Greater South East Net Zero Hub

HERITAGE BUILDINGS DECARBONISATION TOOLKIT FOR THE PUBLIC SECTOR

www.gsenetzerohub.org.uk

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Contents

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If you have any feedback or updated information you'd like to share, feel free to get in touch at **psd@gsenetzerohub.org.uk**.

Executive Summary

This toolkit provides practical guidance for public sector organisations on decarbonising historic and listed buildings. It offers solutions to reduce carbon emissions and enhance energy efficiency while preserving the architectural and heritage value of these challenging structures. By bringing together valuable information, case studies, and existing guidance, the toolkit supports sustainable retrofit projects, justifies investments, and builds business cases to help facilitate the necessary upgrades to ensure the long-term preservation of heritage buildings.

Designed for public sector professionals, this resource equips decision-makers with the tools, knowledge, and real-world examples to improve the energy performance of heritage buildings. In this context, *retrofit* means more than just adding insulation or upgrading heating systems. Following Historic England's approach, it's about taking a whole building view considering how the building was built, its condition, its significance, and how it's used to make it more energy-efficient, resilient, and ready for the future. *Decarbonisation* is the bigger goal: cutting carbon emissions through a mix of retrofit measures, renewable energy, and adaptation strategies.

The toolkit helps heritage buildings play their part in a low-carbon future without losing the qualities that make them special. If you'd like to get in touch about support regarding a heritage building, please email psd@gsenetzerohub.org.uk.

Background

Many public sector organisations own and manage listed buildings as part of their property portfolios. Heritage buildings, due to their historical and architectural significance, are protected by conservation laws, which present unique considerations for achieving sustainability and energy efficiency goals. As public bodies work towards reducing carbon emissions and meeting net-zero targets by 2050, there is increasing pressure to balance heritage preservation with the need for decarbonisation.

The decarbonisation of heritage buildings can offer a vital contribution to meeting the UK Government's net zero commitments and there are opportunities to undertake this alongside careful conservation of the nation's built heritage. Evidence shows that retrofitting existing heritage properties typically results in a significantly lower carbon impact than constructing new buildings, as it reduces embodied carbon emissions associated with building materials and their transportation. For further insight, the Heritage and the Pathway to Net Zero from Historic England provides valuable data on energy efficiency for heritage assets.

In England alone, there are approximately 400,000 listed buildings. Given their protected status, any work must comply with heritage conservation regulations, requiring careful planning and specialist approaches. With appropriate strategies, materials, and technology, it is possible to significantly reduce carbon emissions associated with listed buildings while preserving their heritage status. However, the extent of reduction depends on how 'low carbon' is defined for each project.

Getting Started

Listed Building Grades:

Listed Buildings are structures that hold significant architectural, historical, or cultural value which are legally protected to preserve their heritage. These buildings are recognised for their unique design, craftsmanship or historical importance and are subject to strict regulations to prevent unauthorised alterations or demolition. They can range from grand historic landmarks, such as castles, churches, and stalely homes, to more modest structures such as terraces or cottages. Listed Buildings can be classified into different grades[1] or categories, depending on their level of importance. For example, in England, there are three grades:

Grade I Listed "Exceptional Importance" e.g. Buckingham Palace. Only about 2.5% of listed buildings in England are Grade I.

Grade II Listed "Particularly Importance"* e.g. Old Royal Naval College, London**.** Only about 5.8% of listed buildings in England are Grade II*.

Grade II Listed "Special Interest" e.g. Historic houses or pubs. About 91.7% of all listed buildings in England are Grade II listed.

[1] *What Are Listed Buildings? | Historic England*

Checklist of considerations before beginning a Heritage Decarbonisation project: [2]

- ✓ **Assess Building Significance:** Review the historical and architectural importance to ensure any intervention's respect and preserve its character. Check Historic England National Heritage List for listed grade, district authority and details**.**
- ✓ **Prioritise Maintenance and Repairs:** Address basic repairs and maintenance first to improve energy efficiency before considering more invasive measures. These measures can reduce disruption and lower operational costs.
- ✓ **Adopt a 'Whole Building Approach':** How different building elements interact to ensure compatibility of retrofit measures and prevent unintended consequences (causing harm to the significance of the building, its fabric or its occupants). Evaluate moisture and ventilation to prevent decay and confirm that proposed measures do not compromise the building's ability to manage heat and moisture.
- ✓ **Conduct a Building Assessment and Involve Specialists:** Assess the building's condition, energy performance, and structural integrity to build an evidence base. Engage architects, planners, and engineers to prepare a decarbonisation plan. Where appropriate, consult conservation officers at the pre-application stage to support a cohesive whole building approach.
- ✓ **Seek Appropriate Permissions:** Determine if listed building consent or planning permission is required for the proposed works and engage with local planning authorities early in the process. Historic England Advice Note 18 Adapting Historic Buildings for Energy and Carbon Efficiency
- ✓ **Monitor and Review:** Before, during and after apply Building Performance Evaluation (BPE) to set an accurate baseline and ensure retrofit measures are proportionate and efficient. Track and compare expected versus actual performance during and after works.

