



Livery Climate Action Group

Heritage and Listed Buildings

Background

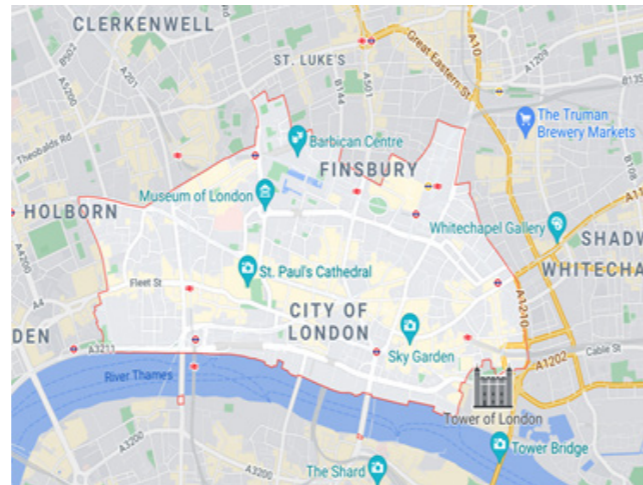
This document has been prepared by the Livery Climate Action Group and complements the work of others, including the City of London Climate Action Strategy which was itself written to support the Paris Agreement on Climate Change (2015) and the obligation enshrined into to Law by The UK Climate Change Act (2019)

Introduction

As we tackle climate change and make plans to significantly reduce our carbon footprint, there is a focus on the impact of construction, demolition and the energy used to occupy buildings as the construction sector's greenhouse gas (GHG) emissions account for approximately 40% of global GHG emissions (WBCSD, 2018).

The most sustainable building is one that already exists and, with this in mind, we review our historic building stock. The term 'heritage' means different things to different people and can refer to people, culture or behaviour, objects and buildings. It connects us with our past and promotes feelings of nostalgia.

This discussion focuses on buildings and monuments, specifically the heritage structures within the City of London Square Mile, and links closely to the City of London Climate Action Strategy 2020-2027.



Map of Square Mile of The City of London - Google Maps, 2021

Resilience

Climate change brings challenges to us all. Heritage buildings are no different and in some respects are more vulnerable to the following risks:

- Increased rainfall
- Higher winds
- Warmer temperatures
- More frequent weather events

All of these risks are real and present now but in the short and long term will continue to impact our built environment. We need to prepare for and deal with these challenges.

Practical Advice

As with all risks we need to try to mitigate these where possible. The following notes provide advice and direct you to further sources of information. There is also a checklist available on the website to assist and direct the user.

The City of London by its own strategy has committed to major investment in:

- ✓ Improving energy efficiency at our investment and corporate properties
- ✓ Aligning our investment portfolio with the Paris Agreement
- ✓ Enhancing carbon removal in our open spaces
- ✓ Protecting our shared natural resources
- ✓ Driving net zero through our supply chain
- ✓ Integrating climate considerations into all our decisions

Becoming carbon neutral and ensuring environmental sustainability of our heritage buildings is not only a way to comply with legislation, but reduces running costs, improves efficiency, encourages innovation and supports the wider objectives of the City.

Establish the Base Case

As with any plan, without an understanding of the current position, a Livery Company will struggle to understand the true scale and scope of the problem. In order to understand the issues, specifically in relation to Heritage assets, the following is required:

1. **Know your building** - if information is not available, employ specialists to check the current energy consumption of your building, monitor energy use over the year and understand where savings can be made.
2. **Check that your maintenance plan** is fit for purpose in a changing climate

Without this first step of understanding, the objectives of reduction of climate risk become difficult, if not impossible to ascertain - unless your intention is a complete refurbishment of the Hall.

Understand the 'Significance'

Prior to the commencement of any work to a historic or traditionally built structure, it is essential to understand its significance e.g. is the building, structure or land listed, a scheduled ancient monument or a non-designated heritage asset.

It is sensible to employ a specialist to produce a heritage statement which includes a statement of significance and a heritage impact assessment of any proposed works. The implications of work to a historic building, structure or landscape without permission are serious and may result in a large fine or imprisonment.

Many construction professionals will work on a historic building at some stage in their career, but many do not understand how a traditional building responds differently to modern construction and the different approaches needed for repair and conservation. Always seek specialist professional advice.



Establish The Plan

It is important when deciding how to manage and future-proof an estate to create a plan that has a clear goal; this will help to prevent 'action paralysis' when confronted with buildings that are more challenging to change.

