8 Conclusions and recommendations

8.1 This pilot study breaks new ground in that it has focused specifically on retrofitting a sample historic core area in central London. Such mixed-use core areas typify the historic centres of many big cities and towns. We have shown how Soho, an exemplar, suffers from particular deficiencies in environmental sustainability including, in particular, a disproportionately high carbon footprint. There is thus is real urgency in finding solutions.

8.2 The visible performance, or non-performance, of sustainability plays a crucial role in informing public attitudes over environmental issues. The West End, whilst a leader in all areas of the creative industries and centre of business and government, has yet to demonstrate a decisive stand on issues of sustainability.

8.3 An exemplar demonstrating how greater sustainability can be achieved and put into practice in the West End would, by the visibility of the location, quickly disseminate such best practice widely. The high profile of Soho as a cultural and knowledge economy district is a key strength that could be drawn upon. A 'Sustainable Soho' project could build on public perception of Soho as a place of innovation.

8.4 A considerable amount could be done to improve the sustainability of Soho and Chinatown, and other similar areas, including reducing local carbon emissions and improving resource use efficiency more generally.

8.5 Although there are challenges in refurbishing and retrofitting buildings to be more environmentally sustainable in a conservation area such as Soho, the constraints of preserving historic built heritage are not as great as might be supposed. At the same time, the preservation of the cultural and economic value associated with this heritage is key to the overall sustainability of the area. At the same time, the preservation of the cultural and economic value associated with this heritage is key to the overall sustainability of the area.

8.6 Around 38% of the buildings in the area are not regarded as of historic merit. Of the rest, just under half are listed. The area of historic buildings that is visible from the public realm represents a small proportion of the total building fabric that could be improved.

8.7 Changing the way that people use buildings can have a major impact. Much of the energy use in buildings comes from the use of plant, equipment, fittings and appliances that could be upgraded over time to become more energy or water efficient.

8.8 The major barriers to implementing sustainability measures are not technical or regulatory, rather they relate to issues of tenure, awareness and behaviour.

8.9 The report has set out basic principles and a framework for understanding how, where and why particular solutions would be applied and who would initiate and apply them. Success is only likely to be achieved if the following recommendations are taken forward by a productive partnership between the private and public sectors.

PRINCIPAL RECOMMENDATIONS

A step by step approach to retrofitting buildings

8.10 The technical solutions outlined in this section are all well known and, for the most part, tried and tested. Rather, it is the particular context in which they are applied and how they are combined that has required elaboration. Our initial assessment of building retrofit measures is shown in table 8.1. These measures can be applied in a step-by-step approach at various levels.

Table 8.1: Building retrofitting assessment *(Source: Max Lock Centre)*

	Area of impact	Capital cost	Cost effectiveness
1: Quick hits			
Loft insulation	Heating	Low	Very high
Draught proofing	Heating	Low	High
Cavity wall insulation	Heating	Low	Very high
Light painted walls	Lighting	Low	Medium
Reflective surfacing to flat roofs	Cooling	Low	Medium
2: Easy life cycle wins			
Environmental control systems	Lighting/heating/cooling/ water management	Low/medium*	High*
Energy-efficiency lighting; display lighting	Lighting	Low/medium*	High*
Boiler replacement/upgrading to	Heating	Low/medium*	High*
condensing boiler			
Energy-efficiency appliances/fittings/	Appliances/fittings	Low/medium*	High*
office equipment			
Micro CHP.	Heating/power supply	Medium/high*	Currently low*
3: Refurbishment gains			
Building layout/configuration**	Lighting/heating/ cooling/ ventilation	Medium/high	High
Secondary glazing	Heating/cooling/ ventilation/noise	Low	Medium/high for noise
Window replacement/double glazing	Heating/cooling/ ventilation/ noise	Medium	Low
Floor insulation	Heating	Medium	Medium
External wall insulation	Heating	Medium/high	High
Internal wall insulation	Heating	Medium	High
Flat roof insulation	Heating	Medium	High
Energy-efficiency a/c/cooling plant/ ventilation systems	Cooling/ventilation	Low/medium*	High*
Water efficient sanitary fittings, taps etc.	Water management	Low/medium*	High*
Grey water recyling	Water management	Medium/high	Low
4. External retrofits			
Solar voltaic cells	Power supply	High	Low
Wind generators	Power supply	Medium	Negligible
Solar water heaters	Water heating	Medium	Medium
Green roofs	Cooling/water management/biodiversity	Medium	Medium
Green walls	Cooling/biodiversity	Low	Medium (high for biodiversity)
Rainwater recycling	Water management	Medium	Low
External shading	Cooling	Low/medium	High for cooling
Ground source heating/cooling	Heating/cooling	Medium/high	High*
5. Shared solutions			
Shared central heating	Heating	Low/medium*	High*
Small scale CHP (individual building or group of buildings)	Heating/power supply	Medium*	High*
Community Heating/Cooling/ CHP systems	Heating/cooling/ power supply	Very high	High