[2] *Based on Guidance from HEAG321 Adapting Historic Buildings for Energy and Carbon Efficiency (2024)*

Stakeholder Mapping for Heritage Building Projects

Engaging the right stakeholders early in a heritage decarbonisation project is crucial for effective planning, funding and regulatory compliance. Historic England's stakeholder engagement guidance emphasises the importance of involving key groups such as planning departments, community members, heritage professionals, conservation officers and funding bodies.

To simplify the process, below is a suggested stakeholder map, showing key roles and the stages of the RIBA Plan of Work where they may be involved: **Disclaimer this may vary depending on the public sector. Find out more about the RIBA stages in appendix A.*

Stakeholder	Role In Project	RIBA Stages they may be required In
Public Sector Body	Sets project objectives, budget, and approval	0-7
Project Manager	Oversees planning, funding and delivery	0-7
Distribution Network Operator (DNO) Engagement	Engage on project feasibility and timescales in relation to any network connections and upgrades required.	0-6
Funding bodies	Provide financial support	1-3
Heritage Consultant (e.g. conservation architect/ architect experienced working on historic building)	Ensures conservation principles are met	1-6
Building Users and Occupants	Provide input on operational needs and user comfort	1-7
Facilities Management Team	Contributes to information gathering and maintains system post installation	2-7
Legal & Procurement Teams	Ensures contracts align with public sector regulations meet public sector regulations	2-5

Structural Engineer (e.g. architects, structural engineers, quantity surveyors, energy assessors,, MEP (Mechanical, Electrical, and Plumbing) consultants)	Assesses building integrity for energy upgrades	2-7
Conservation Officer	Advises on applications for evidence to the planners/planning authority	2-5
Suppliers	Provide energy – efficient materials and low carbon systems	5-6

Planning Requirements

When planning energy efficiency or renewable technology measures for listed buildings, it is essential to understand the likely acceptability of interventions within policy constraints, based on building grade (Grade I, Grade II*, and Grade II) and the buildings significance. The table below provides a quick, high-level RAG (Red, Amber, Green) assessment to support initial decision-making. However, it should be used alongside site-specific assessments by suitably qualified specialists who can evaluate 'significance' and 'heritage impact', as well as consultations with conservation officers and planning departments (as outlined in the stakeholder map in the previous section), recognising that each listed building is unique. *This is not official guidance.*

Technical suitability of such interventions based on building construction, condition and space alongside building regulations requirements and their 'special considerations' for historic and traditional buildings should also be accounted for in the decision-making process, but is not reflected in the table below.

Key	
	Unlikely to be permitted due to heritage constraints
	May be permitted with conditions in certain locations
	Generally acceptable or low-impact interventions

		Listed Building Grade		
		Grade I	Grade II*	Grade II
Energy Efficiency Measures	LED Lighting			
	Underfloor Insulation			
	Roof Insulation			
	Loft Insulation			
	Secondary Glazing			
	Double/ Triple Glazing			
	Cavity Wall Insulation			
	Interior Wall Insulation			
	Exterior Wall Insulation			
	Draught Proofing			
	Building Energy Management System (BEMS)			
Generation Measures	Roof Mounted Solar Panels			
	Ground Mounted Solar Panels			
	Wind Turbines			
Heating Measures	Air Source Heat Pump			
	Ground Source Heat Pump			
	Biomass Boiler			
	Solar Water Heating			
	Heat Network			

Next Steps for Informed Decision Making:

While the above RAG table offers a quick overview, the Sustainable Traditional Building Alliance STBA Guidance Wheel provides a more nuanced, project specific assessment. The wheel depicts more than 50 measures that can be used for the retrofitting or refurbishing of traditional buildings. It encourages exploration of the measures' advantages, concerns about their performance and possible interactions between them. Each measure has a number of advantages and concerns (categorised into technical, heritage and energy). It helps evaluate potential risks by producing a report with recommendations and related measures that should

be considered, and acknowledging risks, such as moisture issues, making it a valuable next step for informed decision-making.