The vital first step is to set a target date for reaching net zero and then to develop a clear framework and series of steps detailing how to reach that goal. Conducting a full energy audit of the entire estate and each individual building (placing them into categories dependent on the difficulty of carrying out an energy retrofit) ensures that you understand the issues that have to be tackled.

It is essential that the framework is sufficiently flexible to accommodate future technological innovations - seek advice from experts in the field.

Get Senior Buy In

Any plan will no doubt have costs and, as such, will need to be supported by the Court. Early engagement with Court is recommended. Make sure your estate/ building managers and advisors are giving you robust advice that recognises the impact of climate change. If not, seek new advisors!

Establish a Reporting Obligation

Manage the process by making someone responsible for reporting against the key risks and opportunities on a regular basis.

Set Targets

Setting energy targets for the refurbishment and upgrade of listed buildings remains a challenge. Fortunately there are many good sources of guidance and advice for the owners of such buildings to tap into and, in terms of measurement of the performance of the works, the London Energy Transformation Initiative (LETI) provide some excellent advice in their publication, 'LETI Climate Emergency Design Guide'.

There are also measurable standards that can be applied to heritage buildings. The Passivhaus Trust Organisation has introduced a new standard called 'EnerPHit' which provides design standards and energy objectives for retrofit and refurbishment projects. The use of a recognised rating system will provide a demonstrable and reportable recognition of the improvement made.

Facilities First

By concentrating on reducing the energy load within the building and looking at the demand, significant energy savings can be found and could generate 60% reduction in load through:

- Insulation
- Double glazing – if feasible
- Reduced air leakage
- Improving the use of daylight
- Upgrading lighting to LED etc

More guidance on these options can be found in the Energy Guidance Paper.

Once the demand has been reduced, further carbon savings are achievable through improving system efficiency:

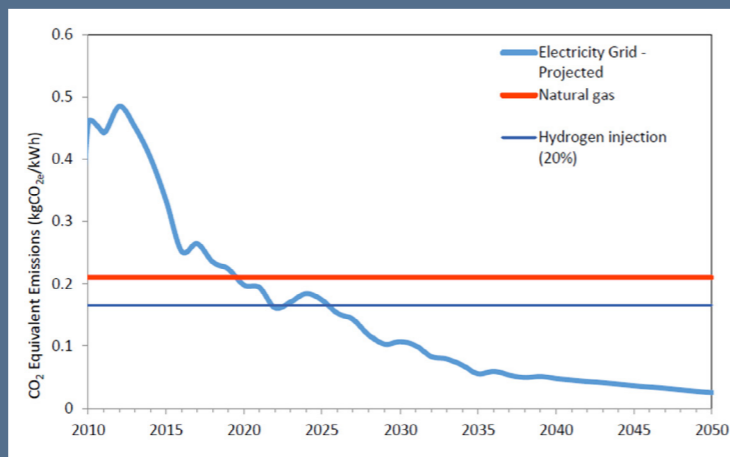
- More efficient heating, lighting, ventilation and control systems

Lastly a change to the carbon in the grid, through a change to all electric systems, will offer further reductions.

Energy Sources

One of the biggest changes to the way we source energy is driven by the decarbonisation of UK Grid electricity. As more green energy sources provide power, the cleaner the grid becomes. This continued improvement makes the choice of power for any refurbishment obvious and clients should be aiming to refurbish to a zero-emission standard where possible.

Grid electricity remains relatively expensive and, even with the addition of heat pump technology, there may still be a differential to the current gas pricing. However, with mains gas set to be scaled back, removed or replaced with a hydrogen mix, it still makes climate sense to change to electricity. The graph opposite (produced by Max Fordham LLP) shows the long-term grid decarbonisation situation.



Max Fordham LLP)

Embodied Carbon

The UK Green Building Council define embodied carbon as the greenhouse gas emissions or carbon dioxide equivalent associated with the non-operational phase of a building project. This includes the emissions caused by extraction of raw material, the manufacturing process, transport, construction or assembly, maintenance, replacement, deconstruction or demolition and disposal of materials that make up a building (UKGBC, 2015).

The careful consideration of relative embodied carbon content can be used to make informed decisions on demolition and refurbishment options, as well as material selection. Opting for less carbon intensive products, more local produce or designing to minimise the amount of waste will reduce embodied carbon.