** Additional to low specification replacement*

*** Limited to replacement building and reconfiguration*

Environmental impact		Ease of implementation	Time scale years	Planning constraints
Building	Area wide			
High	Low/medium	High	Immediate	No
Low/medium	Low	High	Immediate	No
High	Very low	High	Immediate	No
Low	Low	High	Immediate	No
Low/medium	Low/medium	High	Immediate	
Medium	Medium	High	From now on	No
Medium/High	Medium	High	From now on	No
Medium	Medium	High	From now on	No (except flues)
Medium/High	Medium	High	From now on	No
Potentially high	Potentially high	Relatively large space demand	In a few years	No (except flues)
High	High	Depends on current layout	From now on	Possible
Low/high for noise	Low	High	From now on	No except listed bldgs
Medium	Low	High	From now on	Yes
Medium	Medium	High	From now on	Yes
High	Low	Depends on location	From now on	Yes
High	Medium	Medium/high	From now on	No except listed bldgs
High	Medium	Depends on location	From now on	No except listed bldgs
Medium	Medium	High	From now on	Possible
High	High	High	From now on	No
Medium	Low	Space issues	From now on	No
Medium–increasing	Medium	High	Increasingly viable in future	Yes
Negligible	Negligible	Medium	Not likely to be viable	Yes
Medium	Medium	High	From now on	Yes
Medium	Medium	High	From now on	Possible
Low/medium	Low	Depends on location	From now on	Possible
Medium	Low	Storage space issues	From now on	No
High for cooling	Low	Depends on location	From now on	Yes
Medium	Low	Depends on location	From now on	No
Medium/high	Medium	Management/space issues	From now on	No (except flues)
High	High	Management/space issues	From now on	No (except flues)
Very high	Very high	Management/space issues	In a few years	Possible issues with plant

8.11 At the **first** level simple measures to improve the thermal performance of existing buildings will provide 'quick wins' that owners can employ to reduce their energy costs and the carbon footprints of their properties. These are low-cost, non-disruptive measures such as draught-proofing, secondary double glazing, loft insulation and replacing non energy-efficient lamps that can be applied in the short-term.

8.12 A **second** level of measures are those 'easy life cycle hits' that may be applied even in listed buildings without raising conservation concerns but which may require a larger initial outlay. These may not be cost effective unless forming part of the natural replacement or building cycle refurbishment process. They include replacement and upgrading of boilers, appliances, fittings, controls and internal services systems.

8.13 A **third** level of measures, necessary if owners are going to go as far as they can to meet the standards of the Building Regulations, part L, include the insulation of the building envelope (walls, roofs and floors) and upgrading of windows. This certainly requires more attention to conservation concerns. However, outside of listed buildings, there are many contexts in Soho where retrofitting can be applied to enhance the sustainability of buildings without undermining the visual quality and historical character of the streets of Soho and Chinatown.

8.14 A **fourth** level involves more innovative retrofitting measures to the outsides of buildings, particularly at roof level. This includes the installation of solar thermal and photovoltaic panels, green roofs, rainwater harvesting and light tubes, roof-lights and atria to introduce natural lighting and ventilation to the interior of deep plan buildings. As a result of the historical development of Soho, the area is very densely built-up and the area of roof behind the street facades and mostly hidden from street view is extensive. Much of this roofscape is flat and potentially adaptable to these measures. For some historic buildings and parts of others, this approach may not be appropriate.