Historic England also provide further guidance and advice on the consideration of the Risks of Energy Efficiency Interventions in Buildings of Traditional Construction

The Heritage Planning Toolkit by RISE (Retrofit information support & expertise) is a practical guide designed to support retrofit projects involving heritage buildings. It outlines key legislation, permissions, and considerations required when working on listed buildings, conservation areas, and other protected sites.

Mitigating Harm to Heritage:

When proposing changes to decarbonise a building, the primary aim should be to avoid or minimise harm to its significance and special interest. Where potential harm is considered 'less than substantial,' it should be weighed against the public benefits, as outlined in the National Planning Policy Framework (NPPF), particularly in Section 16: Conserving and Enhancing the Historic Environment.

Funding Options

The Greater South East Net Zero Hub provides funded strategic and technical support to the public sector and communities to develop, help finance, and deliver net zero projects. This includes supporting heritage buildings on their decarbonisation journey; through undertaking critical friend reviews on any key documentation (e.g., technology-based studies and funding applications) in addition to providing technical advice and project management. The Hub can also support the development of Heat Decarbonisation Plans and Heat Decarbonisation Strategies as well as undertake desktop assessments to help pre-qualify sites for future funding bids. This is as well as providing general guidance, advice and signposting to other resources that may be able to assist in developing a successful project. Get in touch at psd@gsenetzerohub.org.uk.

Historic England offers a range of grant schemes to support the conservation and enhancement of England's historic environment. These include funding for buildings and areas at risk, such as through the Heritage at Risk Capital Fund and Partnership Schemes in Conservation Areas, as well as grants for research and capacity-building projects that improve understanding, protection, and public engagement with heritage assets - Our Grant Schemes | Historic England

The Greater South East Net Zero Hub has also developed a summary of funding options considered for faith groups detailing available funding for the decarbonisation of buildings at the time of its public in December 2024.

National Lottery Heritage Grants

The Greater South East Net Zero Hub supports grant applications to the National Lottery through critical friend reviews and technical advice. Get in touch at info@gsenetzerohub.org.uk.

Total scheme funding: Anticipated £3.6billion 2023-2033.

Status: Open

What is it?

Purpose: Its objectives are to conserve the UK's diverse heritage, to encourage people to be involved in heritage and to widen access and learning.

Delivery body: The Trustees of the National Heritage Memorial Fund (who administer the National Lottery Heritage Fund and other grant funding on behalf of other bodies).

Delivery mechanism: The majority of funding decisions are taken by six area and nation committees using local knowledge and expertise.

Funding type: Capital Grant

RIBA Stage: Technical Design – Handover (stage 4 - 6)

Who is it aimed at?

Funding a broad range of projects that connect people and communities to the UK's heritage.

The grant can be used for:

a) Activities: to engage the wider community in your heritage.
b) Repairs and conservation.
c) Digital outputs
d) New staff posts
e) Paid training placements
f) Professional fees

Assessment Process

Applications via the online portal can be made at any time. The majority of funding decisions are taken by six area and nation committees using local knowledge and expertise.

Four investment principles guide decision making:

1. Saving heritage
2. Projecting the environment
3. inclusion, access and participation
4. Organizational sustainability.

Other relevant information

What you can't spend the money on:

1. Existing staff posts or organisational costs: unless calculated through full cost recovery
2. Repairs to your own home.
3. Legal and/or statutory responsibilities: e.g. rent, utilities, building maintenance.
4. Promoting the causes or beliefs of political or faith organisations.
5. Recoverable VAT.
6. Costs for any activity that has taken place before a grant is awarded.
7. Costs for installing artificial grass or plants.

Key dates

Ongoing

- Grants up to £100,000 should receive decisions within 8 weeks
- Grants over £100,000 will receive decisions quarterly.

Renewable Energy Options and Considerations

Considerations for Heat Pumps in Historic Budlings [3]

Preserving Historic Radiators:

- Contractors may be concerned about liability and potential damage to the system, talk to them about this.
- Assess if debris in older systems could impact heat pump performance.

Ensuring Radiator Suitability:

- Radiators should be cleaned inside and out to remove debris.
- Conduct pressure tests (2–3 times) to ensure there are no leaks.
- A qualified engineer can determine if existing radiators provide sufficient heat output.

Assessing Building Use and Investment Feasibility:

- Consider the frequency of building use (e.g. churches used only on Sundays).
- Evaluate if the capital expenditure (CapEx) of an Air Source Heat Pump (ASHP) is justified for low-usage buildings.

Sizing Heat Emitters Correctly:

- Heat pumps are often perceived as slow to heat buildings, but this depends on the efficiency of heat emitters.
- Ensure radiators or other heat distribution systems are appropriately sized for effective heat output.

