buildings

All efforts to reduce energy use lessens dependence on fossil fuels and moves organisations closer to achieving Net Zero emissions.

The main methods of reducing energy use in buildings are outlined below.

Energy management

Good energy management is crucial in reducing energy use – ‘what you can’t measure, you can’t manage’. This includes smart meters, the use of software, using relevant targets, monitoring for exceptions etc. **Staff training** can be of immense value and it is important to put in the resources – 5% of energy spend could realise 20+% reductions – and **allocate staff time**, rather than giving current staff extra activities.

Night use

Night use in buildings is invariably higher than it should be – often using 20% of a building’s electricity use, usually unnecessarily. The use of smart meters (for monitoring) and good BMS control, timeclocks, night surveys and staff awareness usually successfully address this.

Building Management System (BMS)

The BMS is often the part of the building management with greatest potential but often fails to live up to the promise. Good BMS training, changing settings to properly reflect building use, appropriate setting of heating/cooling set-points and deadbands, and confirming that air handling or cooling does not operate overnight are good strategies. The BMS can throttle itself based on user numbers (or CO2 levels) to give clean conditioned air for the lowest energy use.

Cooling strategies

Cooling is often overused in the UK – it is generally only necessary in server rooms and auditoriums (and some places that have artefacts). Elsewhere it is a user choice, and many organisations choose to avoid it. Spilt air conditioning systems tend to get put in to deal with some short-term overheating and end up being used far more than necessary. Cooling can be achieved using good air movement (windows, extractors, fans), heat rejecting film on large south facing glazing, and by reducing gains through equipment.

Lighting

LEDs are one of the best energy efficiency interventions. They payback in several years, reduce maintenance, last longer, give better light and allow occupancy sensing (which should be used everywhere) and daylight saving (where light is reduced when natural light is abundant). LEDs can reduce energy usage by over 70%.

Fabric

Fabric retrofits are important, although can be expensive and difficult – especially in older buildings. But there is a good potential of secondary glazing and internal wall insulation. Roofs are often left-out and draughts from poor fitting windows and doors can be a large source of energy waste. It is important to consider the effect on cooling as well as heating as insulation measures can cause overheating – but appropriate cooling strategies (controlled extraction rather than drafts) can address this in warmer weather.

Auditing

Though there are a number of energy reduction strategies that may apply to all, buildings are unique and have their own specific issues. These are well addressed through conducting an audit by a building energy expert, and having trained and engaged staff.

Annex B – Zero Carbon Technology Options for Buildings

Any green option is a good option because every additional gram of CO₂e takes us further away from a liveable future.

The following provides detail on the technologies available in the UK for low and zero carbon non-domestic buildings.

Green gas

Green gas – or biomethane produced from wet waste could only ever supply a small amount of UK gas demand. Biomethane is identical to fossil methane – except slightly different levels and types of impurities. Normal boilers will operate with biomethane, and it will be directly injected into the grid where possible with no effect on the end user. It will help in emissions reduction but will only be a small part of the answer for Net Zero.

Heat pumps

Heat pumps use compressors to circulate a volatile gas around a circuit consisting of a high pressure/hot/condensing side and a low pressure/cold/evaporating side.

They are very efficient, and can move heat energy from one side to the other and move approximately 4 times the heat that is required in electrical input for the compressor and fans. **They reduce energy use for the same amount of heating by 75%** but do use more expensive electricity to do it.

Heat pumps usually move heat from outside air to inside air, from outside air to inside circulating warm water or from outside ground to inside circulating warm water. They can work in reversible mode and provide both heating and cooling.

They tend to have expensive set-up costs but lower running costs (not yet as low as gas, though the costs of gas are increasing) and are only economic with a government subsidy. That said, they have a wide take-up in commercial buildings, especially those that need heating and cooling.

Hydrogen boilers

Hydrogen boilers are a future potential heating source where the current gas grid is upgraded and supplied with pure hydrogen, which is burned in boilers that look like conventional natural gas boilers. This relies on a hydrogen gas grid and the creation of zero carbon hydrogen (from renewable energy and water splitting or methane where carbon is removed and sequestered). It is a technology which is not yet available and may or may not be in future.

Direct electric heating

Direct electric heating is the most expensive heating method but with the **lowest set-up costs**. It has been used both for convenience and to be zero carbon (with a green tariff). It is more efficient than a gas boiler. It does, however, require more electricity, but the positive environmental outcomes are very significant.