Comparisons of embodied carbon levels can also prove useful when considering different design solutions and complements decisions based on cost and function.

Defending Against Water

Climate change is creating more extreme weather events which are frequently categorised by hotter and wetter weather.

For a building of traditional construction, ensuring water can drain away from the property or be allowed to dry quickly is essential for its thermal efficiency. Traditional buildings are generally constructed with a solid wall, which may be of timber, cob, brick or stone. Excessive moisture causes old buildings to deteriorate - dampness promotes decay and corrosion, spoils plasterwork, decorations and furniture and creates an uncomfortable and sometimes harmful condition for the inhabitants (Kent, 2018).

Dealing with rainwater is a good place to start. This could be by deflection; using the architectural details of drips, overhangs and absorption; allowing the traditional building material to absorb rainwater in surface pores from which it later evaporates; and/ or collection of water in internal and external drainage systems (English Heritage, 2014).

Good maintenance is a form of defence and may include adaptation to a historic building such as increasing gutter and hopper sizes or reducing areas of hard standing. English Heritage and Historic England have excellent advice on the maintenance and repair of historic buildings.

- Make sure your building is waterproof and ready for greater volumes of rain
- Maintain drainage systems to ensure they are constantly clear

Checklist

- ✓ Understand climate change and its potential impact
- ✓ Develop a Net Zero Carbon Plan of action
- ✓ Know where to find specialist heritage advice: Chartered Institute of Building (CIOB), Royal Institute of British Architects (RIBA), Royal Institution of Chartered Surveyors (RICS), London Energy Transformation Initiative (LETI)
- ✓ Understand the significance of your heritage property
- ✓ Carry out an assessment of the impact that any changes will make
- ✓ Work with your local Heritage Officer on any planned work
- ✓ Refer to guidance or seek specialist advice
- ✓ Use the Sustainable Traditional Buildings Alliance (STBA) Retrofit Guidance Wheel
- ✓ Ensure your maintenance plan is up to date
- ✓ Add climate risk to your risk assessment



Heritage Context

Annexe 1

Heritage Context - Annex 1

Introduction

The city of 'Londinium' was founded by the Romans circa AD43. The initial settlement was burned to the ground by Boudica around AD60 (Jagger, 2018). London now covers 600 square miles, but the oldest part, known as 'the Square Mile' and identified by the Roman walls, is The City of London, a city within a city.

The Great Fire of London infamously started in a bakery in Pudding Lane in 1666. "The fire raged for five days and is estimated to have consumed 13,200 houses, as well as St Paul's Cathedral, 87 churches, six chapels, Guildhall, the Royal Exchange, the Custom House, numerous Livery Company Halls, three gates and four stone bridges" (Jagger, 2018). The fire influenced Building Regulations in fire spread, leading to the Building Act of 1667. The Building Regulations can be traced back to 1189 with the greatest hazard identified as fire (Manco, 2009). The judgements of the Assize of Nuisance survive from 1301 to 1431.

London has the oldest continuous system of government in the UK and was the first city to elect its own Chief Magistrate (Jagger, 2018).

The Building Act of 1667 required construction of properties in brick or stone, and specified the number of storeys and width of streets. We can identify pre-1667 properties as their windows are flush with the external wall, whereas the Act required windows and doors to be recessed.

The Great Fire of 1666 marks the beginning of architectural dominance in London by Sir Christopher Wren (1632 - 1723). The fire provided 436 acres of land to develop. Influenced by European design, Wren re-designed the City layout with radiating avenues and St Paul's Cathedral as a focal point. Fifty one churches were rebuilt where their predecessors once stood.

The second world war 1939-1945 destroyed more of the remaining heritage of the City of London including many Livery Halls, the roof of Guildhall and of St Paul's which was damaged but not destroyed. These destructive events led to the Listing of buildings. The National Heritage List for England had originated with the First Ancient Monuments Protection Act (1882), however the Second World War provided the need to draw together "all scheduled monuments, listed buildings, registered landscapes and battlefields, and protected wrecks". The basis for the war-time list was to determine whether a particular building should be protected from demolition if bomb-damaged, and a system of grading and specific criteria was introduced. The amendments to the Act in 1900 and 1913 had introduced greater levels of protection and fines to prevent damage. The Acts of 1944 and 1947 provided a list of buildings with special architectural or historical interest and took nearly 25 years to produce 120,000 entries (Historic England, 2021).