8.15 At the **fifth** level, we are looking beyond the single property or building to shared or communal solutions. Synergies can be achieved through tenants in the same building or adjoining property owners working together, for example, in sharing a heating or air conditioning system. Groups of property owners in a single street or street block might club together to install a shared Combined Heat and Power (CHP) or Combined Cooling Heat and Power (CCHP) system, or ground source heat pump, or carry out a linked refurbishment scheme.

An Integrated Approach

8.16 Although rising energy prices will reduce the payback period on cost-intensive measures, it will remain considerable in the case of some alternative technologies such as photovoltaic cells. Moreover, it is important that, while it is possible to carry out lower level measures on an ad hoc basis, it becomes more important for reasons of cost effectiveness to ensure that works at a higher level, or works carried out in combination or cumulatively, are planned in an integrated fashion.

8.17 The balance between improving a building's thermal insulation and reducing leakage, making better use of natural ventilation and cooling, making best use or improving thermal mass, employing solar gain to reduce heating loads or reducing it to reduce cooling loads all need to be taken into account. Appropriate forms of control should be incorporated combining automation with the capacity for individuals to control their own environments according to varying needs and comfort conditions.

8.18 Some of these measures may have implications for the internal layout of a building and the way it is used. Internal zoning is advisable. The aim should be to make as effective use of natural measures through the building itself to reduce the use of energy in artificial heating, lighting, ventilation or cooling.

8.19 With historical buildings, it is important to heed the view of conservationists in trying to understand how the building works and working with its intrinsic characteristics rather than against them.

8.20 The type of use and intensity of occupancy is critical. It is important that appropriate professional expertise is required to ensure that an optimal and integrated response is achieved to current and anticipated conditions over the lifetime of any investment. A lifecycle and whole life costing approach should be employed.

Combined Cooling, Heat and Power

8.21 Having explored the alternatives to reduce emissions we propose that, in the medium term, a community C/CCHP scheme could provide heating, cooling and electricity to a substantial part of the study area. Soho lacks major public buildings or a large housing estate that would normally serve as the focus of such a system. However, a series of planned and potential large developments could serve as sites for a series of CHP installations linked together to provide a networked hub for a local community distribution system.

8.22 Each installation on its own could be justified in terms of the size of development, and mix of uses, that it immediately serves. However, linked together and serving properties in the surrounding neighbourhood, synergies and economies of scale could be achieved allowing the system as a whole to operate at greater efficiency.

8.23 The scale of capital investment involved is large, but could be stepped. There would be major costs and substantial disruption associated with the installation of new heating and cooling mains in the surrounding streets but, again, the network could be gradually enlarged. There are potential and substantial long term gains in terms of energy and carbon savings, security of power supply and associated cost benefits (particularly if feed-tariff benefits are improved). We recommend that a feasibility study for a community C/CCHP scheme is carried out as the basis for the medium term implementation of such a scheme.

Cooperative, partnership and communal solutions

8.24 Communal solutions could be employed in adjacent or clusters of properties under single ownership. In practice, however, as far as building systems are concerned to date things have worked in the opposite direction. For example, landlords prefer installing boilers in individual units, rather than one serving a whole building, as this puts the onus on tenants to manage their own heating costs directly with utility companies. This has often suited the tenants better, as well, but rising energy costs may increase their unterest in energy efficient systems.

8.25 We recognise that multiple ownership and occupational leases present major challenges to such a co-operative approach, not only in organising the works, but also in managing the solution and in distributing the costs and benefits equitably.

8.26 However, with the spread of more sophisticated (‘smart’) metering systems, and at a critical mass, it may become cost effective to set-up a common services company or engage an outside utility agency to manage the system. Such an approach could pay large dividends in both financial and environmental terms. We feel strongly that this is worth further exploration if a ‘step-change’ in sustainability is to be achieved.

8.27 This approach could form part of a larger initiative on the part of landlords to introduce green leases that can help overcome these ‘split incentives’ and ensure that tenants play their part in realising the

energy efficiencies associated with retrofitting measures. We recommend that the London Better Building Partnership, which is exploring this issue, and/or the RICS are involved in further discussion and research as to how green leases can be best employed in Soho.

The private sector

8.28 The main task of improving the sustainability of Soho lies in the hands of the private sector, particularly the private landlords who own most of the property. While some larger property owners have developed corporate social responsibility strategies that have required them to address sustainability issues in the management of their buildings, it is much less likely that smaller owners and tenants will have the incentive to do so or be aware of how to go about it.

