

**Step 5**

***Generating clean energy in heritage buildings***

## 1. Generating clean energy in heritage buildings

Climate change and carbon reductions are absolute priorities for Oxford City Council. Oxford has a target of reducing emissions in the city by 40% by 2020 and 80% by 2040, and within that the City Council has elected to adopt a target of 5% year on year reduction in emissions from its own estate. A significant step towards reducing carbon and other greenhouse gases produced by using fossil fuels for heating and power is to generate energy locally by adopting clean low to zero carbon technologies: from solar to wind, from hydro to biomass, the choice nowadays is vast.

However, given the sensitivity of the historical context of the City, special consideration needs to be given to how the use of these technologies can impact on Oxford's heritage. Some of them may alter negatively the appearance of existing buildings, or the view of these buildings from higher points around the City, others may affect the building fabric (for instance, holes may need to be drilled to install new flues). As seen in previous sections of this guide, it is therefore important, before implementing any change and installing any technology, to understand your building well and to assess carefully the impact the technology may have on what makes the building and its surroundings special. Good design and creative solutions may help reducing the impact of clean technologies in historic contexts, but in certain cases, the sensitivity of the building and its surrounding may be such that some technologies are not be suitable.

Another element to consider is that planning permission and/or listed building consent may be needed for some of these technologies, so if in doubt it is always best to ask the Planning Department or a conservation specialist.

The first step towards producing your own energy will be to make sure (as explained in the flow chart right at the beginning of this guide) that the building is performing at its best and heat losses are reduced through repairs and draught-proofing while ensuring that the building 'breathes' and ventilation paths are not obstructed; energy demand from the building will be as low as possible, risk of condensation will be reduced, and it will; be possible to install energy generating technologies of smaller capacity, that will work as efficiently as possible. Another important consideration would be to assess whether in the building there is more of a need to generate electricity, heating or both, because this will determine the type and size of technology needed.

Finally, take into consideration joining efforts with neighbours as energy generation is more efficient at a district level with bigger installations than at an individual building level.

The table below provides an indication of the suitability of the most common renewable energy sources with concerns to heritage impact, energy efficiency, initial costs and time to pay back (please refer to the legend in Step 4).

Building element	Retrofit Option	Heritage Impact	Energy Efficiency	Initial Cost	Time to Pay Back	Permission required	Things to consider
Energy generation: heat	Air Source Heat Pump (ASHP) + underfloor heating (where possible)	<b>K</b>	<b>J</b>	<b>L</b> ££££ / £££££	<b>K</b> Medium	Listed Building Consent, Planning Permission	<ul style="list-style-type: none"> <li>• An ASHP extracts heat from the outside air in the same way that a fridge extracts heat from its inside. It can get heat from the air even when the outside temperature is as low as -15°C. Heat pumps have some impact on the environment as they need electricity to run, but the heat they extract from the air is constantly being renewed naturally.</li> <li>• Need little maintenance – these technologies are called ‘fit and forget’</li> <li>• Does not need fuel deliveries</li> <li>• Eligible under Government’s incentive schemes and could provide you with an income through the Government’s Renewable Heat Incentive (RHI)</li> <li>• ASHP are often less efficient than GSHP</li> </ul>
Energy generation: heat	Ground Source Heat Pump (GSHP)	<b>K</b>	<b>J</b>	<b>L</b> ££££ / £££££	<b>L</b> Long	Listed Building Consent	<ul style="list-style-type: none"> <li>• GSHP use pipes which are buried in the garden to extract heat from the ground. This heat can then be used to heat radiators, underfloor or warm air heating systems and hot water in your building.</li> <li>• Needs trench and drilling in the ground – may need archaeological inspection first</li> <li>• Does not need fuel deliveries</li> <li>• Can provide space and hot water heating</li> <li>• Needs little maintenance – these technologies are called ‘fit and forget’</li> <li>• Eligible under Government’s incentive schemes and could provide you with an income through the Government’s Renewable Heat Incentive (RHI)</li> <li>• ASHP are often less efficient than GSHP</li> </ul>

Building element	Retrofit Option	Heritage Impact	Energy Efficiency	Initial Cost	Time to Pay Back	Permission required	Things to consider
Energy Generation: Heat	Solar Water Heating Panels	L	J	L ££££	K Medium	Listed building consent, Planning permission	<ul style="list-style-type: none"> <li>Survey needs to be carried out to ensure the roof can bear the weight of the solar panel.</li> <li>Eligible under Government's incentive schemes and could provide you with an income through the Government's Renewable Heat Incentive (RHI).</li> </ul>
Energy Generation: Electricity	Photovoltaic (PV) Panels	L	J	L ££££ / £££££	K Medium	Listed building consent, Planning permission	<ul style="list-style-type: none"> <li>Survey needs to be carried out to ensure the roof can bear the weight of the PV panel.</li> <li>Eligible under Government's incentive schemes and could provide you with an income through the Government's Feed In Tariff Scheme (FIT)</li> </ul>
Energy generation: electricity	Hydro-electricity	L	J	L £££££	K Medium	Listed building consent, Planning permission	<ul style="list-style-type: none"> <li>Use running water to generate electricity, whether it's a small stream or a larger river. Small or micro hydroelectricity systems can produce enough electricity for lighting and electrical appliances in an average home.</li> <li>If eligible, could provide you with an income through the Government's Feed In Tariff (FIT) scheme</li> <li>Good option if your building is off the National Grid and close to a water stream</li> <li>It may more cost effective to have a system that powers a number of buildings rather than just one</li> </ul>
Energy generation: electricity	Wind Turbine	L	K	K £££ / ££££	L Long	Listed building consent, Planning permission	<ul style="list-style-type: none"> <li>Good option in exposed sites, rather than urban sites.</li> <li>Eligible under Government's incentive schemes and could provide you with an income through the Government's Feed In Tariffs (FIT).</li> <li>Bigger installations (on a pole, rather than building mounted) for larger developments of</li> </ul>

Building element	Retrofit Option	Heritage Impact	Energy Efficiency	Initial Cost	Time to Pay Back	Permission required	Things to consider
Energy generation: electricity and heat	Micro-Combined Heat and Power (CHP)	J	J	L ££££	L Long		<p>more than one building tend to be producing more energy per kW.</p> <ul style="list-style-type: none"> <li>• This technology generates heat and electricity simultaneously, from the same energy source, in individual homes or buildings. The main output of a micro-CHP system is heat, with some electricity generation, at a typical ratio of about 6:1 for domestic appliances (<i>source: Energy Saving Trust</i>)</li> <li>• Bigger installations for larger developments of more than one building tend to be producing more energy per kW.</li> <li>• Eligible under Government's incentive schemes and could provide you with an income through the Government's Renewable Heat Incentive (RHI)</li> </ul>

## Find out more:

- **English Heritage – Generating Energy in Older Buildings:**  
<http://www.english-heritage.org.uk/your-property/saving-energy/generating-energy/>
- **English Heritage – Microgeneration in the Historic Environment:**  
<http://www.english-heritage.org.uk/publications/microgeneration-in-the-historic-environment/>
- **Energy Saving Trust:**

- [www.energysavingtrust.org.uk/](http://www.energysavingtrust.org.uk/)
- **City of Westminster – Retrofitting historic buildings:**  
<http://www.westminster.gov.uk/services/environment/greencity/retrofitting-historic-buildings/>
- **IHBC Guide: A Stitch in Time:**  
<http://www.ihbc.org.uk/publications/stitch/stitch.html>