Plan for Electrical Requirements:

- Verify that the building's electrical supply can accommodate the heat pump, larger systems may require a three-phase supply. If not, engage with the local Distribution Network Operator (DNO) early to address potential upgrades.

[3] Historic England Webinar (2025) "Heat pumps in historic buildings: Addressing myths and misconceptions". Webinar link: https://historicengland.org.uk/education/training-skills/training/webinars/recordings/heat-pumps-in-historic-buildings-addressing-myths-misconceptions/

Adress Domestic Hot Water Needs:

- ASHPs typically heat water to 55°C; an auxiliary heater may be needed to reach 60°C to prevent Legionella bacteria growth.

Considerations for Installing PV Panels on Historic Buildings

Assessing Heritage Impact[4]:

- Consider the visual sensitivity of the PV panels. If the only feasible location is a prominent roof slope, assess whether the installation would harm the building's significance. If visibility of panels is an issue explore options to place panels on less visible roof slopes or consider a ground-mounted system.

- Conduct a fire risk assessment early in the design phase to identify potential hazards, assess risks to people and property, and plan mitigation strategies.

Installation and Structural Considerations[5]:

- Ensure that the roof structure can support the additional weight of PV panels. For example, a typical panel weighs about 15 kg/m². Assess the condition of roofing materials like slate or lead and avoid drilling through them to prevent damage.

- Use appropriate mounting systems that do not compromise the roof's weatherproofing. For slate roofs, proprietary clamps or lead flashing components are recommended to prevent water ingress.

- Design installations to be reversible, allowing for removal without lasting damage to the historic fabric.

Aesthetic Integration:

- Consider choosing panels with colors and finishing's that complement existing roof materials. Anti-reflective coatings can reduce glare and visual impact.

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[4] Installing Solar Panels (2024): https://historicengland.org.uk/advice/technical-advice/building-services-engineering/installing-photovoltaics/

[5] Considerations When Planning a PV Installation (2024): https://historicengland.org.uk/advice/technical-advice/building-services-engineering/installing-photovoltaics/considerations

Environmental and Maintenance:

- Install bird guards to prevent nesting under panels, which can cause maintenance issues.
- Establish a maintenance schedule to ensure the longevity and efficiency of the PV system, including regular inspections and cleaning.

General Technical Considerations

Prioritise fabric-first for lower budgets:

Before installing new low or zero-carbon heating systems, it is vital to first reduce unnecessary energy use and improve the building's overall efficiency. In historic buildings, effective interventions go beyond thermal upgrades to the fabric and can include repair and maintenance, upgrading existing services, installing efficient heating technology with responsive controls, and targeted draught-proofing.

Interventions should follow the *Energy Efficiency Hierarchy*:

1. **Sufficiency** – Reduce energy consumption in real terms (e.g., good repair, keeping the building dry, optimising use of space).
2. **Efficiency** – Minimise unavoidable energy use (e.g., service upgrades, smart controls).
3. **Generation** – Where possible, generate energy from renewables or other low/zero carbon technologies.

This approach helps maximise carbon savings, support energy security during electrification, and minimise negative impacts on occupants, the historic fabric, and the environment.

Higher budgets high temperature heat pumps[6]:

- High temperature heat pumps may be used to replicate performance of existing fossil-fuel systems while reducing disruption to fabric and user expectations. Though typically more expensive, they provide an effective solution where interventions like radiator upgrades or insulation are not viable due to conservation constraints.

Low – Temperature heat pumps require fabric and ventilation considerations[7]:

- Heat pumps operating at low flow temperatures (typically 35-55 degrees Celsius), deliver heat slower than traditional fossil fuel heating systems so comfort depends on how well the building holds heat. In older buildings, upgrades should work with the way the walls manage heat and moisture. If natural airflow is reduced, add proper ventilation to prevent condensation and dampness.

Heat the people, not the place[8]:

- In large, intermittently used spaces, such as historic churches or halls, zone-based heating offers an energy efficient alternative to whole building heating. This can involve electric panel heaters, radiant heating or heated cushions in key occupancy areas. With the addition of solar PV and battery storage this enhances sustainability and reliance on the grid.

Strategy and Planning[9]:

- Create and maintain structured planning preventative measures (PPM) programmes. Waiting until systems fail leaves no room to assess low carbon options or plan robust upgrades. i.e heat pump installation, meaning like-for-like fossil fuel replacements often have to be put in place to ensure continuation of use. Public organisations should also look at tracking the lifecycle of the asset.

[6] Heat Pumps in Historic Buildings (2023) https://historicengland.org.uk/images-books/publications/air-source-heat-pumps-historic-buildings/.