8.29 The commercial tenants and occupants of Soho's buildings also have a major role to play and have influence over, or are directly responsible for, a substantial proportion of carbon emissions from buildings.[1] Clearly, in undertaking retrofitting measures, it is the owners' responsibility to ensure that tenants are aware of their responsibilities in using the building properly so that energy and resource efficiencies can be effectively realised.

8.30 A persistent theme in this study has been the lack of communal and public space in this highly developed area. Those with large property holdings and/or undertaking major developments have the opportunity, not open to smaller owners, of finding space that could be used to serve collective interests, like places for additional badly-needed micro-recycling facilities. They should form the basis of section 106 agreements between developers and the City Council.

8.31 However, most tenants will also be responsible for making their own installations in retail premises, offices, restaurants, and places of entertainment which will be highly energy intensive. There will be particular patterns of waste and water consumption and management. For those who want to take action there is great difficult in accessing information or appropriate advice, skills and expertise in applying retrofitting solutions.

8.32 We recommend that the feasibility of setting up a web portal as a 'one-stop' shop for providing information and advice on retrofitting sustainability in such mixed use areas.

8.33 We think that part of the huge reservoir of creative talent concentrated in Soho should be tapped and mobilised to change hearts and minds and communicate the effective strategies and practical techniques for change. Businesses and residents should be encouraged to come up with their own ideas and the skills of Soho's advertising industry brought to bear.

The role of Westminster City Council

8.34 There is a negative perception that little or no retrofitting is allowed in the conservation area. Seminars on retrofitting, better guidelines and promotion of models of good practice can help overcome this type of communication problem.

8.35 We recommend that the gap between the City's Council policy on sustainable buildings, conservation, the broader action plans and supplementary guidance, be bridged with new sustainable urban design guidance on retrofitting for mixed-use, mixed-age conservation areas like Soho.

1. 45% of UK's energy use depends on consumer behaviour according to Simon Retallack Senior Research Fellow on Low Carbon Policy at the Institute of Public Policy Research in discussion in 'Week in Westminster'. BBC Radio 4. 15 March 2008

8.36 In Chapter 5 we outlined how an urban design approach, building a classification of the different building, street and street block typologies and associated typical building sections can provide a framework for more detailed and targeted guidance on sustainable refurbishment. Such an approach could ensure that significant measures to improve the sustainability of buildings could take place whilst maintaining, and enhancing, the historic character of the area.

8.37 Both building period and use would form an essential part of this classification. It would enable building owners and planning officers to establish, at an early date in drawing up development proposals, the opportunities for and constraints upon retrofitting and sustainable refurbishment in particular locations.

8.38 In order to facilitate the development of this guidance, we recommend that the proposed environmental audit of Soho should include visual, photographic, aerial thermo imaging and high level photographic surveys of the built form so the appropriate location for retrofitting measures affecting the external envelopes of buildings can be mapped and used to create practicable criteria for appropriate solutions.

8.39 We further recommend that sample surveys and energy audits are carried out to determine the construction, condition, pattern of use and baseline environmental performance of established building types. This will facilitate the development of model or typical packages of retrofitting measures, taking an integrated and holistic approach by building on the innate characteristics of the buildings concerned.

8.40 This is a field that could fit in with English Heritage developing its broader guidance for sustainable refurbishment. BRE should also be encouraged to develop their existing BREEAM methodology to target the range of building types found in Soho and similar mixed-use, predominantly commercial areas.

8.41 While the Flagship Home, Kensington and Chelsea's demonstration retrofit with Westminster City Council (and the recently opened Camden Eco House[2]), has shown how sustainable refurbishment may be carried out on a historic residential property in multiple occupancy in a conservation area and with significant improvements in thermal performance. A similar demonstration project in Soho with a mixed commercial use building would indicate how similar benefits could be achieved for commercial occupiers. We recommend that Westminster City Council takes the lead in identifying a suitable building and helping to identify sources of finance.

8.42 New sustainable urban design guidance ought to address two other issues that are key for the future cultural, social and environmental substantiality of the area – the public realm and new developments.

8.43 At present, Westminster's broader planning policies and supplementary local plans like the Soho Action Plan contain a range of proposals relating to waste management, traffic management, pedestrian and cycle movements, legibility and signage, noise and green space and bio-diversity. They are treated as independent measures led by different departments in the Council.