Historic England shows 11,673 results for listed buildings and monuments within the City of London Square Mile (Historic England, 2021).

The population of the Square Mile was 7,375 according to the 2011 Census (world population review, 2021) yet more than 400,000 people commuted to work in the City of London before the COVID-19 pandemic. In business hours, the City was a hive of activity, but was much quieter on weekends, as the area is away from the more well-known tourist attractions.

All buildings are damaged by general wear and tear, by weather, and accidental or intentional damage.

Objectives of the Corporation of London

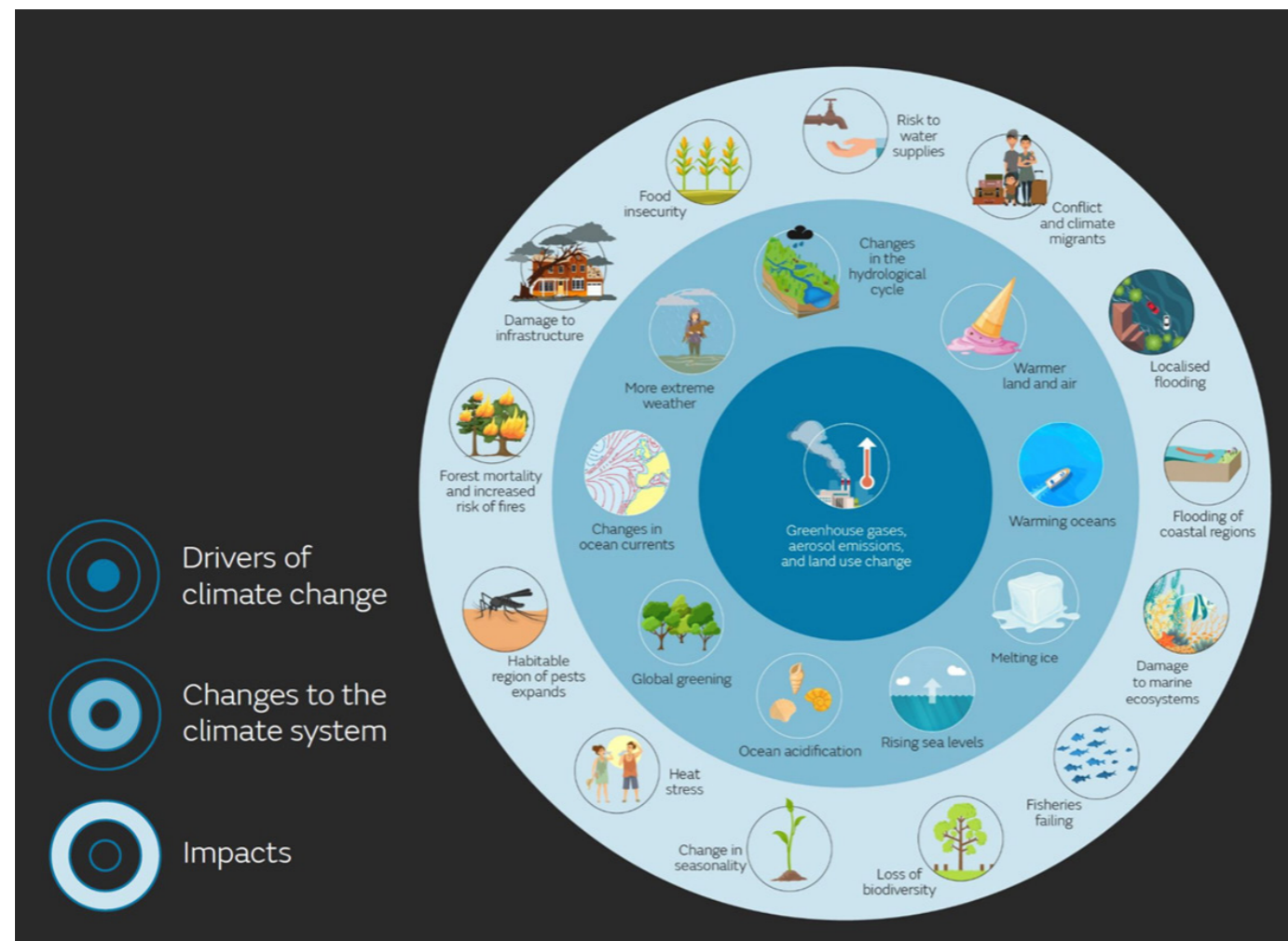
The City of London Corporation are responsible for a number of the heritage buildings within the Square Mile and own and operate heritage structures outside of the City such as Tower Bridge (1894), London Bridge (1973), Southwark Bridge (1921), Millennium Bridge (2002) and Blackfriars Bridge (1869). The unique combination of very ancient and very modern buildings will provide a challenge for a carbon-neutral future.