Hot water

Hot water is usually supplied by gas boilers. It is harder to supply though heat pumps which lose efficiency with the high temperature gain required for heat and safety (legionnaires). It can be supplied via two-stage heat pumps and often with electrical or gas 'top-up'. It is easiest to supply using direct electrical heating and under-sink on-demand units reduce heat loss through pipes.

PV

Photovoltaic panels are far cheaper than they used to be and are regularly installed without the need for government feed-in tariffs. As a rule of thumb, PV costs £100 per m² to install (less for larger installations) and each m² produces 120 kWh per year. At current electricity costs of 15p/kWh, this gives a payback of less than 6 years. **Most average buildings would produce 10-20% of their electricity this way – which can be higher if aggressive energy efficiency interventions are employed.**

Solar thermal

Solar thermal water heating used to be popular and economic. Now, due to the reduction in cost of solar panels, it is **invariably better to install solar PV instead**.

CHP

Combined Heat and Power (CHP) – CHP involves burning a fuel through an internal combustion engine to create electricity and to use the heat as a by-product. They have been used widely in commercial buildings but do not dominate over gas boilers due to cost and complexity. As the UK moves towards zero carbon, however, peak electricity prices will increase, and CHP will become more economic. When used with hydrogen they have the bonus of a) using a renewable generated fuel at times of peak heating b) producing electricity that can be used elsewhere at times of peak heating to drive heat pumps. Hydrogen can be used in a very specific form of CHP units known as a fuel cell. These can produce up to 60% electricity with 40% waste heat for space or water heating. They have been installed as demonstrator units in some large commercial buildings.

Heat pump and green hydrogen debate

There are several technologies available for **zero carbon running of buildings** and these are mainly **heat pumps** (air, ground, or water) and *potential* hydrogen or hydrogen Combined Heat and Power (CHP) in future.

There is currently a vigorous debate about the relative benefits of heat pumps versus green hydrogen boilers.

Different types of hydrogen:

- o Grey hydrogen – has been produced for many years by splitting natural gas into Hydrogen and CO₂.
- o Blue Hydrogen – is grey hydrogen where the CO₂ is captured and stored long-term making it carbon neutral.
- o Green hydrogen – is hydrogen produced from the electrolysis of water using renewable energy.

The main points of debate about whether UK heating systems should run using heat pump or green hydrogen are:

- **Heat pumps are the most efficient way of heating buildings** – they produce 4 units of heat for each 1 unit of electricity input.
- The electricity demand for a heat pump powered UK would be considerable and would require grid strengthening and far more electricity generation than we currently have.
- Wind and solar do not necessarily produce electricity when heat is needed – so renewable energy would need to be stored and reproduced in times of heating demand.

- There are many storage methods including batteries, green hydrogen etc. but they are all expensive – green hydrogen has a low efficiency of production but is easily and cheaply stored.
- Given that green hydrogen is being created to store excess wind energy – it might be better to burn it directly in hydrogen boilers rather than convert back to electricity to power heat pumps.

Heat pumps are very efficient, but are expensive and demand electricity at peak times for heating (which can be offset to some extent by storing hot water). Hydrogen boilers are very inefficient (when accounting for the hydrogen production) but very cheap to install and would use cheap excess wind for the hydrogen production.

An alternative to both (given that green hydrogen will be produced) is to use hydrogen combined heat and power (CHP) to produce heat and electricity. These produce electricity at peak times.

It is likely (though not certain) that a hydrogen gas grid will exist in 2050, that green hydrogen will be produced from excess wind (or from carbon capture methane) and that in 2050 there will be a mix of heat pumps, hydrogen boilers, direct electrical heating, and CHP. The mix will depend on costs and convenience at the time.

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About Julie's Bicycle

Julie's Bicycle is a pioneering not-for-profit organisation mobilising the arts and culture to take action on the climate and ecological crisis. Founded by the music industry in 2007 and now working across the arts and culture, JB has partnered with over 2000 organisations in the UK and internationally. Combining cultural and environmental expertise, Julie's Bicycle focuses on high-impact programmes and policy change to meet the climate crisis head-on.

The Arts Council England programme

In 2012, Arts Council England launched its Environmental Programme, becoming the first cultural body in the world to embed environmental reporting into its funding agreements. Julie's Bicycle works in partnership with Arts Council England to deliver its Environmental Programme, built on a shared vision of the transformative role of culture to tackle the climate crisis. In 2018 the Spotlight programme was launched, focused on building energy management and carbon reduction for 30 of the Arts Council's biggest NPOs.

About Pilio

Pilio is a sustainability innovation company, has been working with Julie's Bicycle for over 10 years supporting with sustainability tools and expertise for the arts to take climate action. Pilio is the technical delivery partner for the Spotlight Programme.