8.44 Retrofitting environmental sustainability to Soho demands an integrated public realm strategy that addresses all these issues as aspects of a single management strategy. A public realm plan is needed that addresses the needs of local residents and businesses in a coherent manner.

2. 17 St Augustine's Road (Camden Council-owned Victorian property) (Camden Council).

8.45 Finally, there will always be a relatively high turnover of buildings in Soho. We believe that some new buildings can enhance the character of the conservation area whilst providing an opportunity for achieving the highest standards of thermal and resource efficiency.

8.46 While any new buildings will need to meet the increasing demands of the Building Regulations, we recommend that Westminster City Council require that any new development is exemplary in its design for sustainability and that new interventions address the larger strategic sustainability issues for the area.

8.47 No equivalent to the Code for Sustainable Homes has yet been produced for non-residential or for existing buildings. However, using a typological approach, such a framework could be devised for both new non-residential and existing buildings. This could set standards for exemplary retrofit measures, including benchmark levels of energy and carbon performance.

A new retrofitting partnership

8.48 Major national and local players represented on the Steering Committee of this study – Westminster City Council, English Heritage, the Soho Community Environment Fund, The Crown Estate and Shaftesbury PLC could form the nucleus of formally created Working Committee involving wider stakeholder interests under the umbrella of the Westminster Carbon Reduction Alliance, the new city-wide initiative to work with businesses and the community to reduce emissions of greenhouse gases.

8.49 Those who could be invited to join it include the Heart of London Business Alliance, Soho Housing Association, Soho Estates, the Berwick Street regeneration group, Chinatown community and business interests, Cross London Rail Links and retailers and property companies with an interest in development sites along east Oxford Street.

8.50 Clearly, those joining this initiative would have to be committed to the implementation of practical projects. Such a group, however, could collectively disseminate the innovative corporate environmental practices – both the ‘software’ and ‘hardware’ – that some of them, on an individual basis, have initiated.

Priority Recommendations

1. Establish a mechanism to clarify and promote green leases, smart meters, and landlords' energy allowances in commercial core areas; and to make the best use of Energy Performance Certificates and other measures to overcome the issues of split incentives and the 'vicious circle of blame' in areas achieving more sustainable buildings.[3]
2. Commission a feasibility study into community-wide individual and networked heat and power solutions for Soho and Chinatown as a test bed for such solutions for similar commercial and mixed-use core areas.
3. Establish new sustainable urban design guidance for mixed-use, mixed-age historic areas like Soho and Chinatown beginning with an audit of building typology in the study area.
4. Carry out a study to identify the potential for small and larger scale, local solutions (through commercial enterprise, public-private partnership and/or developers contributions) to enhance the efficiency of recycling of local waste such as anaerobic digestion of food waste and large-scale waste separation.
5. Implement a demonstration flagship commercial, mixed-use building retrofit – this could also include model landlord-tenant agreements linked to smart metering.

Further recommendations:

6. Carry out sample building surveys and energy audits to establish baseline performance of different building types identified in **3** above.
7. Carry out a sample owner/occupant survey to identify current good practice, in sustainable refurbishment, fit out and resource management.
8. Carry out visual, photographic and thermo imaging surveys, including aerial or high level photographic surveys of the built forms of Soho and Chinatown for mapping the building envelopes for applying substantiality solutions, particularly at roof level.
9. Promote a programme of awareness raising on measures to improve energy and resource use efficiency through focused publicity programmes, workshops and seminars for business, including smaller landlords and occupants.
10. Promote and publicise retrofit and new infill development as sustainability beacons. As an extension of **3** above, set up guidelines and performance benchmarks for sustainable, contemporary building design making a positive contribution to the morphology, townscape and essential character of the area.
11. Explore the potential for a more co-ordinated and integrated public realm strategy. This should address linked issues such as traffic management, facilitating electric vehicles, delivery of supplies, waste collection, pedestrian routes, linkages and area legibility, street lighting, furniture and signage, and noise and pollution, which constrain the natural ventilation and cooling of buildings.
12. Explore and develop sustainability appraisal methodologies more tailored to the needs of retrofitting mixed-use commercial building in historic core areas.

3. RICS. 2008.