[7] The Need for Old Buildings to 'Breathe' (2020) https://www.spab.org.uk/sites/default/files/SPAB%20Technical%20advice%20note-Need%20for%20old%20buildings%20to%20breathe.pdf

[8] Church Heating Approaches (2021) https://www.churchofengland.org/sites/default/files/2023-05/Heating_approaches.pdf.

[9] Managing Local Authority Heritage Assets (2017) https://historicengland.org.uk/images-books/publications/managing-local-authority-heritage-assets/

Overheating in Historic Buildings

By understanding how the environment will change (for example, increased temperature or storm frequency/intensity) organisations and individuals can make decisions and plan future action to mitigate for or adapt to the impacts of climate change. Increasing temperatures will have an impact on occupants via potential overheating, among other things. The likelihood of overheating can be assessed using dynamic thermal modelling tools. The Good Homes Alliance's Overheating in Retrofit and Existing Homes – Tool and Guidance is a useful resource (mainly for domestic dwellings).

Consider impact of heating season efficiency measures[10]:

Resilience to current and future climates has the potential to be enhanced or undermined by choices made to improve energy efficiency. Energy efficiency measures, such as wall insulation, can adversely affect the thermal continuity of the external envelope or has the capacity to undermine client resilience in the face of increasing temperatures, if they are not designed and installed appropriately.

Use Passive Cooling Measures:

Historic buildings often have high thermal mass, thick walls, and original ventilation features. Unblocking any chimneys and vents allows natural ventilation. Consider the need and ability to implement secure night-time purge ventilation. Retain or reinstate original shading elements such as large blinds for high windows to reduce solar gains.

Insulation Measures Paired with Overheating Controls[11]:

Use permeable insulation materials and systems designed for traditional walls and roofs. Combine insulation with external shading solutions such as external shutters or deciduous planting to prevent solar gain through windows, especially any south facing. Incorporating planting will also have co-benefits such as habitat creation and flood resilience.

Reduce Internal Heat Gains Durning Occupied Hours:

Make the switch to LED lighting and low heat appliances to minimise internal heat load, especially in any rooms with limited ventilation or high occupancy. Reposition equipment such

[10] Controlling overheating in historic buildings: how the past offers solutions for a hotter future (2023): https://www.savills.co.uk/blog/article/351232/residential-property/controlling-overheating-in-historic-buildings--how-the-past-offers-solutions-for-a-hotter-future.aspx.

[11] Improving Energy Efficiency Through Mitigation (2025): https://historicengland.org.uk/advice/technical-advice/retrofit-and-energy-efficiency-in-historic-buildings/improving-energy-efficiency-through-mitigation.

as computers in areas with better ventilation away from areas with high concentration of localized heat.

Appendix

This appendix provides additional resources, references, and supporting materials to complement the guidance outlined in this toolkit. It includes detailed case studies, technical advice and relevant links to other helpful information. Use this section as an additional resource to help deepen understanding and support informed decision making when working on heritage decarbonisation projects.

Appendix A: Understanding the RIBA Plan of Work

The RIBA (Royal Institute of British Architects) Plan of Work provides a clear, structured framework for managing building projects. It is divided into eight stages, each with specific tasks and outcomes:

- **Stage 0 – Strategic Definition:** Define project purpose and assess feasibility.
- **Stage 1 – Preparation and Briefing:** Develop the project brief and assess site constraints.
- **Stage 2 – Concept Design:** Explore initial design concepts, layouts, and materials.
- **Stage 3 – Spatial Coordination:** Refine design and align all building systems.
- **Stage 4 – Technical Design:** Develop detailed specifications and construction plans.
- **Stage 5 – Construction:** Execute the work, both on-site and off-site.
- **Stage 6 – Handover:** Complete the project and provide training/documentation.
- **Stage 7 – In Use:** Monitor performance and manage ongoing maintenance.

Note: The stages may vary slightly depending on the public sector context.

Appendix B: Advice on Finding an Installer

Finding a Reputable Heat Pump Installer[12]

When selecting an installer, it's important to ask about their experience with similar public sector buildings and request references from past clients to ensure their expertise. Inquire how they demonstrate the heat pump's functionality to customers and request data on the actual energy performance achieved through insulation. Confirm that the Coefficient of Performance (COP) for Air Source Heat Pumps (ASHP) is at least 2.5, and ask what calculations they performed to assess the system's performance. It's also crucial to determine how they evaluate the building's electricity capacity. Finally, be sure to check if they offer a servicing contract and request a detailed quote. If their responses are vague or unclear, it's wise to consider seeking another installer.

Learning from Successful Installations

- Engage with networks and visit existing successful heat pump installations Visit a heat pump. Visit on a cold day to experience the heating system firsthand.