Heritage and Climate-Change Threat

The earth is warming and sea levels are rising. We are seeing extremes of weather conditions: increased episodes of torrential rain leading to flooding, prolonged heat and dry spells, and wet and frosty winters. The following image illustrates some of the drivers of climate change and the impact they may have (Met Office, 2021).

Climate change is a physical force requiring attention from all in society. It threatens our heritage and invokes questions around sustainability. We will need to be creative and adaptive in our solutions to work with the change in our climate. Large and significant changes are possible, and responsible management of heritage properties can be a part of the solution.

A rise in sea levels caused by ice melt and isostatic rebound as the land rises where it was once depressed by ice sheets will impact the future of the City of London. The Thames is tidal and high tides bring increased water levels to the river in the City. The risk of tidal surges is increasing, caused by a combination of high tide and strong winds: "the level has risen since 1780 by over 1.5 metres" (OpenLearn, 2020). The construction of the Thames Barrier is not enough to protect the City, therefore the Environment Agency is working to devise new plans. If the city of London floods, the loss of heritage will be catastrophic.



Policy and Practice

Policy will guide custodians of historic buildings and enable them to make the right decisions for the heritage and environmental sustainability of the building. UNESCO launched a consultation in 2021 to update the impacts of climate change on World Heritage Properties. The consultation highlights a lack of awareness about the alarming rate at which impacts of climate change are affecting heritage properties and asks for development of synergies between international conventions and organisations and the identification of future research opportunities (UNESCO, 2021).



The United Nations have identified 17 Goals for Sustainable Development (UN, 2021);

Care of our historic buildings and cultural heritage align with all of the UN Sustainable Development Goals as identified in "Transforming our world: the 2030 Agenda for Sustainable Development" (UN, 2021)

Managing Climate Change and Historic Buildings

A combination of climate change, development on flood plains and the construction of more hard-standing surfaces has reduced the drainage capacity of land across the UK. This results in flash flooding during heavy downpours. Maintenance and repair of any property will ensure longevity and reduce running costs. Ensuring a good maintenance regime, changing our behaviours to save energy and be more thoughtful and innovative about re-use and recycling, nurturing nature and thinking about relevant ways to use existing structures (which may also provide a financially sustainable return on investment) will keep our heritage alive.

There are 53 churches, temples and synagogues of all denominations within the City boundary. Eco Church is "an award scheme for churches in England and Wales who want to demonstrate that the gospel is good news for God's earth" (Eco church, 2021). A free, online questionnaire assists custodians to look after buildings and land and engage with their local community, working towards Eco Church Awards. There is guidance to measure the impact of small and large changes, ones that we are all able to make. The leaders at St Paul's Cathedral have embraced the climate-change challenge with advice, guidance and debate and leading the "Will for Action" in 2014.

For a building of tradition construction, ensuring water can drain away from the property, or be allowed to dry quickly, is essential for its thermal efficiency. Traditional-construction buildings generally have a solid wall, which may be in timber, cob, brick or stone. In the City of London, the traditional buildings are mostly brick and stone and these include Custom House, Guildhall, The Mansion House, The Monument, St Paul's and the Livery Halls. Excessive moisture causes old buildings to deteriorate, dampness promotes decay and corrosion, spoils plasterwork, decorations and furniture, and creates an uncomfortable and sometimes unhealthy condition for the inhabitants (Kent, 2018). Dealing with rainwater is a good place to start. This could be by deflection; using the architectural details of drips and overhangs, absorption; allowing the traditional building material to absorb rainwater in surface pores from which it later evaporates, and collection of water in internal and external drainage systems (English Heritage, 2014). Good maintenance is a form of defence and may include adaptation to a historic building (requiring the relevant permissions) such as increasing gutter and hopper sizes or reducing areas of hardstanding. English Heritage and Historic England have excellent advice on the maintenance and repair of historic buildings.