[12] Historic England Webinar (2025) "Heat pumps in historic buildings: Addressing myths and misconceptions". Webinar Link: https://historicengland.org.uk/education/training-skills/training/webinars/recordings/heat-pumps-in-historic-buildings-addressing-myths-misconceptions/

Appendix C: Case Studies

Council Building Case Study

Decarbonising Alton Town Council Grade II Listed Town Hall

Background

Alton Town Hall, a Grade II listed civic building, plays a central role in local governance, hosting council meetings and providing office space. With a commitment to achieve Net Zero by 2030, the council is targeting one of its main sources of emissions its fossil fuel-based heating system.

Challenges

The building's heritage status and all four exposed external walls mean many common low-carbon solutions, such as conventional air source heat pumps, are not viable due to planning and conservation constraints. The goal is to find heating technologies that cut carbon while respecting the building's historic character.

Options Explored

Several innovative low-carbon heating approaches were assessed, including:

- Thermal battery boilers that can store heat from off-peak electricity and work with existing radiators.
- Phase change material systems that store heat efficiently in a compact form.
- Low-voltage infrared heating integrated into ceilings to warm people and surfaces directly, helping to reduce damp.
- Smart controls and efficiency measures to optimise existing systems and reduce fossil fuel demand.

Key considerations included system weight, installation feasibility, compatibility with heritage fabric, planning requirements, and the need for reliable long-term maintenance.

Next Steps

The council is considering a combination of solutions to balance performance, cost, and conservation needs, such as pairing a thermal battery boiler with smart controls and selective infrared heating. Further technical and feasibility assessments will inform the final decision, with the aim of implementing a solution that delivers meaningful carbon savings without compromising the Town Hall's historic significance.

"GSE Net Zero have supported the projects with contacts of new suppliers and possible delivery options. They have also helped with funding opportunities to support the Town Council to move forward with these decarbonisation solutions. The team's communication has been supportive but not overly demanding, meaning that each time we heard from the guys they have something interesting to say."

Planning Case Study

Streamlining Solar Panel Installation on Listed Buildings in Kensington and Chelsea

The Royal Borough of Kensington and Chelsea (RBKC) boasts over 4,000 listed buildings, with approximately 70% situated within conservation areas. Historically, property owners faced significant challenges when seeking to install solar panels, as each application required individual listed building consent. This process was often time-consuming and costly, deterring many from pursuing renewable energy solutions

Solution

RBKC introduced a Local Listed Building Consent Order (LLBCO), a pioneering initiative that grants blanket consent for the installation of solar panels on most Grade II and Grade II* listed buildings. This order eliminates the need for individual applications, provided installations meet specific conditions regarding positioning, materials, and fixings to ensure the protection of the buildings' appearance and fabric.

Outcomes

- **Reduced Administrative Load**: The LLBCO has streamlined the process, allowing heritage officers to focus on more complex applications.
- **Increased Adoption of Renewable Energy**: By simplifying the consent process, more residents are encouraged to consider solar panels, contributing to the borough's goal of achieving net-zero carbon emissions by 2040.
- **Preservation of Heritage**: The conditions set within the LLBCO ensure that the installation of solar panels does not compromise the historical integrity of the buildings.

Lessons Learned

- **Proactive Policy Development**: Implementing the LLBCO required upfront effort but has proven to be a proportionate and effective use of resources.

- **Community Engagement**: Public consultations revealed strong support from residents and conservation societies, highlighting the importance of stakeholder involvement.

Read the full case study here Royal Borough of Kensington and Chelsea: Local Listed Building Consent Order | Local Government Association

Education Case Study

Royal Latin School Decarbonisation, Buckinghamshire

The Royal Latin School, a historic 600-year-old grammar school founded in 1423, aimed to decarbonise its site by replacing its Victorian style, fossil-fuel-based heating with sustainable technologies. The goal was to improve energy efficiency, cut carbon emissions, and support long-term net zero ambitions. The school was awarded £282,484 as part of Phase 2 of the Public Sector Decarbonisation Scheme.

Solution

A ground source heat pump system was installed in the new Discovery Centre to enhance energy efficiency. Additionally, the building was retrofitted with improved insulation and advanced building management systems. All low-carbon technologies were carefully integrated to ensure that the school's historic setting remained unaffected.

Outcomes

These measures significantly reduced the school's reliance on fossil fuels and supported its goal to achieve net zero emissions by 2028. The upgrades also enhanced indoor comfort and provided long-term cost savings through more efficient systems.