Embodied Carbon

The UK Green Building Council defines embodied carbon as the greenhouse gas emissions or carbon-dioxide equivalent associated with the non-operational phase of a building project. This includes the emissions caused by extraction of raw material, the manufacturing process, transport, construction or assembly, maintenance, replacement, deconstruction or demolition and disposal of materials that make up a building. The whole-life carbon emission of the building is the embodied carbon and the carbon associated with operating the building including heating, cooling, power, and water (UKGBC, 2015). This is where our innovative use of historic buildings will enable the continued use of a structure and its embodied carbon energy.

When we evaluate the listed buildings and scheduled monuments within the City of London, we can see they already have a purpose. Used as Livery Halls, churches, museums, and meeting places, they still have a relevant place in our culture, they are protected by law and looked after by custodians. There may be areas to improve the whole-life carbon in the operation of the buildings, but there is less risk to the embodied carbon in the fabric of these structures. The opportunity to reduce embodied carbon is within traditional buildings that are unlisted, possibly unused, or have lost their original purpose. The Guardian reported "City of London plans to create 1,500 homes from empty offices... Cultural and creative businesses and organisations, previously priced out of the area by high rents, will be encouraged to the ancient heart of London through low-cost, long-term lets in vacant and little-used spaces" (The Guardian, 2021). This initiative will re-populate an area that in recent history became dominated by business. Inviting people to live in this space will enhance smaller local business, reduce commuting for some residents and entice visitors outside of office hours. Any work to traditional buildings will require responsible retrofit and we advise the use of experts in this field of design and delivery.

Incentives

The current tax system in the UK is not supportive of maintenance and repair. The tax rate for new build properties is 5%, compared to 20% for maintenance, repair and adaptation. A proposed development site with property on the site invites a rate charge, whereas land without property has no monthly charges. This encourages the unsustainable practice of demolition.

Understanding the Process

Every historic buildings is significant in terms of architecture, archaeology or cultural heritage. Prior to the commencement of any work to an historic or traditionally built structure, it is essential to understand its significance: is the building, structure or land listed, a scheduled ancient monument, or a non-designated heritage asset? It is sensible to employ a specialist to produce a heritage statement which includes a statement of significance and a heritage impact assessment of any proposed works. The implications of work to an historic building, structure or landscape without permission are serious and may result in a large fine or imprisonment. Many construction professionals will work on an historic building at some stage in their career, but many do not understand how a traditional building responds differently to modern construction and the different approaches needed for repair and conservation. Always seek specialist professional advice.

Practical Advice

- Understand climate change and its potential impact
- Support the UN Sustainable Development Goals
- Know where to find specialist heritage advice: Chartered Institute of Building (CIOB), Royal Institute of British Architects (RIBA), Royal Institution of Chartered Surveyors (RICS)
- Understand the significance of your heritage property
- Carry out an assessment of the impact that any changes will make
- Read relevant case studies: CIOB Retrofit and Re-Use Case Studies
- Use the STBA Retrofit Guidance Wheel
- Ensure your maintenance plan is up to date
- Ensure climate risk is added to your risk assessment
- Sign up for weather warnings - flash flooding, high winds etc, and take appropriate action
- Maintain drainage systems to ensure they are constantly clear
- Reduce your water, energy use and waste production at work and at home
- Reduce your travel for work, personal activities and holiday
- Nurture nature - buy local food produce, plant a tree, grow plants from seed

Summary

Tackling climate change on a global level will require an international agreement for all governments to support and play their part. At a national and local level we can all make a difference and reduce our carbon footprint. We can make a positive start by understanding the value of our existing tangible and intangible heritage. Consideration of the vulnerability of intangible heritage to the impacts of climate change should become part of policy documentation (UNESCO, 2021).

Becoming carbon neutral and ensuring environmental sustainability of our heritage buildings is not only a way to comply with legislation, but reduces running costs, improves efficiency and encourages innovation. Talking about sustainable heritage keeps our heritage buildings in use and relevant to our generation and the next, and this is where we can share the vision of the United Nations Sustainable Development Goals.