Lessons Learned

The school initiated its decarbonisation efforts in 2020 with Phase 1 funding, implementing measures such as solar panels, LED lighting, and roof insulation. Phase 2 funding enabled the installation of air source heat pumps and energy-efficient radiators. Showing the effectiveness of a phased approach when decarbonsing a heritage building as it allows time planning permission etc.. to be acquired. Additionally, the establishment of the 'Green Touch' student group in 2020 highlights the importance of involving the school community in sustainability initiatives to create buy-in of the project and showcase real life examples of how it can be done.

Read the full case study here Royal Latin School | Salix Finance

Swanton Morley Primary School Decarbonisation, Norfolk

Swanton Morley Primary School, a Grade II-listed building constructed in 1917, is part of Norfolk County Council's initiative to decarbonise its school estate. With an initial Display Energy Certificate (DEC) rating of G, the school was identified as a priority for energy efficiency improvements. The project aligns with the council's goal to achieve net-zero carbon emissions across its estates by 2030.

Solution

Key interventions included the restoration of inefficient building fabric to improve insulation and reduce heat loss, as well as the installation of solar photovoltaic (PV) panels to generate renewable electricity on-site. Inefficient lighting was replaced with energy-efficient alternatives, and the fossil-fuel heating system transitioned to a combination of ground and air source heat pumps, significantly lowering carbon emissions and improving overall energy efficiency.

The total project cost exceeded £1.4 million, with 62% (£884,000) funded through the Public Sector Decarbonisation Scheme (PSDS) administered by Salix. *This number includes the 4 other schools that were also part of the application.*

Outcomes

The decarbonisation measures are projected to achieve a 79.3% reduction in carbon emissions for Swanton Morley Primary School, equating to approximately 119.52 tonnes of CO_2e savings. Beyond environmental benefits, the upgrades are expected to enhance the building's functionality, comfort, and longevity, while also reducing operational energy costs as the national grid becomes greener.

Lessons Learnt

A phased approach, using a structured, multi-stage process, proved essential for thorough planning and successful implementation. Leveraging available funding, particularly grants like the Public Sector Decarbonisation Scheme (PSDS) was also crucial in making large-scale energy projects financially viable. These efforts demonstrate how strategic investments in energy efficiency can drive progress toward broader sustainability goals while delivering significant operational savings over time.

Read the full case study here https://norseconsulting.co.uk/wp-content/uploads/2022/11/norse-consulting-case-study-Decarbonisation-of-Norfolk-schools.pdf

For more case studies please refer to Case Studies of Carbon in the Built Historic Environment | Historic England and Heritage Sector Net Zero Report - Public from Historic Environment Forum.

Appendix D: Further Case Studies List

Building/ Site	Public Sector Body	Key Decarbonisation Actions	More Information/ Website Link
Kenwood House (London)	English Heritage	Using battery-powered sensors that map the building's normal environmental conditions, stream live data to existing systems, and use AI to detect leaks, breakdowns or performance issues early helping reduce maintenance and energy costs by around 25% while protecting the historic fabric and collections	https://live.historicengland.org.uk/research/heritage-counts/2019-carbon-in-built-environment/case-studies/kenwood-house/
London Transport Museum	Transport for London (TfL)	Energy audits, LED lighting upgrades, better controls. Conducted cost assessments to replace its gas boilers with heat pumps, a move toward electrification. However, a new opportunity to connect to a heat network has emerged. Updates are expected later in 2025.	https://juliesbicycle.com/resource/london-transport-museum/
The Ice House (Out There Arts)	Great Yarmouth Norfolk. Supported by Arts Council England & Great Yarmouth Borough Council	Grade II-listed building originally used to house freshly caught sea food which has now been turned into a National Center for Outdoor arts and Circus with insulation and efficient lighting upgrades.	https://ahfund.org.uk/news/latest/step-right-up-great-yarmouth-ice-house-opens-following-major-transformation/
Norwich City Hall	Norwich City Council	Installed an air source heat pump (ASHP) at City Hall, which will provide a source of renewable heat to the city council building.	https://www.norwich.gov.uk/news/article/539/installation_of_eco-friendly_heating_sys

		The move will enable the council to save over 100 tonnes of CO2 emissions per year, which is the equivalent of planting approximately 5000 trees.	tem continues at city hall

Appendix E: Further Reading Resource List

Resource	Type	Published By	What information/ learning does it provide you with?
'Retrofit Toolkit' to protect heritage buildings: https://news.cityoflondon.gov.uk/city-of-london-corporation-launches-retrofit-toolkit-to-protect-heritage-buildings/	Toolkit	City of London Corporation in 2025	A toolkit designed to help professionals retrofit historic buildings while preserving their architectural heritage.
Energy Efficiency and Retrofit in Historic Buildings | Historic England	Article	Historic England in July 2024	A comprehensive guide on improving the energy performance of historic buildings while maintaining their character and structural integrity.
Adapting Historic Buildings for Energy and Carbon Efficiency: https://historicengland.org.uk/images-books/publications/adapting-historic-buildings-energy-carbon-efficiency-advice-note-18/	Advice Notes	Historic England in July 2024	Strategies and case studies on how historic buildings can be adapted to meet modern energy and carbon efficiency targets.