If we do not respond to the climate-change crisis and the sea levels rise, we are in danger of losing many historic buildings in the City of London Square Mile, and indeed many cities around the world. The inclusion of heritage buildings within the City of London Corporation Climate Action Strategy will provide part of the solution:

- To support the achievement of net-zero carbon emissions - re-using and re-purposing traditional buildings to provide environmental and financial sustainability, and to prevent the loss of embodied carbon
- To build climate resilience - less impact on raw materials in the adaptation of an existing property
- To champion growth - understanding the intangible heritage within a traditional building gives a human connection, improves health and wellbeing and encourages diverse design and innovation

Bibliography

Bradley, S. and Pevsner, N. (1998). The Buildings of England. London: The City Churches. Yale University Press. ISBN 978 0 300 09655 2

CIfA (2021) The Chartered Institute for Archaeologists. <https://www.archaeologists.net>

CIOB (2021) The Chartered Institute of Building. <https://www.ciob.org>

CIOB (2021) Retrofit and Re-use. <https://www.ciob.org/carbon-action-2050/retrofit-and-re-use>

CIOB Academy (2021) Building Conservation - its meaning, understanding and implementation. https://www.ciobacademy.org/product/building-conservation-its-meaning-understanding-and-implementation/?_ga=2.36778528.1811086896.1626084168-1341327076.1626084168

City of London Climate Action Strategy 2020 - 2027 <https://www.cityoflondon.gov.uk/assets/Services-Environment/climate-action-strategy-2020-2027-20-10-20.pdf>

ECO Church (2021) ECO Church, An A ROCHA UK Project. <https://ecochurch.arochoa.org.uk>

English Heritage (2014) Practical Building Conservation. Building Environment. Ashgate Publishing Ltd. ISBN-13: 9780754645580.

Google Maps (2021) City of London, The Square Mile. <https://www.google.com/maps/place/City+of+London,+London/@51.5150422,-0.1107947,14z/ta=!3m1!4b1!4m5!3m4!1s0x487603554edf855f:0xa1185c8d19184c0!8m2!3d51.5123443!4d-0.0909852>

Harvey, D. C. and Perry, J. (2015). The Future of Heritage as Climates Change. Loss, Adaption and Creativity. Routledge. ISBN 9 781138 781849

Historic England (2021) About The List. <https://historicengland.org.uk/listing/the-list/about-the-list/>

Historic England (2021) The List. City of London Square Mile. <https://historicengland.org.uk/listing/the-list/results/?searchType=NHLE+Simple&search=City+of+London+square+mile>

Jagger, P. D. (2018) City of London. Secrets of the Square Mile. Pitkin Publishing. ISBN 978-1-84165-803-2

Kent, D. (2018) Control of Dampness. SPAB. Technical Advice Note. https://www.spab.org.uk/sites/default/files/Control_of_Dampness_0.pdf. ISBN 978-1-898856-40-5

Manco, J. (2009) The History of Building Regulations. <http://www.buildinghistory.org/regulations.shtml>

Met Office (2021) Effects of climate change. <https://www.metoffice.gov.uk/weather/climate-change/effects-of-climate-change>

OpenLearn (2020) Sea level rise in London, UK. <https://www.open.edu/openlearn/nature-environment/environmental-studies/sea-level-rise-london-uk>

STBA (2021) Sustainable Traditional Buildings Alliance. Responsible Retrofit. <http://responsible-retrofit.org/wheel/>

St Paul's Cathedral (2014) Climate Change, the 21st century's daunting challenge debated at St Paul's. <https://www.stpauls.co.uk/news-press/latest-news/climate-change-the-21st-centurys-most-daunting-challenge-debated-at-st-pauls>

The Guardian (27 April 2021) City of London plans to create 1,500 homes from empty offices. <https://www.theguardian.com/uk-news/2021/apr/27/city-of-london-plans-to-create-1500-homes-from-empty-offices>

UK Green Building Council (2015) Tackling embodied carbon in buildings. <https://www.ukgbc.org/sites/default/files/Tackling%20embodied%20carbon%20in%20buildings.pdf>

UNESCO (2021) Updating of the "Policy Document on the impacts of Climate Change on World Heritage Properties". <https://whc.unesco.org/en/climatechange/>

United Nations (2021) Sustainable Development Goals. <https://sdgs.un.org/goals>

United Nations (2021) Transforming our world: the 2030 Agenda for Sustainable Development. <https://sdgs.un.org/2030agenda>

wbcsd (2018) World Business Council for Sustainable Development. A framework for carbon emissions management along the building and construction value chain. <https://www.wbcsd.org/Programs/Cities-and-Mobility/Sustainable-Cities/Transforming-the-Built-Environment/Decarbonization/Resources/framework-carbon-emissions-management-building-construction-value-chain>

World Population Review (2021) London Population 2021. <https://worldpopulationreview.com/world-cities/London>