Heritage Consents | Historic England	Website	Historic England in 2025	The Historic England Consents page provides a concise overview of the types of permissions required for changes to historic buildings, and conservation areas.
The use of Air Source Heat Pumps in Non – Domestic Historic Buildings https://historicengland.org.uk/education/training-skills/training/webinars/recordings/air-source-heat-pumps-in-non-domestic-historic-buildings/	Webinar	Historic England in September 2023	Provides insight on implementing air source heat pumps in historic public buildings, covering feasibility, case studies, regulatory considerations, cost efficiency, and best practice to support decarbonisation efforts.
Webinar Recordings | Historic England	Webinars	Historic England – last updated 2 July 2025	The technical Tuesdays webinar series offers free, in depth focused on technical conservation for historic buildings.
Climate Change and Net Zero Key Resources https://historicenvironmentforum.org.uk/hef-activities/climate-change-and-net-zero-resources/	Resource Hub	Historic Environment Forum in 2024	A collection of resources focused on achieving net-zero targets while preserving historic environments.

Heritage responds - Taking positive action on climate change: https://historicenvironmentforum.org.uk/wp-content/uploads/2021/10/HEF-Climate-Change-doc-final.pdf	PDF Report	Historic Environment Forum – No Date	A comprehensive document outlining the impact of climate change on historic buildings and strategies for adaptation.
HEF Net Zero Resource List - March 2023	Excel Spreadsheet	Historic Environment Forum	A compiled list of resources focused on achieving net-zero goals in the historic building sector.
The Institute of Historic Building Conservation](https://www.ihbc.org.uk) IHBC Toolbox (2021)	Website	The Institute of Historic Building	A professional organization providing guidance, training, and resources on historic building conservation and retrofit projects.
Renewables - Online Faculty System	Interactive Map to see case studies	The Church of England	This Church of England Faculty Online resource provides users with real-life case studies of approved renewable energy installations. It allows you to see how similar heritage buildings have navigated permissions and implemented ASHP systems. Gain insight into the challenges, solutions, and outcomes of renewable installations in churches and other historic sites.

ArcGIS Climate Risk and Resilience Experience	Interactive Map	National Trust	An interactive mapping tool that provides data on climate risks affecting heritage buildings which helps inform strategies for resilience planning.
Planning (Listed Buildings and Conservation Areas) Act 1990	Website	Legislation. Gov updated in May 2025	The Planning (Listed Buildings and Conservation Areas) Act 1990 sets out the legal framework for protecting listed buildings and conservation areas in England and Wales. It outlines: The need for listed building consent before making alterations. Powers and responsibilities of local authorities and penalties for unauthorised works.
Retrofit for heritage buildings: Lessons learned from local authority innovations	PDF paper	Regen created for Innovate UK Net Zero Living Programme in 2025	The paper summarises the opportunities and challenges for retrofitting older properties and sets out practical solutions to accelerate progress. It identifies three ways that councils can work proactively to increase support for sensitive retrofit through their planning functions, along with case studies of how local authorities have been

			putting this into practice.
Heritage retrofit examples with Edward Hart Consultancy: https://www.youtube.com/watch?v=fSjbQ1NakgI	Video	RISE Masterclass in 2024	Case studies and insights on best practices for retrofitting heritage buildings while maintaining their historical integrity.
The Challenge of Retrofitting Historic Buildings: https://www.youtube.com/watch?v=IAsfyLlGKpI	Video	RISE Masterclass in 2024	A discussion on the challenges of updating historic buildings with modern energy-efficient solutions while complying with conservation regulations.
Planning constraints (including heritage) https://riseretrofit.org.uk/knowledge-hub/preparing-a-retrofit-project/identifying-planning-constraints	Guide	RISE Retrofit in 2024	Guidance on navigating the legal and regulatory challenges of retrofitting historic properties, including planning permissions and conservation requirements.
Future of Heating in Historic Buildings Conference presentations from the Fit for the Future Network https://www.sustainabilitywestmidlands.org.uk/news/future-of-heating-in-historic-buildings-conference-presentations-from-the-fit-for-the-future-network/	Conference Presentations	Sustainability West Midlands in September 2022	Presentations and insights from industry experts on innovative heating solutions for historic structures.